**BIOLOGY PhD PROGRAMME**

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| **First Year** | | | | | | |
| **I. Semester** | | | | | | |
| Code | Course Title | ECTS | T+P | Credit | C/E | Language |
| 501011101 | [THE SCIENTIFIC RESEARCH METHODS AND ITS ETHICS](#C100) | 7.5 | 3+0 | 3 | **C** | Turkish |
| 501111625 | [PRINCIPLES OF ARTICLE WRITING AND PUBLISHING](#C3) | 7.5 | 3+0 | 3 | **C** | Turkish |
|  | Elective Course-1 | 7.5 | 3+0 | 3 | E | Turkish |
|  | Elective Course-2 | 7.5 | 3+0 | 3 | E | Turkish |
|  | Total of I. Semester | 30 |  | 12 |  |  |
| **II. Semester** | | | | | | |
| Code | Course Title | ECTS | T+P | Credit | C/E | Language |
| 501112630 | [RESEARCH DESIGN, FUNDING AND INTELLECTUAL PROPERTY RIGHTS](#C2) | 7.5 | 3+0 | 3 | **C** | Turkish |
|  | Elective Course-3 | 7.5 | 3+0 | 3 | E | Turkish |
|  | Elective Course-4 | 7.5 | 3+0 | 3 | E | Turkish |
| 501112001 | PhD Seminar | 7.5 | 0+1 | - | **C** | Turkish |
|  | Total of II. Semester | 30 |  | 9 |  |  |
|  | TOTAL OF FIRST YEAR | 60 |  | 21 |  |  |

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| **Second Year** | | | | | | | | | | | | | | |
| **III. Semester** | | | | | | | | | | | | | | |
| Code | | Course Title | | | ECTS | | T+P | | Credit | | C/E | | Language | |
| 501111801 | | PhD PROFICIENCY | | | 30 | | 0+1 | | **-** | | **C** | | Turkish | |
|  | | Total of III. Semester | | | 30 | |  | |  | |  | |  | |
| **IV. Semester** | | | | | | | | | | | | | | |
| Code | | Course Title | | | ECTS | | T+P | | Credit | | C/E | | Language | |
| 501011102 | | THESIS PROPOSAL | 30 | | 0+1 | | **-** | | **C** | | Turkish | |
|  | | Total of IV. Semester | | | 30 | |  | |  | |  | |  | |
|  | | TOTAL OF SECOND YEAR | | | 60 | |  | |  | |  | |  | |

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| **Third Year** | | | | | | |
| **V. Semester** | | | | | | |
| Code | Course Title | ECTS | T+P | Credit | C/E | Language |
| 501111802 | PhD THESIS STUDY | 25 | 0+1 | **-** | **C** | Turkish |
| 501111803 | SPECIALIZATION FIELD COURSE | 5 | 3+0 | **-** | **C** | Turkish |
|  | Total of V. Semester | 30 |  |  |  |  |
| **VI. Semester** | | | | | | |
| Code | Course Title | ECTS | T+P | Credit | C/E | Language |
| 501111802 | PhD THESIS STUDY | 25 | 0+1 | **-** | **C** | Turkish |
| 501111803 | SPECIALIZATION FIELD COURSE | 5 | 3+0 | - | **C** | Turkish |
|  | Total of VI. Semester | 30 |  |  |  |  |
|  | TOTAL OF THIRD YEAR | 60 |  |  |  |  |

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| **Fourth Year** | | | | | | |
| **VII. Semester** | | | | | | |
| Code | Course Title | ECTS | T+P | Credit | C/E | Language |
| 501111802 | PhD THESIS STUDY | 25 | 0+1 | **-** | **C** | Turkish |
| 501111803 | SPECIALIZATION FIELD COURSE | 5 | 3+0 | **-** | **C** | Turkish |
|  | Total of VII. Semester | 30 |  |  |  |  |
| **VIII. Semester** | | | | | | |
| Code | Course Title | ECTS | T+P | Credit | C/E | Language |
| 501111802 | PhD THESIS STUDY | 25 | 0+1 | **-** | **C** | Turkish |
| 501111803 | SPECIALIZATION FIELD COURSE | 5 | 3+0 | - | **C** | Turkish |
|  | Total of VIII. Semester | 30 |  |  |  |  |
|  | TOTAL OF FOURTH YEAR | 60 |  |  |  |  |

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| **Elective Courses** | | | | | | |
| Code | Course Title | ECTS | T+P | Credit | C/E | Language |
| 501111620 | [AEROPALINOLOGY](#C58) | 7.5 | 3+0 | 3 | E | Turkish |
| 501112618 | [APPLIES OF POLLEN ANALYSIS](#C59) | 7.5 | 3+0 | 3 | E | Turkish |
| 501111629 | [Aquaponic Systems](#C112) | 7.5 | 3+0 | 3 | E | Turkish |
| 501112613 | [BIOLOGICAL DOCUMENTARY AND PHOTOGRAPHY](#C17) | 7.5 | 3+0 | 3 | E | Turkish |
| 501112629 | [BIOLOGICAL MONITORING IN SURFACE WATER](#C18) | 7.5 | 3+0 | 3 | E | Turkish |
| 501112633 | [Using Digital Macrophotography to Study Entomology](#C113) | 7.5 | 3+0 | 3 | E | Turkish |
| 501112634 | [LICHENOLOGY](#C114) | 7.5 | 3+0 | 3 | E | Turkish |
| 501112603 | [BIOLOGY OF ANAEROBIC MICROORGANISMS](#C16) | 7.5 | 3+0 | 3 | E | Turkish |
| 501111609 | [BLOOD PHYSIOLOGY](#C49) | 7.5 | 3+0 | 3 | E | Turkish |
| 501112614 | [CELL DAMAGE](#C61) | 7.5 | 3+0 | 3 | E | Turkish |
| 501112605 | [CELL MOVEMENTS AND MOLECULAR MECHANİSMS](#C41) | 7.5 | 3+0 | 3 | E | Turkish |
| 501111607 | [CHARACTERISTICS BEHAVIOUR OF ANIMAL GROUPS](#C89) | 7.5 | 3+0 | 3 | E | Turkish |
| 501111612 | [DETERMINING AND MONITORING OF WATER QUALITY IN THE USE OF BIOLOGICAL METHODS](#C29) | 7.5 | 3+0 | 3 | E | Turkish |
| 501112623 | [ECONOMIC ENTOMOLOGY](#C12) | 7.5 | 3+0 | 3 | E | Turkish |
| 501112631 | [ENTOMOLOGİCAL PREPARATİON TECHNİCS](#C107) | 7.5 | 3+0 | 3 | E | Turkish |
| 501112615 | [ENVIRONMENTAL BIOTECHNOLOGY](#C23) | 7.5 | 3+0 | 3 | E | Turkish |
| 501112626 | [ENVIRONMENTAL IMPACT ASSESSMENT](#C33) | 7.5 | 3+0 | 3 | E | Turkish |
| 501112610 | [ENVIRONMENTAL POLLUTION AND BIOMONITORING](#C34) | 7.5 | 3+0 | 3 | E | Turkish |
| 501111624 | [EXTINCTION OF THE SPECIES](#C35) | 7.5 | 3+0 | 3 | E | Turkish |
| 501111601 | [EXTREME EUKARYOTA AND THEIR METABOLITES](#C36) | 7.5 | 3+0 | 3 | E | Turkish |
| 501111622 | [FAUNA OF TURKEY](#C93) | 7.5 | 3+0 | 3 | E | Turkish |
| 501111627 | [FIELD STUDIES IN HYDROBIOLOGY](#C109) | 7.5 | 3+0 | 3 | E | Turkish |
| 501111630 | [Fishing methodology in freshwater](#C111) | 7.5 | 3+0 | 3 | E | Turkish |
| 501111618 | [FOREST VEGETATION OF TURKEY](#C72) | 7.5 | 3+0 | 3 | E | Turkish |
| 501111623 | [FRESH WATER FISH IN TURKEY](#C46) | 7.5 | 3+0 | 3 | E | Turkish |
| 501112611 | [FUNGAL BIOTECHNOLOGY](#C11) | 7.5 | 3+0 | 3 | E | Turkish |
| 501111602 | [FUNGAL SAMPLING METHODS AND MODERN IDENTIFICATION](#C39) | 7.5 | 3+0 | 3 | E | Turkish |
| 501112627 | [HES ASSESSMENT](#C44) | 7.5 | 3+0 | 3 | E | Turkish |
| 501112632 | [Hygiene and Sanitation in Food Production](#C108) | 7.5 | 3+0 | 3 | E | Turkish |
| 501111615 | [IDENTIFICATION OF MICROFUNGI](#C22) | 7.5 | 3+0 | 3 | E | Turkish |
| 501112624 | [INVASIVE SPECIES IN FRESHWATER AND STRUGGLE METH.](#C45) | 7.5 | 3+0 | 3 | E | Turkish |
| 501112628 | [LAGOON SYSTEMS](#C52) | 7.5 | 3+0 | 3 | E | Turkish |
| 501112602 | [LANDSCAPING TECHNIQUES AND APPLICATIONS](#C101) | 7.5 | 3+0 | 3 | E | Turkish |
| 501111619 | [LIMNOLOGY](#C53) | 7.5 | 3+0 | 3 | E | Turkish |
| 501111611 | [MANIPULATION TECHNIQUES İN EXPERIMENTAL ANIMALS](#C31) | 7.5 | 3+0 | 3 | E | Turkish |
| 501112619 | [MEDICAL AND POISONOUS PLANTS](#C84) | 7.5 | 3+0 | 3 | E | Turkish |
| 501111606 | [MICROORGANISMS AND METAL INTERACTIONS](#C54) | 7.5 | 3+0 | 3 | E | Turkish |
| 501112607 | [MUTAGENS AND GENETIC MUTATIONS](#C32) | 7.5 | 3+0 | 3 | E | Turkish |
| 501112625 | [PHYLOGEOGRAPHY](#C85) | 7.5 | 3+0 | 3 | E | Turkish |
| 501112606 | [PLANT EMBRYOLOGY](#C68) | 7.5 | 3+0 | 3 | E | Turkish |
| 501112601 | [POPULATION GENETICS](#C97) | 7.5 | 3+0 | 3 | E | Turkish |
| 501112620 | [PRACTICUM OF PLANT TAXONOMY](#C65) | 7.5 | 3+0 | 3 | E | Turkish |
| 501111617 | [PRINCIPLES OF PLANT IDENTIFICATION](#C62) | 7.5 | 3+0 | 3 | E | Turkish |
| 501111603 | [PROTEIN CHEMISTRY](#C66) | 7.5 | 3+0 | 3 | E | Turkish |
| 501112608 | [PROTEIN PURIFICATION METHODS](#C67) | 7.5 | 3+0 | 3 | E | Turkish |
| 501111605 | [RIVER ECOLOGY AND BIOLOGY](#C30) | 7.5 | 3+0 | 3 | E | Turkish |
| 501112604 | [SYSTEMATIC BIOLOGY AND ZOOLOGIC NOMENCLATURE](#C90) | 7.5 | 3+0 | 3 | E | Turkish |
| 501111628 | [Systematic Benthology](#C110) | 7.5 | 3+0 | 3 | E | Turkish |
| 501111621 | [TAXONOMICAL REVISION](#C63) | 7.5 | 3+0 | 3 | E | Turkish |
| 501112609 | [TECHNIQUES IN MICROBIAL ECOLOGY](#C91) | 7.5 | 3+0 | 3 | E | Turkish |
| 501112617 | [THE PROCESS AND THE MOLECULAR MECHANİSM OF CANCER](#C50) | 7.5 | 3+0 | 3 | E | Turkish |
| 501112622 | [THE TERMINOLOGY OF SPERMATOPHYTA](#C64) | 7.5 | 3+0 | 3 | E | Turkish |
| 501111608 | [ULTRASTRUCTURE AND FUNCTIONS OF CELL ORGANELS](#C60) | 7.5 | 3+0 | 3 | E | Turkish |
| 501111616 | [USE OF PLANTS](#C98) | 7.5 | 3+0 | 3 | E | Turkish |
| 501112616 | [ZOOTAXONOMY](#C96) | 7.5 | 3+0 | 3 | E | Turkish |

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** |  | **TITLE** | Research Methods and Ethic |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 25 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 25 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Subjects of rules of scientific ethic, design and steps of scientific research, types of scientific meeting, production of treatise, data presentation and thesis writing are taken place in scope of this course. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | Aim of this course is that students get basic knowledge and ability of about scientific research and production of knowledge. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course is contributed to students get ready for career via providing ability of planned, evaluated and publicated scientific studies as part of ethic rules. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Ability of reach information about their fields  2. Ability of plan research  3. Ability of differentiate types of scientific meeting  4. Ability of evaluate and present data  5. Ability of produce treatise | | | | | | | |
| **TEXTBOOK** | | | | | ESOGU Biyoloji Bölümü Ders notları | | | | | | | |
| **OTHER REFERENCES** | | | | | Kurtuluş K. 2010, "Araştırma Yöntemleri" Türkmen KitapeviKıncal R.Y. 2013 "Bilimsel Araştırma Yöntemleri" AnkaraResnik D.B. 2009 "Bilim Etiği" İstanbul | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Definition and scope of science |
| 2 | Basic features having researchers/responsibilities of scientific people |
| 3 | Knowledge literacy/ ways of reaching scientific information |
| 4 | Examining of literatura/evaluation of data |
| 5 | Selection of research subject and design of experiment |
| 6 | Midterm Examination 1 |
| 7 | Principles of scientific research and rules of scientific ethic |
| 8 | Types of scientific meeting |
| 9 | Treatise production |
| 10 | Treatise production |
| 11 | Midterm Examination 2 |
| 12 | Methods of data presentation (table, graphic, figure etc.) |
| 13 | Scientific spelling rules |
| 14 | Thesis writing |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Faculty members of Biology Department | **Date:** | 05/06/2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** |  | **TITLE** | RESEARCH DESIGN, FUNDING AND INTELLECTUAL PROPERTY RIGHTS |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 25 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 25 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | In this course; the importance of science in society and industry, will take place on issues related to research projects and financial means | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aim of this course is to gain basic knowledge and skills necessary for planning and providing financial support to scientific researches about welfare of the society and solve the problem of the industry. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | The course provides the students the preparation of his career with knowledge of scientific research outcomes should be contribute the society and industry. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1.To understand the importance of science in society and industry,  2. To analysis the demands of society and scientific research-based industry  3. To create a research group  4. Research to evaluate ways of financing  5. Being able to write a research proposal  6. Evaluate phase related patents | | | | | | | |
| **TEXTBOOK** | | | | | Lecture notes of ESOGU Department of Biology | | | | | | | |
| **OTHER REFERENCES** | | | | | Türk Patent Estitüsü yayınları: http://www.tpe.gov.tr/TurkPatentEnstitusu/commonContent/Publications | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | The importance of science and society, the relationship between industry |
| 2 | University-industry cooperation in the world |
| 3 | University-Industry Cooperation in Turkey |
| 4 | Industry-University Cooperative Research Centers |
| 5 | Ways to finance researches |
| 6 | Midterm Examination 1 |
| 7 | Create a research group |
| 8 | Ways to finance researches |
| 9 | Write a proffer research |
| 10 | Experience of maintaining research and reporting (tips for project executive) |
| 11 | Midterm Examination 2 |
| 12 | Patent (Turkish patent ınstitute) |
| 13 | Scaning, types and applications of patent |
| 14 | Patent incentives |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. |  |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. |  |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. |  |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. |  |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. |  |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. |  |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. |  |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. |  |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. |  |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. |  |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. |  |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. |  |  |  |

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| **Prepared by :** |  | **Date:** |  |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| --- | --- | --- | --- |
| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** |  | **TITLE** | PRINCIPLES OF ARTICLE WRITING AND PUBLISHING |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 25 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 25 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | In this course; The issues take place related to processes of writing and publishing scientific article and scientific referee. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aim of this course is to gain basic knowledge and skills about preparation and publication of scientific research results. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | The course provides the students for the preparation of his career with knowledge of planning, evaluation and dissemination the scientific works within the framework of the ethical rules. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Interpret data obtained from research  2. Present data in a way that could be interpreted easily  3. To convert the resulting research paper format  4. To select the academic journal on the subject of research  5. To be admitted to the magazine for Publication  6. To evaluate an article submitted to it | | | | | | | |
| **TEXTBOOK** | | | | | Lecture notes of ESOGU Department of Biology | | | | | | | |
| **OTHER REFERENCES** | | | | | Day, Robert A. "Bilimsel bir makale nasıl yazılır ve yayımlanır” | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Types of written scientific works (articles, short reports, compile, report, etc.) |
| 2 | How to write a scientific paper? Writing Language |
| 3 | How to write a scientific paper? Main paper sections |
| 4 | How to write a scientific paper? Paper sections |
| 5 | How to write a scientific paper? Side factors (Thanks, finance, ethics, conflict of interest etc.) |
| 6 | Midterm Examination 1 |
| 7 | Stage of publishing the article |
| 8 | Journal choosing |
| 9 | Final control and send to publication |
| 10 | Monitoring the article review process |
| 11 | Midterm Examination 2 |
| 12 | What is the scientific referee? |
| 13 | Data evaluation |
| 14 | Refereeing principles |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | |  | **Date:** | |  | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501101513 | **TITLE** | Biology of Actinomycetes |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | |  |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 35 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | | 1 | | 25 |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 40 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Cytological, ecological, morphological, physiological, biochemical and biotechnological properties of actinomycetes, Isolation and identification of actinomycetes from new habitats. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aim of this course; to distinguish and understand the biological and systematic characteristics of actinomycetes. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | The course introduces the characteristics of actinomycetes as a part of the biological diversity. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. To explain the cell structıre of actinomycetes.  2. To distinguish properties of actinomycetes.  3. To explain biotechnological importance of actinomycetes.  4. To classified isolation methods of actinomycetes. | | | | | | | |
| **TEXTBOOK** | | | | | ÖNER, M., 1989, Actinomycetes, E.Ü. Fen Fak. Kitaplar Serisi No: 89, İzmir, 328 s | | | | | | | |
| **OTHER REFERENCES** | | | | | GOODFELLOW, M., WILLIAMS, S.T. and MORDARSKI, M., 1988, Actinomycetes in Biotechnology, Academic Press, San Diego, 501 pp.BUCHANAN, R.E. and GIBBONS, N.E., 1974, Bergey’ s Manuel of Detrminative Bacteriology, The Williams & Wilkins Company, Baltimore, 881 pp.HOPWOOD, D.A., BIBB, M.J., CHATER, K.F., KIESER, T., BRUTON, C.J., KIESER, H.M., LYDIATE, D.J., SMITH, C.P., WARD, J.M. and SCHREMPF, H., 1985, Genetic Manupulations of Streptomyces; A Laboratory Manual, The John Innes Foundation, Norwich, 356 pp. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | General proterties of actinomycetes |
| 2 | The cell structure of actinomycetes |
| 3 | Ecological proterties of actinomycetes |
| 4 | Physiological proterties of actinomycetes |
| 5 | Morphological proterties of actinomycetes |
| 6 | Midterm Examination 1 |
| 7 | Isolation of actinomycetes |
| 8 | Classification of actinomycetes |
| 9 | International Streptomyces Project |
| 10 | Pathological proterties of actinomycetes |
| 11 | Midterm Examination 2 |
| 12 | Primary metabolism of actinomycetes |
| 13 | Secondary metabolism of actinomycetes |
| 14 | Biotechnological importance of actinomycetes |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Prof.Dr. Mustafa YAMAÇ | **Date:** | 05.05.2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501101514 | **TITLE** | Plant Microbiology |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | |  |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 35 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | | 1 | | 25 |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 40 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Microorganisms living in and on plants. The positive relations between microorganisms and plants. Microbial plant diseases. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aim of this course; to understand relations between microorganisms and plants. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | The course introduces positive and negative relations between microorganisms and plants. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. To give examples of microorganisms living in and/or on plants.  2. To give examples of positive relations between microorganisms and plants.  3. To give examples of microbial plants diseases  4. To give examples of decompositon of plant wastes | | | | | | | |
| **TEXTBOOK** | | | | | CAMPBELL, R., 1985, Plant Microbiology, English Language Book Society / Edward Arnold, 191 pp | | | | | | | |
| **OTHER REFERENCES** | | | | | ANDREWS, J.H. and HIRANO, S.S. (Eds.), 1991, Microbial ecology of leaves, Springer – Verlag, New York, 499 pp.HALKMAN, K., 1991, Tarım Mikrobiyolojisi, A.Ü. Ziraat Fak. Yayınları No: 1214, Ders Kitabı No: 350, Ankara, 82 s.SAETTLER, A.W., SCHAAD, N.W. and ROTH, D.A. (Eds.), 1989, Detection of Bacteria in Seed, APS Press, St. Paul, 122 pp. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Introduction to plant microbiology |
| 2 | Epiphytic microorganisms living on plants |
| 3 | Plant parts and microbiological properties |
| 4 | Lichenes |
| 5 | Mycorrhizae |
| 6 | Midterm Examination 1 |
| 7 | Microbial nitrogen fixation |
| 8 | Fungal plant diseases |
| 9 | Bacterial plant diseases |
| 10 | Viral plant diseases |
| 11 | Midterm Examination 2 |
| 12 | Biocontrol of plant diseases |
| 13 | Decomposition of plant wastes |
| 14 | Plants as sources of compounds with antimicrobial activity |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Prof.Dr. Mustafa YAMAÇ | **Date:** | 05.05.2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501101516 | **TITLE** | Advanced Entomology |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 30 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 20 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | The contents of this lesson are; origin of insects and evolutional developments, biological features of insects and relationship with their environment, insect effect on human life and biodiversity of insects. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aims of this lesson are; to get competence to students, explain the insect origins and evolution, understand the main biological activities of insects, make comment about insect interaction with environment, differentiate the biodiversity of them. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course will contribute to students who will be a specialist on  Entomology develope their informations about insects | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1.to comment on phylogeny of insect  2. to explain physiological features of insects  3. to determine ecological factors effected on insect’s life  4. to comment on relationship between insects and the other organims  5. to perceive biodiversity of insects  6. to comment on relationship between insects to human  7. to learn the principles of systematical and taxonomical researches in insect’s world  8. to plan a scientific research on insects and their biology | | | | | | | |
| **TEXTBOOK** | | | | | Demirsoy , A (1993). “Entomoloji”Yaşamin Temel Kuralları Cilt II Kısım I ve II, , Ankara; Meteksan | | | | | | | |
| **OTHER REFERENCES** | | | | | 1. Aktaç, N. (2002): Genel Entomoloji - Ders Kitabı2. Hancı, İ. Ve ark. (2002). Adli Entomoloji. EGM Asayiş DAire Başkanlığı, Ankara.3. Borror and Delong (2004). Introduction to the study of Insects.4. Gilliot, C. (1995). Entomology. Springer5. Nation, J. (2001). Insect Physiology and Biochemistry. CRC Press Inc.,U.S. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Insecta in Animalia Kingdom |
| 2 | The origin and evolution of insects |
| 3 | Morphology of insects |
| 4 | Morphology of insects |
| 5 | Organ systems of insect |
| 6 | Midterm Examination 1 |
| 7 | Respiration and digestion physiology |
| 8 | Circulatory and excretion physiology |
| 9 | Reproduction and development of insects |
| 10 | Relationships of insects with their environment |
| 11 | Midterm Examination 2 |
| 12 | Systematic and taxonomy of insects |
| 13 | Insect orders |
| 14 | Insect orders |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Assit. Prof. Dr. Ümit ŞİRİN | **Date:** | 6 May 2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501101527 | **TITLE** | Microbial Fermentation Techniques |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | |  |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 35 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | | 1 | | 25 |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 40 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Microbiological culture types. Medium and inoculum preparation for fermentation. Fermenter types. The environmental conditions to be controlled during fermentation. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aim of this course; to understand the growth characteristics of microorganisms under fermenter conditions. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | The course introduces the microbial growth properties under fermenter conditions. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. To explain the microbial culture types.  2. To classified inoculum preparation methods.  3. To express environmental conditions to be controlled during fermentation.  4. To explain fermenter types. | | | | | | | |
| **TEXTBOOK** | | | | | McNeill, B., Harvey, L.M., 2008, Practical Fermentation Technology, Wiley, 388pp | | | | | | | |
| **OTHER REFERENCES** | | | | | Okafor, N., 2007, Modern Industrial Microbiology and Biotechnology, Science Publishers, 530 pp.Stanbury, P.F., Whitaker, A. and Hall, S.J., 2003, Principles of Fermentation Technology, Butterworth Heinmann, Oxford, 357 pp.Mitchell, D.A., Krieger, N., Berovic, M. (Eds.), 2006, Solid State Fermentation Bioreactors, Fundamentals of Design and Operation, Springer, 447 pp. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Introduction to fermentation process |
| 2 | Microbial growth kinetics |
| 3 | Batch culture |
| 4 | Continuous culture |
| 5 | Fed-batch culture |
| 6 | Midterm Examination 1 |
| 7 | Media for fermentation |
| 8 | The development of inocula for fermentation |
| 9 | Fermenter design |
| 10 | Aeration and agitation |
| 11 | Midterm Examination 2 |
| 12 | Temperature control |
| 13 | Foam control |
| 14 | Applied fermenter techniques |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Prof.Dr. Mustafa YAMAÇ | **Date:** | 05.05.2015 |

**Signature**:

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**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501101528 | **TITLE** | Fungal Biodiversity |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | |  |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 35 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | | 1 | | 25 |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 40 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Biodiversity of fungi from different morphological groups. Fungal habitats. Ecological functions of fungi. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aim of this course; to distinguish and understand biodiversity and the functions of fungi in their habitats. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | The course introduces the characteristics of fungi in their habitats as a part of the biological diversity. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. To explain biodiversity of different morphological groups of fungi.  2. To classified habitats of fungi.  3. To classified functions of fungi.  4. To classified isolation methods of fungi. | | | | | | | |
| **TEXTBOOK** | | | | | Mueller, G.M., 2004, Bills, G.F., Foster, M.S., Biodiversity of Fungi: Inventory and monitoring method, Elsevier, 777 pp. | | | | | | | |
| **OTHER REFERENCES** | | | | | Watling, R., Frankland, J., 2002, Tropical Mycology: Micromycetes, 320 pp.Schmidt, O., 2006, Wood and Tree Fungi: Biology, Damage, Protection, and Use, Springer, 334 pp.Carlile, M.J., Watkinson, S.C:, Gooday, G.W., 2001, The Fungi, Academic Press, 588 pp.Rainey, F.A., Oren, A., 2006, Extremophiles, Methods in Microbiology Vol. 35, Academic Press, Amsterdam, 821 pp. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Biodiversity of macrofungi |
| 2 | Biodiversity of microfungi |
| 3 | Biodiversity of yeasts |
| 4 | Biodiversity of endophytic fungi |
| 5 | Extremophilic fungi |
| 6 | Midterm Examination 1 |
| 7 | Fungicolous fungi |
| 8 | Fungal parasites and predators |
| 9 | Fungi associated with vertebrates |
| 10 | Coprophilous fungi |
| 11 | Midterm Examination 2 |
| 12 | Anaerobic zoosporic fungi associated with animals |
| 13 | Fungi in freshwater habitats |
| 14 | Fungi in marine habitats |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Prof.Dr. Mustafa YAMAÇ | **Date:** | 05.05.2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501102516 | **TITLE** | Potamobentology |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 30 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 20 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | The contents of this lesson are; terminology of Potamobentology, freshwater systems, types and zonation of running water, running water ecosystem, Invertebrate animal groups in benthos, adaptations of animals in running water, main scientific research methods of running water biology. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aims of this lesson are; explaining to freshwater ecosystems; determining to different characteristics of lotic systems from other freshwaters; exposing to the effects of physical and chemical characteristics of running water on living things in it; describing invertebrate animals living in running waters to students. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course will contribute to students who will be a specialist on  Hydrobiology develope their informations about insects | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. to understand different characteristics of running water from other freshwater types.  2. to comment on the effects of physical and chemical characteristics of running water on living things in it  3. to explain the similar adaptations of animals living in freshwater  4. to recognize animals in benthos  5. to perceive biodiversity in running waters  6. to plan a scientific research about running water biology | | | | | | | |
| **TEXTBOOK** | | | | | Hynes, H.B.N. (1970). The Ecology of Running Waters. | | | | | | | |
| **OTHER REFERENCES** | | | | | McCafferty, W.P. and Provonsha, A. (1983). Aquatic Entomology | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Basic principles and concepts of hydrobiology |
| 2 | Terminology of potamobenthology |
| 3 | Systems of freshwater; lakes, underground water |
| 4 | Running water; types of running water; zones of lotic systems |
| 5 | Physical characteristics of runing water |
| 6 | Midterm Examination 1 |
| 7 | Chemical characteristics of runing water |
| 8 | Biological features of running water |
| 9 | Biological features of running water |
| 10 | Invertebrate animal groups in benthos |
| 11 | Midterm Examination 2 |
| 12 | Invertebrate animal groups in benthos |
| 13 | Adaptations of animals in running water |
| 14 | Main scientific research methods of running water biology |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Assit. Prof. Dr. Ümit ŞİRİN | **Date:** | 6 May 2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501102534 | **TITLE** | Ecology of Insect |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 30 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 20 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | The contents of this lesson are; habitats and living styles of insects, abiotic and biotic factors which effects of insects, population ecology and population dynamics of insects, insects of terrestrial and aquatic ecosystems, adaptations of environmental conditions, Environmental Impact Statement (EIS) and insects. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aims of this lesson are; to get competence to students, explain the interactions between insect and animate-inanimate enviroment, make comment about ecological factors which effect on insects, examine the roles of insects on ecosystems. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course will contribute to students who will be a specialist on  Entomology develope their informations about insects | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. to comprehend environmental conditions which effect on insect living  2. to make comment insect homotypic relationship  3. to examine the relationship between insect and other animals  4. to examine the relationship between insect and plants  5. to analyze the roles of insect in aquatic ecosystems  6. to analyze the roles of insect in terrestrial ecosystems  7. to trace insect's populations dynamics | | | | | | | |
| **TEXTBOOK** | | | | | Hunter et al. (2008).Ecology of Insects. Wiley-Blackwell. | | | | | | | |
| **OTHER REFERENCES** | | | | | 1. Demirsoy , A (1993). “Entomoloji”Yaşamin Temel Kuralları Cilt II Kısım II, , Ankara; Meteksan2. Aktaç, N. (2002): Genel Entomoloji - Ders Kitabı3. Borror and Delong (2004). Introduction to the study of Insects.4. Kansu, İ. A., Böcek Çevre Bilimi (Böcek Ökolojisi) I. Birey Ökolojisi. Ank. Ü. Zir. Fak. Yayınları: 862 | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Habitats of insects |
| 2 | Diversity of insect's life |
| 3 | Environmental conditions which effect on insect living /Abiotic factors. |
| 4 | Environmental conditions which effect on insect living /Biotic factors. |
| 5 | Homotypical coactions of insects |
| 6 | Midterm Examination 1 |
| 7 | Heterotypical coactions of insects |
| 8 | Insects population and dynamics |
| 9 | Insects population and dynamics |
| 10 | Insects of terrestrial ecosystems |
| 11 | Midterm Examination 2 |
| 12 | Environmental adaptations of insects |
| 13 | Natural enemies of insects |
| 14 | EIS and insects |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Assit. Prof. Dr. Ümit ŞİRİN | **Date:** | 6 May 2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501112611 | **TITLE** | Fungal Biotechnology |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  ( x ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | |  |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 35 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (Seminar) | | | | | 1 | | 25 |
| **Final Examination** | | | | | | | 40 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | The using of fungi in industry, medicine, agriculture and forestry. The potential use of fungi for ecological problems. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aim of this course; to understand the biotechnological using of fungi. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | The course introduces the product and services production, using potantial and importance of fungi in different area. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. To give using examples of fungi in industry.  2. To give using examples of fungi in medicine.  3. To give using examples of fungi in agriculture.  4. To give using examples of fungi in forestry. | | | | | | | |
| **TEXTBOOK** | | | | | Arora, D.K., 2004, Handbook of Fungal Biotechnology, Second Ed., Marcel Dekker, New York, Basel. | | | | | | | |
| **OTHER REFERENCES** | | | | | Rai, M., Bridge, P.D., 2009, Applied Mycology, Cab International, 318 pp.An, Z., 2005, Handbook of Industrial Mycology, Marcel Dekker, 763 pp.Tkacz, J.S., Lange, L., 2004, Advances in Fungal Biotechnology for Industry, Agriculture, and Medicine, Kluwer, 445 pp.Khachatourians, G.G., Arora, D.K., 2002, Applied Mycology and Biotechnology Vol 2: Agriculture and Food Production, Elsevier, 361 pp. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Fungal cell biology |
| 2 | Metabolic road regulation. |
| 3 | Strain development in filamentous fungi |
| 4 | Fungal enzymes in industry |
| 5 | Fungal metabolites in industry |
| 6 | Midterm Examination 1 |
| 7 | Fungi in medical biotechnology |
| 8 | Fungi as biocontrol agents |
| 9 | Mycofiltration |
| 10 | Fungi in forestry |
| 11 | Midterm Examination 2 |
| 12 | Fungal bioremediation |
| 13 | Fungal biotransformation |
| 14 | Culture collections |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | | Prof. Dr. Mustafa Yamaç | **Date:** | | 05.05.2015 | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501112623 | **TITLE** | Economical Entomology |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  ( x ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | |  |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 20 |
| Project | | | | | 1 | | 30 |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | The contents of this lesson are; economically important insect species, insect growing, insect as food source, agriculture, forestry and storage pests economy, species that threaten human and animal health and struggling economy. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aims of this lesson are; to get competence to students, analyze the economic importance of insects that most crowd taxon with species diversity and species number, make comment about effects on human life. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course will contribute to students, who will be a specialist on Entomology, to develope their informations about insects. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1.To examine the insect species and biological activities on the role of world economy  2. To analyze the economic contribution of benefit species for mankind  3. To develope a method for determinate and utiuzation the economically important insect species  4. To analyze the economic lose caused from harmful insects  5. To develope growing methods for different insect species  6. To analyze the economic loses caused from vector species | | | | | | | |
| **TEXTBOOK** | | | | | Hill, D.S. (1997). The Economic Importance of Insects. Published by Chapman & Hall, London. | | | | | | | |
| **OTHER REFERENCES** | | | | | 1. Hill, D.S. (1983). Agricultural Insect Pests of the Tropics and their Control. Cambridge University Press2. Metcalf, C. L. and W. P. Flint (1925) Destructive and Useful Insects. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Insects and Economy |
| 2 | Benefical insects and their economy |
| 3 | Insect culturing |
| 4 | Insects as food source |
| 5 | Harmful insects |
| 6 | Midterm Examination 1 |
| 7 | Agriculture pest and struggle economy |
| 8 | Agriculture pest and struggle economy |
| 9 | Forest pest and struggle economy |
| 10 | Forest pest and struggle economy |
| 11 | Midterm Examination 2 |
| 12 | Warehouse and goods pest economy |
| 13 | Species that threaten human and animal health and struggle economy |
| 14 | Profit and loss account based on insects in the world economy. |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | | Assit. Prof. Dr. Ümit ŞİRİN | **Date:** | | 6 May 2015 | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501102526 | **TITLE** | ANAEROBIC TREATMENT TECHNIQUES |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( x ) | TURKISH |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| 3 | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | |  |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 25 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | | 1 | | 25 |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | In this course, the principles of anaerobic digestion, microbiology and biochemistry of anaerobic processes, anaerobic reactors used in treatment, the energy recovery in the anaerobic treatment, anaerobic treatment of different industries, such topics will be included in the work. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aim of this course, to have information about biological methods of wastewater treatment, to allow comparisons anaerobic treatment with other treatment techniques and make practical studies. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course gives an opportunity for students to practice techniques for biological wastewater treatment will contribute to prepare for professional life. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Aerobic and anaerobic biological treatment comparisons  2. Knowing the advantages and disadvantages of anaerobic treatment  3. Lack of knowledge about the microbiology of anaerobic processes  4. Knowing the types of reactors used for anaerobic treatment  5.To carry out laboratory-scale anaerobic treatment | | | | | | | |
| **TEXTBOOK** | | | | | 1. Öztürk İ, 1999, Anaerobik Biyoteknoloji ve Atık Arıtımındaki Uygulamaları 2. Arceivala S.J. ,1998, Wastewater Treatment of Pollution Control, Second Edition | | | | | | | |
| **OTHER REFERENCES** | | | | | Madigan M.T., Martinko J.M., and Parker J. , 2006, Biology of Microorganisms. Pearson Practice Hall | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Overview of Methods Used in Biological Wastewater Treatment |
| 2 | Principles of anaerobic treatment |
| 3 | Microbiology and Biochemistry of Anaerobic Processes |
| 4 | Widely used in Waste Water Treatment Reactor 1 |
| 5 | Widely used in Waste Water Treatment Reactor 2 |
| 6 | Midterm Examination 1 |
| 7 | Control Parameters in Anaerobic Reactor |
| 8 | Toxic Materials and Controls in Anaerobic Reactors |
| 9 | Energy Recovery in Anaerobic Treatment |
| 10 | Anaerobic Treatment in Different Industries Study 1 |
| 11 | Midterm Examination 2 |
| 12 | Anaerobic Treatment in Different Industries Study 2 |
| 13 | Anaerobic Sludge Treatment and Utilization |
| 14 | Special Topics in anaerobic treatment |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Doc.Dr.Dr. Cansu FILIK ISCEN | **Date:** | 14.05.2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** |  | **TITLE** | DIVERSİTY OF BACTERIA |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | |  |  | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 2 | | 50 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Topics relating to systematic of bacteria and biodiversity as an element of diversity of bacteria will be included within the scope of this course. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | This course aims to provide students with understanding systematic and diversity of bacteria. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course will completely contribute to perceive students biodiversity concept by recognizing of bacteria. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Be able to comprehend the tree of life  Be able to comprehend the systematic structure of bacteria  Be able to comprehend the molecular organization of bacteria  Be able to comprehend the archaea biodiversity is an element of biodiversity  Be able to provide knowledge about modern methods in systematic of bacteria. | | | | | | | |
| **TEXTBOOK** | | | | | Brock Biology of Microorganisms, T. Madigan, J. Martinko, and J. Parker. Prentice-Hall, NJ. 2003., | | | | | | | |
| **OTHER REFERENCES** | | | | | Willey, J.M., Sherwood, L.M. and Woolverton, C.J. Prescott, Harley, and Klein’s Microbiology, 7th Ed, Mc Graw Hill Higher Education, 2008.Madigan, M.T., Martinko, J.M., Dunlap, P.V. and Clark, D. P., Biology of Microorganisms 12th Ed, Pearson. USA. 2009.Brenner, D.J., Krieg, N.R and Staley, J.T., Bergey’s Manuel of Systematic Bacteriology, Volume 2: Proteobacteria Part B: Gammaproteobacteria, Springer, 2005.Kim, B.H. and Gadd, G.M., Bacterial Physiology and Metabolism,1th Ed, Cambridge University Press, 2008.Withman, W.B., Parte, A.C., Bergey’s Manuel of Systematic Bacteriology, Volume 3: The Firmicutes, Springer, 2009 | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Microbial phylogeny, 3 domain; Phenotypic and genotypic methods for identification of prokaryotic cells, systematic of microbial, |
| 2 | Species concept, general characteristics of phylum in “Bergey’s Manuel of Systematic Bacteriology“ volumes, Prokaryotic cell morphology, |
| 3 | Cellular structures used in systematic of prokaryot, |
| 4 | Phototrophic Proteobacteria, Cyanobacteria, Heliobacteria, Green sulfur bacteria anD Green nonsulfur bacteria, |
| 5 | Members of Chemolithotrophic and Methanotrophic Proteobacteia, members of Anaerobic Proteobacteria, members of Chenoorganothropfic Protepbacteria, |
| 6 | Midterm Examination 1 |
| 7 | Subclasses of Proteobacteria, Physiology, Morphology and Ecology of classes of Proteobacteria. |
| 8 | Group of Non-Proteobacteria:Members of Aquaficea and Thermotogae |
| 9 | Members of phylum of Deinococcus-Thermus, Chlamidia, Planctomyces, |
| 10 | Properties of Spirochaeta and Bacterioides, |
| 11 | Midterm Examination 2 |
| 12 | Low GC- gram positive bacteria |
| 13 | Low GC- gram positive bacteria |
| 14 | Phylogenetic trees |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. | | |  | |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. | | |  | |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. | | |  | |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. | | |  | |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. | | |  | |  |  |
| **LO 7** | Develops attitude towards project-based work. | | |  | |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. | | |  | |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. | | |  | |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. | | |  | |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage | | |  | |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. | | |  | |  |  |
| **LO 13** |  | | |  | |  |  |
| **Prepared by :** | | Prof. Dr. Ahmet Çabuk | **Date:** | | 15/05/2015 | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501112603 | **TITLE** | Biology of Anaerobic Microorganisms |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( x ) | TURKISH |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| 3 | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | |  |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 25 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | | 1 | | 25 |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | In this course will include topics such as characteristics of anaerobic microorganisms, anaerobic respiration, fermentation and syntrophy, anaerobic Bacteria, Archaea, and Eukarya, applications of anaerobic microorganisms. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | By the end of this module, students will be able to:  To have knowledge the evolution, phylogeny, genetics, physiology and diversity of anaerobic microorganisms. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course gives an opportunity for students understanding of issues related fields by providing properties and applications of anaerobic microorganisms contribute to prepare for professional life | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Know the properties of anaerobic microorganisms  2. Examples of anaerobic microorganisms at the principality level  3. Knowledge of the concept and importance of anaerobic respiration  4. Give examples of fermentation and syntrophy events  5. Knowledge of the application areas of anaerobic organisms  6. Description of biotechnological importance of anaerobic organisms | | | | | | | |
| **TEXTBOOK** | | | | | Madigan MT, Martinko JM, Parker J, and Clark DP, 2009. Brock Biology of Microorganisms. Pearson Prentice Hall. | | | | | | | |
| **OTHER REFERENCES** | | | | | Willey M, Sherwood LM., Woolverton CJ, 2007. Prescott, Harley, and Klein’s microbiology. 1088 p. McGraw- Hill College | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Anaerobic Aspects of Life |
| 2 | Anaerobic Respiration |
| 3 | Fermentation and syntrophy |
| 4 | Anaerobic Bacteria 1 |
| 5 | Anaerobic Bacteria 2 |
| 6 | Midterm Examination 1 |
| 7 | Anaerobic Archaea 1 |
| 8 | Anaerobic Archaea 2 |
| 9 | Anaerobic Eukarya 1 |
| 10 | Anaerobic Eukarya 2 |
| 11 | Midterm Examination 2 |
| 12 | Application of Anaerobic Microorganisms 1 |
| 13 | Application of Anaerobic Microorganisms 2 |
| 14 | Biotechnological importance of anaerobic microorganisms |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | | Do.Dr. Cansu FİLİK İŞÇEN | **Date:** | | 14.05.2015 | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501112613 | **TITLE** | Biological Documentary and Photography |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | |  |  | | | 3 | 7,5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | | - | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Contents of the course are: photography camera and its parts, Optical filters and their usage, Light and framing techniques, applications of photography, video cameras and documentary techniques. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | Main objective of the course is Teaching students techniques of nature photography and documentary preparation. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | |  | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Photography for biological purposes  2. Nature photography and its applications  3. Shooting nature documentaries and techniques of video camera | | | | | | | |
| **TEXTBOOK** | | | | | Biyolojik Belgesel ve Fotografi Notları; Yrd. Doç. Dr. Ünal Özelmas | | | | | | | |
| **OTHER REFERENCES** | | | | | 1. Modern Fotoğraf Sanatı; Ümit İmer2. Amatör Fotoğrafçılık; Hasan Deniz3. TV yapımlarında Teknik ve Kuramsal Temeller; Nadi Kafalı | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Light in Photography |
| 2 | Parts of the Camera |
| 3 | Framing in Photography |
| 4 | Basic Photography Information |
| 5 | Shutter speed and aperture. |
| 6 | Midterm Examination 1 |
| 7 | Parts of a Digital Video Camera |
| 8 | Camera Angles and Movement |
| 9 | Ways to approach wild animals |
| 10 | Hiding in shooting |
| 11 | Midterm Examination 2 |
| 12 | Photographing of the plant material |
| 13 | Protection of Cameras and Data |
| 14 | Video Editing |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | | Assoc.Prof. Dr. Ünal ÖZELMAS | **Date:** | | 18.05.2015 | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501112629 | **TITLE** | Biological Monitoring in Surface Water |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | |  |  | | | 3 | 7,5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | |  |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 25 |
| Project | | | | |  | |  |
| Report | | | | | 1 | | 25 |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Definition of biological monitoring, how to applied to surface water, which criteria are sustainable for biological monitoring in surface water according to water framework directive, which are monitoring species according to WFD, how to choose monitoring points, which are main parameters using monitoring in surface water and how to measure, what are methods of monitoring, what are bioindicator organisms using monitoring and how to use them. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | This course aims that students getting information and ability about which parameters and methods using in surface water according to water framework directive, which bioindicator organisms using and how to evaluation according to results. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course contributes to students learned how to do biological monitoring in surface water and getting ability a studying by theoretical and applied in this field. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Students who are complete this course have information about applied to surface waters of biological monitoring methods and making classification of surface water status according to results. | | | | | | | |
| **TEXTBOOK** | | | | | EOLSS, Environmental monitoring (edited by Boris Stepnovich Maslov) Volume 1, 587 p.EOLSS, Environmental monitoring (edited by Boris Stepnovich Maslov) Volume 2, 339 p. | | | | | | | |
| **OTHER REFERENCES** | | | | | Wetzel, R. G., 2001. Limnology, Lake and River Ecosystems. Elsevier Academic Press, 1005p.Lampert, W. and Sommer, U., 2007. Limnoecology: The Ecology of Lakes and Streams. Oxford University Press, 324p. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Definition of biological monitoring, how to applied in surface water |
| 2 | Which criteria are using biological monitoring in surface water according to water framework directive |
| 3 | What are monitorig species according to WFD, how to choose monitoring points |
| 4 | How to do supervisory monitoring |
| 5 | How to do operational monitoring |
| 6 | Midterm Examination 1 |
| 7 | How to do investigator monitoring |
| 8 | What are the main parameters using biological monitoring in surface water and how to measure |
| 9 | What are methods of monitorig |
| 10 | What are methods of monitorig (continue) |
| 11 | Midterm Examination 2 |
| 12 | What are bioindicator organisms using in biological monitoring and how to use |
| 13 | How to determine the situation according to results of biological monitoring |
| 14 | What are the biological monitoring studies in surface water in Turkey |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | | Prof. Dr. Naime ARSLAN | **Date:** | | 11/05/2015 | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501101541 | **TITLE** | Biological Quality in Limnology and Index |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | |  |  | | | 3 | 7,5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
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| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | |  |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 25 |
| Project | | | | |  | |  |
| Report | | | | | 1 | | 25 |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | What is the water quality and how describe it, changing depend on which factors, what is the biological monitoring, how apply to surface waters, history of biological monitoring, bio-indicator species, fauna and flora elements of using in biological monitoring at aquatic environments, physical and chemical deformation in habitats effects on aquatic organisms, methods of biological monitoringmethods, biological monitoring research in Turkey, index and calculation methods using in biological methods. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | This course aims that gained how to evaluate biological quality in aquatic environment and how to make index, knowledge and ability about use of biological methods for monitoring pollution in environments | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Students taking this course can recognize biological quality elements and have ability make a study in this field as theoretic and practical. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Students taking this course apprehend pollution and effects in aquatic ecosystems, can diagnose effects of physical and chemical changes on aquatic ecosystems and have knowledge about apply biological monitoring methods to surface waters. | | | | | | | |
| **TEXTBOOK** | | | | | J.M. Helawell - Biological indicators of freshwater pollution and environmental management. Elsevier Applied Science Publishers, London. (1986). 546p. F. Mason - Biology of freshwater pollution. Third edit. Longman Group (1996). 356p. | | | | | | | |
| **OTHER REFERENCES** | | | | | Wetzel, R. G., 2001. Limnology, Lake and River Ecosystems. Elsevier Academic Press, 1005p.Lampert, W. and Sommer, U., 2007. Limnoecology: The Ecology of Lakes and Streams. Oxford University Press, 324p. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | What is the water quality and how describe it, changing depend on which factors |
| 2 | What is the biological monitoring, how apply to surface waters |
| 3 | History of biological monitoring and status of our country and world |
| 4 | Bio indicator species to aquatic flora and fauna and usage |
| 5 | Fauna and flora elements of using in biological monitoring at aquatic environments |
| 6 | Midterm Examination 1 |
| 7 | Pollution in aquatic environment, Physical and chemical deformation in habitats effects on aquatic organisms |
| 8 | Physical and chemical deformation in habitats effects on aquatic organisms (continue) |
| 9 | Methods of biological monitoring methods |
| 10 | Methods of biological monitoring methods (continue) |
| 11 | Midterm Examination 2 |
| 12 | What is the biological monitoring research in Turkey |
| 13 | Index and calculation methods using in biological method |
| 14 | Index and calculation methods using in biological methods (continue) |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Prof. Dr. Naime ARSLAN | **Date:** | 11/05/2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501101521 | **TITLE** | Biological Terminology |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 |  | COMPULSORY  (   ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 30 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 20 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Type of species definitions, allopatric and sympatric isolation, overview of the international rules of zoological nomenclature, basic concepts and terms of systematics, taxonomy, ecology and biogeography, systematic abbreviations | | | | | | | |
| **COURSE OBJECTIVES** | | | | | To learn basic concepts and terms of some branches of biology like systematics, taxonomy, ecology and zoogeography | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Course will make an important contribution to understand and to follow scientific studies especially in the field of systematic and taxonomy | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1.Students taking this course are knowledgible of species  2.Are able to summarise type of species definitions  3.Are able to explain allopatric and sympatric isolation  4.Are able to explain systematic abbreviations  5.Has general knowledge about international rules of zoological nomenclature  6.Are able to understand and follow taxonomical studies  7.Are able to explain basic concepts and terms of systematics and taxonomy  8.Are able to explain basic concepts and terms of ecology  9.Are able to explain basic concepts and terms of zoogeography | | | | | | | |
| **TEXTBOOK** | | | | | Mısırlıoğlu M.(2012) Biyolojik Terminoloji, Course Notes | | | | | | | |
| **OTHER REFERENCES** | | | | | 1. Campbell N. A. & Reece J. B. (2006) Biyoloji, Palme Publication.2. Odum E. P., Barrett G. W. (2008) Ekolojinin Temel İlkeleri, Palme Publication. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | species concept and type of species definitions |
| 2 | polytypic species, ring species, and race chain |
| 3 | Allopatric and sympatric isolation |
| 4 | basic ecological concepts and terms |
| 5 | basic biogeographical concepts and terms |
| 6 | Midterm Examination 1 |
| 7 | basic taxonomic concepts and terms |
| 8 | basic taxonomic concepts and terms |
| 9 | basic taxonomic concepts and terms |
| 10 | basic taxonomic concepts and terms |
| 11 | Midterm Examination 2 |
| 12 | An overview of the international code of zoological nomenclature and its board |
| 13 | systematic abbreviations |
| 14 | systematic abbreviations |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Assoc. Prof. Mete MISIRLIOĞLU | **Date:** | 29.04.2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501101524 | **TITLE** | Biology of Mosses |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | |  |  | | | 3 | 7.5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 30 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 10 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | | 1 | | 10 |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Within the scope of this course, topics about origin and fossil remains, classification, morphological-anatomical structure, life-cycle and reproduction, capsule structure and spore dispersion mechanisms, spores and protonema structures, ecology and identification of mosses will be included. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aim of this course is to provide teaching all features and also comprehending biology of mosses which is a little-known group of plantae by the students. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course will make contribution to comprehending biology of mosses by the students. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | In the end of this course, student will be able to:  Emphasize evolutionary relationships of mosses  Comprehend classification, morphological and anatomical structure of mosses  Understand life-cycle and reproduction of mosses  Distinguish sub classes of mosses  Explain herbarium techniques of moss samples  Explain the main characters of diagnosis of mosses | | | | | | | |
| **TEXTBOOK** | | | | | Richardson, D.H.S. (1981). The Biology of Mosses, Blackwell Scientific Publications, London, 221 p. | | | | | | | |
| **OTHER REFERENCES** | | | | | Goffinet B and Shaw AJ (2009). Bryophyte Biology. (Second Edition), pp. 564. Cambridge University Press. Cambridge.Hallingback T and Holmasen I (1985). Mossor En Falthandbok. Interpublishing, Stockholm.Rashid A (2005). An Introduction to Bryophyta (Diversity, Development and Differentiation). First Edition, pp. 298. Vikas Publishing House PVT LTD. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Origin, fosil remains and evolutionary relationships among mosses |
| 2 | Classification and morphological-anatomical structures of mosses |
| 3 | General life cycle and reproduction of mosses |
| 4 | Sub Classis: Andreaeidae (granite mosses), Sub Classis: Sphagnidae (peat-mosses) |
| 5 | Sub Classis: Tetraphidae (four tooth moss), Sub Classis: Polytrichidae (hair cap mosses) |
| 6 | Midterm Examination 1 |
| 7 | Sub Classis: Buxbaumiidae (bug moss) |
| 8 | Sub Classis: Bryidae (true moss) |
| 9 | Sub Classis: Archidiidae (large-spored mosses) |
| 10 | Collection, drying and storage methods of moss samples |
| 11 | Midterm Examination 2 |
| 12 | Main diagnostic characters which are used for identification of mosses |
| 13 | Preparation of moss specimens for diagnosis |
| 14 | Identify species of moss specimens by identification keys from various flora |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Assoc. Prof. Dr. Filiz SAVAROĞLU | **Date:** | 08.05.2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501112615 | **TITLE** | Environmental Biotechnology |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 2 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 20 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 40 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Environmental Biotechnology is a rapidly developing branch of science. This course discusses the principles and environmental applications of biotechnology to degrade and/or remove major groups of environmental contaminants. This course also covers the use of bioremediation techniques for cleanup in specific environmental conditions. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The proposed course is designed to teach students: the fundamentals of environmental biotechnology, pollutants of soil, water and air, bioremediation of organic contaminants and biodegradation of other environmental contaminants. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | The course provides designing a scientific research with basic biological knowledge having students in their fields, implementation and able to presenting by finishing, preparing to professional life. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | -Describe fundamental biological mechanisms that allow microorganisms and plants to degrade and/or remove contaminants from the environment,  -Analyse the global environmental problems and their causes like Ozone depletion, global warming, Air pollution, acid rain  -Explain Xenobiotic metabolism,  -Explain the role of biotechnology in hazardous waste management  -Discuss various pollutants of soil water and air  -Discuss the various biological waste water, air and soil treatment procedures  -Explain the ecological and health risk posed by major groups of environmental contaminants  -Develop the ability to conduct independent scientific investigations within a chosen area, or areas, of environmental biotechnology and to develop the skills for planning, executing, reporting and presenting the results of these investigations. | | | | | | | |
| **TEXTBOOK** | | | | | Environmental Biotechnology : Principles and Applications Rittmann, B.E., and McCarty, P.L., McGraw Hill, 2001. | | | | | | | |
| **OTHER REFERENCES** | | | | | 1. Manual of Environmental Microbiology. Hurst, C.J. (1997) American Society for Microbiology, USA.2. Biotechnology: Principles and Applications. Higgens, I.J., Best, D.J., Jones, J. (1985), Blackwell, London.3. Environmental Biotechnology: Principles and Applications. Moo-Young, M., Anderson, W.A., Chakrabarty, A.M. (1996). Kluywer Academic Publisher, London.4. Basic Environmental Technology: Water Supply, Waste Management and Pollution Control. Nathanson, J.A. (2002), Prentice Hall.5. Environmental Biotechnology. Gareth M. Evans, Judith C. Fulong, (2003), John Wiley & Sons Ltd.6. Environmental Biotechnology. Scragg, A., (2006). Second Edition. Oxford University Press. Oxford. New York.7. Applied Bioremediation and Phytoremediation (Soil Biology). Singh, A., Ward O.P., (2004). First Edition, Springer, Berlin, New York. London.8. Environmental Biotechnology. T. Srinivas, (2008, New Age International (P) Ltd., Publishers.\*Research articles and case studies on the subject of the course. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Role of Biotechnology in Environment Protection: What is environmental biotechnology? What is bioremediation? Overwiew of global environmental problems. |
| 2 | Pollution due to pesticides, tannery, paper and other industries. Xenobiotic compounds, recalcitrance and types of other hazardous wastes. |
| 3 | Microbial enzymes degrading recalcitrant compounds |
| 4 | Biodegradation of xenobiotics, biological detoxification |
| 5 | Bioremediation for air environment. Atmospheric environment for microorganisms  Microbial degradation of contaminants in gas phase |
| 6 | Midterm Examination 1 |
| 7 | Bioremediation for soil environment: soil microorganisms, soil organic matter and characteristics, soil microorganisms association with plants |
| 8 | Pesticides, petroleum hydrocarbons, industrial solvents and microorganisms.  Biotechnologies for ex-situ remediation of soil  Biotechnologies for in-situ remediation of soil  Case studies |
| 9 | Phytoremediation technology for soil decontamination  Case studies |
| 10 | Bioremediation for water environment, contaminants in groundwater: Ex-situ decontamination of groundwater. Bioremediation for water environment: In-situ bioremediation of groundwater.  Factors Affecting Bioaugmentation  Delivery systems for oxygen, nutrients, and innoculation  biotreatment of Landfill leachate |
| 11 | Midterm Examination 2 |
| 12 | Overcoming limitations of bioremediation: Factors affecting the bioremediation processes. Effects of co-substrates on microorganisms |
| 13 | Emerging environmental biotechnologies: Phytoremediation |
| 14 | Emerging environmental biotechnologies: Sequestering carbon dioxide, biomonitoring, application of microbial enzymes, biomembrane reactors. |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | | Assist. Prof. Dr. Buket KUNDUHOĞLU | **Date:** | | 18.05.2015 | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501102510 | **TITLE** | Soil Microbiology |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 2 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 20 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 40 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Soil as a medium for microbial growth. Major groups of microorganisms in soil, their interrelationships, and their responses to environmental variables. Role of microorganisms in cycling of nutrients. Plant-microorganism relationships. Transformations of organic and inorganic pollutants. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | This course is designed to discuss relationships and significance of microorganisms in nutrient cycle, plant development, and environmental quality. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | The course provides designing a scientific research with basic biological knowledge having students in their fields, implementation and able to presenting by finishing, preparing to professional life. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | At the end of the course, students will be able to:  1. Describe the soil environment and predict how it influences soil microorganisms and their activity  2. List the taxonomic groups of organisms living in soil  3. Describes the interactions between soil organisms  4. Describe the different types of metabolism found among soil microorganisms  5. Explain and discuss how carbon and energy flow in the biosphere  6. Describe the biogeochemical cycles of carbon, nitrogen, phosphorus and sulfur, and define the links between them  7. Evaluate the impact of anthropogenic influences on these biogeochemical cycles and on the equilibrium on the biosphere  8. Explain the agricultural significance of soil microorganisms. | | | | | | | |
| **TEXTBOOK** | | | | | Principles and Applications of Soil Microbiology, 2nd Edition, D. Sylvia, J. Fuhrmann, P. Hartel and D. Zuberer, Eds. Prentice Hall, 2005. | | | | | | | |
| **OTHER REFERENCES** | | | | | Toprak Mikrobiyolojisi. M. Çengel. Ege Üniversitesi Yayınları No: 558, İzmir, 2004.Toprak Biyolojisi. K.Haktanır ve S. Arcak. Ankara Üniversitesi Yayın No:1486, Ankara, 1997.Biology of Microorganisms, 12th (2008), 11th (2006), or 10th (2003) editions, by M.T. Madigan, J.M. Martinko, and J. Parker, Pearson Education, Inc., Upper Saddle River, NJ.Modern Soil Microbiology. Van Elsas, Jansson, and Trevors. 2007 2nd edition. Taylor & Francis Group.Manual of Environmental Microbiology, 2nd ed. (2002), edited by C.J Hurst, American Society for Microbiology Press, Washington, DC.Soil Microbiology and Biochemistry, 2nd ed (1996), by E.A. Paul and F.E. Clark. Academic Press, San Diego, CA. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Introductiın to soil microbiology. Soil as a habitat for organisms |
| 2 | Soil types, soil structure, role of microorganisms in soil formation |
| 3 | Soil microorganisms –Bacteria and Archaea |
| 4 | Soil microorganisms –Viruses. Distribution of microorganisms in soil |
| 5 | Soil microorganisms –Fungi and other eukaryotes |
| 6 | Midterm Examination 1 |
| 7 | The effect of environmental conditions on soil microorganisms. Interactions between soil organisms. The rhizospher, Mychorrhizal symbioses |
| 8 | Carbon transformation and soil organic matter formation |
| 9 | The nitrogen transformation –Immobilization/mineralization, Nitrification, and Denitrification. The nitrogen transformation– symbiotic and non-Nitrogen fixation |
| 10 | Sulphure transformation, Phosphorus transformation |
| 11 | Midterm Examination 2 |
| 12 | Methods for studying soil microorganisms. |
| 13 | Microbial degradation of recalcitrant compounds in soil |
| 14 | Microbial degradation of xenobiotic compounds in soil |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Assist. Prof. Dr. Buket KUNDUHOĞLU | **Date:** | 18.05.2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501101518 | **TITLE** | MICROBIOLOGICAL QUALITY CONTROLS OF FOODS |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 2 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 20 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 40 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Role of micro-organisms in spoilage and food-borne illness. Microbiology of selected food products. Quality assurance and quality management. HACCP system, sampling plans. Microbiological analysis, microbiological standards, methods used in controlling the microbiological quality of foods. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The main aims of this course is to:  Provide students with an understanding of the basic principles of the foods microbiology.  Give information about role of micro-organisms in spoilage and food-borne illness.  Discuss principles of quality, quality assurance and quality management and the application of quality tools and techniques in solving food quality control problems.  Describe instrumental techniques for monitoring food quality and safety.  Outline key issues in food legislation and its implementation in control and management of food quality and safety. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | The course provides designing a scientific research with basic biological knowledge having students in their fields, implementation and able to presenting by finishing, preparing to professional life. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | -Discuss the role of micro-organisms in food spoilage and food-borne illness.  -Outline the factors that affect the growth of microorganisms in food.  -Outline the microbiology of selected foods.  -Explain the methods used in the microbiological quality control of foods.  -Outline the role of Good Manufacturing Practice (GMP) and Good Hygience Practice (GHP) in food safety management  -Explain principles of the HACCP system  - Identify potential hazards and Critical Control Points (CCPs) in a food production process.  -Understand local and international food legislations. | | | | | | | |
| **TEXTBOOK** | | | | | Ünlütürk, A., Turantaş, F. (2003). Gıda Mikrobiyolojisi, Meta Basım Matbaacılık Hizmetleri,İzmir.Halkman, K. (2005). Gıda Mikrobiyolojisi Uygulamaları. Başak Matbaacılık, Ankara.Milli Eğitim Bakanlığı. (2003). Gıda Hijyen Uygulamaları Denetim Kursu (HACCP), Ders Notları. ANKARA. | | | | | | | |
| **OTHER REFERENCES** | | | | | Pichhardt, K. (1998). Gıda Mikrobiyolojisi, Gıda Endüstrisi İçin Temel Esaslar ve Uygulamalar (Çevirenler: Yılmaz Keskin, Nural Karagözlü), Literatür Yayıncılık, 2004.Jay, J.M. (1992). Modern Food Microbiology. Chapman & Hall, London.Harrigan, W.F. (1998). Laboratory Methods in Food Microbiology. Academic Press Limited, London.Frazier, W.C., Westhoff, D.C. (1988). Food Microbiology. McGraw-Hill Book Company, Singapore. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Major contamination sources of micro-organisms in food. |
| 2 | Role of micro-organisms in spoilage and food-borne illness. |
| 3 | Factors effecting the growth of micro-organisms in food. |
| 4 | Food preservation methods. |
| 5 | Microbiology of selected food products. |
| 6 | Midterm Examination 1 |
| 7 | Concepts of quality, quality control and quality assurance systems. Good Manufacturing Practice (GMP), Case studies. |
| 8 | Good Hygience Practice (GHP), Case studies. |
| 9 | Hazard Analysis Critical Control Point (HACCP), Case studies. |
| 10 | ISO Standards (ISO9000, ISO22000, ISO22005) |
| 11 | Midterm Examination 2 |
| 12 | Food Legislation. Rapid detection methods in food microbiology. |
| 13 | Rapid methods for on-line quality measurement. |
| 14 | Instrumental techniques for measuring quality. |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Assist. Prof. Dr. Buket KUNDUHOĞLU | **Date:** | 18.09.2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501102539 | **TITLE** | EXPERIMENTAL ANİMAL ETHİCS |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | TÜRKÇE |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | |  |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 25 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (Seminar) | | | | | 1 | | 25 |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | What is ethics in experimental studies? Attention to the ethic rules of using animals in biomedical studies are important for animal rights. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | Of working with experimental animals will contribute to the learning of rules should be careful about animal rights and animal welfare. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | To learn about the rights of animals used in experimental studies. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Students who have taken this course;  1. To learn the working methods with experimental animals.  2. Learn about animal rights.  3. Having knowledge about the ethical rules  4. Learning the basic principles of animal welfare.  5. Recognition of laboratory animals.  6. Learning about alternative methods to animal use. | | | | | | | |
| **TEXTBOOK** | | | | | Biyomedikal Araştırmalarda Deney Hayvanı "Temel Bilgiler ve Etik İlkeler", Yeğen B.Ç. Gören Z., Yüce Yayım Tavaslı Matbaası, 2005, İstanbul. | | | | | | | |
| **OTHER REFERENCES** | | | | | 1. Canadian Council on Animal Care. Guide to the Care. and Use of Experimental Animals. Vol 2. 1984, Ottawa.2. Laboratuvar Hayvanları Biliminin Temel İlkeleri, Çeviri Editörü; Tayfun İde, Medipres, 2003, Ankara.3. Laboratuar Hayvanları Bilimi, Poyraz Ö., Kardelen Ofset, 2000, Ankara. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Description of the Ethics |
| 2 | Bioethics, principles of bioethics |
| 3 | The scope of bioethics |
| 4 | Use of experimental animals and history |
| 5 | Ethical principles in the use of experimental animals |
| 6 | Midterm Examination 1 |
| 7 | Using areas of experimental animals |
| 8 | 3R rules |
| 9 | Euthanasia in animals |
| 10 | Animal rights law |
| 11 | Midterm Examination 2 |
| 12 | Ethical committees |
| 13 | Writing the application of the ethical committee |
| 14 | Submission of the ethics committee report |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Doç. Dr. Hakan ŞENTÜRK | **Date:** | 20.05.2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501101542 | **TITLE** | PRACTİCE AND ANALYSIS METHODS IN LABORATORY ANIMALS I |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | TÜRKÇE |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | |  |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 25 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (Seminar) | | | | | 1 | | 25 |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | How and Why use of animal of experimental study? Biomedical research involving animals remains essential for the advancement of the medical, veterinary, agricultural, and biological sciences. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The principal purpose of this course; ensure that the learning of a variety of techniques in experimental animals | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Contribute to the development of hand skills in experimental studies. Teach a variety of experimental models. Evaluating the results obtained from experiments. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Students who have taken this course;  1. Learning methods study with experimental animals.  2. Used sewing techniques to use after surgery.  3. Learning injection methods used in experimental animals  4. Planning study in experimental animals can do.  5. Materials to evaluate the experimental results obtained.  6. Biochemistry otoanalyzer, microtome, scales and centrifuge etc. the susceptible understand the use of the devices. | | | | | | | |
| **TEXTBOOK** | | | | | Handbook of Laboratory Animal Science, Jann Hau and Gerald L. Van Hoosier, Jr. | | | | | | | |
| **OTHER REFERENCES** | | | | | The laboratory rat/edited by Mark A. Suckow, Steven H. Weisbroth, Craig L. Franklin. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Reproduction and Breeding conditions of rats |
| 2 | Housing conditions of rats (lighting, humidity etc.) |
| 3 | Application for ethics committee |
| 4 | Administration technics of rats. |
| 5 | The preparation of the applied substances |
| 6 | Midterm Examination 1 |
| 7 | Procedures to be performed before the operation (anesthesia), Procedures to be performed during the operation (dissection) |
| 8 | Procedures to be performed after the operation (take blood from the heart) |
| 9 | Fixation methods (neutral formaldehyde fixation, cardiac perfusion, bouine fixation, etc.) |
| 10 | Tissue biopsy for histological examination |
| 11 | Midterm Examination 2 |
| 12 | Surgical models; Nephrectomy technic |
| 13 | Renal ischemia/ reperfusion technics |
| 14 | Principles of the biochemistry autoanalysing systems |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Doç. Dr. Hakan ŞENTÜRK | **Date:** | 20.05.2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501102532 | **TITLE** | PRACTİCE AND ANALYSIS METHODS IN LABORATORY ANIMALS II |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | TÜRKÇE |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | |  |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 25 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (Seminar) | | | | | 1 | | 25 |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | How and Why use of animal of experimental study? Biomedical research involving animals remains essential for the advancement of the medical, veterinary, agricultural, and biological sciences. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The principal purpose of this course; ensure that the learning of a variety of techniques in experimental animals | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Contribute to the development of hand skills in experimental studies. Teach a variety of experimental models. Evaluating the results obtained from experiments. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Students who have taken this course;  1. Learning methods study with experimental animals.  2. Used sewing techniques to use after surgery.  3. Learning injection methods used in experimental animals  4. Planning study in experimental animals can do.  5. Evaluate the experimental results obtained in biological material.  6. Establish a relationship by evaluating the obtained numerical data. | | | | | | | |
| **TEXTBOOK** | | | | | Handbook of Laboratory Animal Science, Jann Hau and Gerald L. Van Hoosier, Jr. | | | | | | | |
| **OTHER REFERENCES** | | | | | The laboratory rat/edited by Mark A. Suckow, Steven H. Weisbroth, Craig L. Franklin. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Organs and functions in rats |
| 2 | Urogenital tract (kidney, bladder) |
| 3 | Endocrine system (pancreas, liver) |
| 4 | Digestive tract (stomach, intestines) |
| 5 | Circulatory system |
| 6 | Midterm Examination 1 |
| 7 | The importance of modeling and types of experimental animals |
| 8 | Surgical models in experimental animals; Hepatectomy, partial hepatectomy |
| 9 | Hepatic ischemia, total hepatic ischemia, partial hepatic ischemia |
| 10 | Type I diabetes model |
| 11 | Midterm Examination 2 |
| 12 | Type II diabetes model |
| 13 | Experimental colitis tract |
| 14 | Alcoholic liver damage |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Doç. Dr. Hakan ŞENTÜRK | **Date:** | 20.05.2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501111612 | **TITLE** | Determining and Monitoring of Water Quality in the Use of Biological Methods |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( x ) | TURKISH |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| 3 | | 1 | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | |  |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 25 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | | 1 | | 25 |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | The scope of this course will be included information to the students about biological monitoring, bioindicator species, the history of biological monitoring, biological parameters in aquatic environments that can be used as animal and plant groups, physical and chemical changes in the aquatic environment, effects on living things, the tests used to determine the water of toxic substances . | | | | | | | |
| **COURSE OBJECTIVES** | | | | | By the end of this module, students will be able to:  To learn concepts on tools and techniques used in water quality and to acquire able to use test equipment. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course gives an opportunity for students to learning methods used in aquatic toxicity contribute to prepare for professional life | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Explanation of the importance of water for life  2. Expressing the concept of water quality  3. Expressing the techniques used to determine water quality  4. Learning techniques to apply  5. Interpret the experimental results | | | | | | | |
| **TEXTBOOK** | | | | | Water quality : diffuse pollution and watershed management Vladimir Novotny Hoboken, N.J. : J. Wiley, c2003 | | | | | | | |
| **OTHER REFERENCES** | | | | | Water quality and treatment : a handbook of community water supplies / American Water Works Association ; Raymond D. Letterman. New York : McGraw-Hill, c1999 http:// www.wqa.org | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Water and Life |
| 2 | Water Quality and Water Quality Parameters Used to Determine |
| 3 | Biological Monitoring and its History |
| 4 | Disclosure of bioindicator species |
| 5 | Used to Determine Water Quality of Living Species |
| 6 | Midterm Examination 1 |
| 7 | Tests Used to Determine the water of toxic substances |
| 8 | Plant Toxicity Tests 1 |
| 9 | Plant Toxicity Tests 2 |
| 10 | Animal Toxicity Tests |
| 11 | Midterm Examination 2 |
| 12 | Based on microorganisms Toxicity Tests 1 |
| 13 | Based on microorganisms Toxicity Tests 2 |
| 14 | Cytogenetic Toxicity Tests |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | | Doc. Dr. Cansu FİLİK İŞÇEN | **Date:** | | 14.05.2015 | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501111605 | **TITLE** | River Ecology and Biology |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | |  |  | | | 3 | 7,5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 25 |
| Quiz | | | | | 1 | | 25 |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Different freshwater systems, importance of water for organisms, physical and chemical characteristics of running water, organisms of running water, running water pollution and research methods. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The main aim of this course is; aprehending importance of water and water organisms for human being;  aprehending of ecology and biology of running water;  aprehending and interpreting of monitoring methods for river systems. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Course will be contributed that importance of water for organisms, physical and chemical characteristics of running water, organisms of running water, running water pollution and research methods comprehended by students. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Ability of explanation importance of water for organisms  2. Ability of explanation importance of aquatic organisms for human  3. Ability of planning river study  4. Ability of distinguish aquatic organisms  5. Ability of comparison different aquatic systems organisms  6. Ability of explanation importance of each aquatic component  7. Ability of apprehending conservation of river systems  8. Ability of make monitoring study  9. Ability of explanation relationship between aquatic systems and human  10. Ability of explanation of chemical and physical properties of water | | | | | | | |
| **TEXTBOOK** | | | | | Hynes, H.B.N., The ecology of running water, 231 s. | | | | | | | |
| **OTHER REFERENCES** | | | | | Jeffries, M. And Mills, D., 1990. Freshwater ecology principles and applications. 283 p. ; Tanyolaç, J. 2000. Limnoloji. Ankara, 237 s. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Importance of water and river systems for organisms |
| 2 | Chemical caracteristics of rivers |
| 3 | Chemical caracteristics of rivers |
| 4 | Physical caracteristics of rivers |
| 5 | Algea |
| 6 | Midterm Examination 1 |
| 7 | Hygrofits, Planktons |
| 8 | Potamobenthic invertebrates |
| 9 | Anatomic and behavioral adaptations of potamobenthic invertebrates |
| 10 | Control factoring on distribution of potamobenthic invertebrates |
| 11 | Midterm Examination 2 |
| 12 | River pollution, Quantitative studies on potamobenthic invertebrates |
| 13 | River fish species, ecological factors on fishes |
| 14 | Biomonitoring studies and index calculating methods |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | | Prof. Dr. Naime ARSLAN | **Date:** | | 11/05/2015 | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501111611 | **TITLE** | Manipulation techniques in experimental animals |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 20 |
| Quiz | | | | | 1 | | 20 |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | | NO | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | In this course; general information and features of the experimental animals, ethical practices in experimental animals, ways of granting material, techniques blood collection, serum and plasma isolation, urine collection, anesthesia and analgesia, euthanasia practice, creating organ ischemia and reperfusion, regeneration studies, surgical practice. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The purpose of this course; students are going to learn experimental animals to learn about the physiological and biochemical information and ability of animal studies may be implemented ethically surgery. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course, students cen prepare ability to perform as the experimental animals, the owner of the information of interest and to carry out the experimental design. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Appropriate studies in experimental animals to make the code of ethics  2. According to the purpose of the experimental animals to make the selection  3. Surgical applications to gain the skills and methods | | | | | | | |
| **TEXTBOOK** | | | | | 1. Deney hayvanları laboratuvar teknikleri (Ayşe Başaran, 2003), | | | | | | | |
| **OTHER REFERENCES** | | | | | 1. A colours atlas of the rat (Olds, R.J., Olds,J.R., 1991). | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | General information and features of experimental animals, |
| 2 | Living space and maintenance of experimental animals, |
| 3 | The experimental techniques in experimental animals, |
| 4 | Ways of granting material, |
| 5 | Techniques blood collection, |
| 6 | Midterm Examination 1 |
| 7 | Serum and plasma isolation, urine collection, |
| 8 | Anesthesia and analgesia, euthanasia practice, |
| 9 | Creating organ ischemia and reperfusion, |
| 10 | Regeneration studies, |
| 11 | Midterm Examination 2 |
| 12 | Surgical applications; nefroktomi, |
| 13 | Surgical applications; hepatoktami, |
| 14 | Ethical practices in experimental animals. |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | | Assoc. Prof. Dr. Mustafa UYANOĞLU | **Date:** | | 08.05.2015 | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501112607 | **TITLE** | MUTAGENS AND GENETIC MUTATIONS |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 20 |
| Quiz | | | | | 1 | | 20 |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | | NO | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | In this course; environments of organisms living in the genetic structure of some natural or industrial products with molecular mechanisms explaining the effects of mutations on the classification and to live as a theoretical analysis of the benefits and losses. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The purpose of this course; students are going to learn classification of mutations and to live as a theoretical analysis of the benefits and losses. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course, students cen prepare classification of mutations, medical and industrial waste informed about the harmful effects of the environment | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Mutation and mutagens with the concepts of understanding the relationships between them  2. Understanding the use of certain mutagenic substances in the experimental work environment | | | | | | | |
| **TEXTBOOK** | | | | | 1.Elseth G.D., Baumgardner K.D., Principles of Modern Genetics, 1995.2.Başaran N., Tıbbi Genetik, 8. Baskı, 1999. | | | | | | | |
| **OTHER REFERENCES** | | | | | 1.Pai A.C.,Foundations of Genetics, 2 th edition, 1996.2.Miller et.al, Molecular Biology of The Cell, 1994. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Definition of mutation, |
| 2 | Formation causes of mutations, |
| 3 | Mechanisms of mutations occurrence, |
| 4 | Areas of mutations occurred, |
| 5 | The origin of mutations, |
| 6 | Midterm Examination 1 |
| 7 | Separate of mutations according to directions, |
| 8 | Classification of mutations, |
| 9 | Chromosome mutations altering the structure and the number of chromosome, |
| 10 | Gene mutations, |
| 11 | Midterm Examination 2 |
| 12 | Detection of chemical mutagens, |
| 13 | Benefits and losses of mutations for human, |
| 14 | Use of mutations in genetic, |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | | Assoc. Prof. Dr. Mustafa UYANOĞLU | **Date:** | | 08.05.2015 | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501112626 | **TITLE** | Environmental Impact Assessment |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | |  |  | | | 3 | 7,5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | |  |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 25 |
| Project | | | | |  | |  |
| Report | | | | | 1 | | 25 |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Within the scope of this course, gain adequacy of preparation Environmental Impact Assessment Reports for facilities determinated by Environmental Impact Assessment (EIA) Regulation, give general information about Environmental Law and related regulations, improve ability of examination and implemantation regulations and how to make a systematic and multi-disciplinary teamwork about evaluate to activities based on environmental impacts | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The main aim of this course gets able to concept of Environmental Impact Assessment (EIA), official and technical issue of EIA Regulation, relationship of environmental legislation-environmental regulation and EIA Report and subject of evaluation EIA Reports. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | The aim of this course provides apprehended able to apply and interpret concept of EIA, official and technical issue of EIA Procedure, relationship environmental legislation-environmental procedure and EIA Report in different fields. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Ability of explanation steps of preparation Environmental Impact Assessment Reports for facilities determinate by EIA Regulation  2. Ability of get essential information about necessary followed technical official steps during preparation of EIA Reports and Project Information Files  3. Ability of explanation general information about Environmental Law and relative regulations, improve examination and practice of regulations  4. Ability of explanation concept of Environmental Management nationally and locally, identify agency and institute responsible of environmental management  5. Ability of make research about gain documents necessary for EIA  6. Ability of make a systematic and multi-disciplinary teamwork about evaluate to environmental impacts of activities | | | | | | | |
| **TEXTBOOK** | | | | | Türk Çevre Mevzuatı ( Çevre Yasası, Kanun Hükmünde Kararnameler, Uluslararası Sözleşmeler, Yönetmelikler, Tebliğler) | | | | | | | |
| **OTHER REFERENCES** | | | | | T.C. Çevre ve Orman Bakanlığı Web Sayfası (www.cevreorman.gov.tr) | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | What is the EIA? How to evaluate? |
| 2 | Description of EIA, EIA Procedure |
| 3 | EIA Procedure-Examine sample EIA Report |
| 4 | EIA Procedure-Competence Notification |
| 5 | Regulations and Relationship with EIA Report |
| 6 | Midterm Examination 1 |
| 7 | Water Pollution Control Regulation-Examine sample EIA Report |
| 8 | Solid Wastes Control Regulation- Examine sample EIA Report |
| 9 | Dangerous Wastes Control Regulation- Examine sample EIA Report |
| 10 | Air Quality Control Regulation |
| 11 | Midterm Examination 2 |
| 12 | Soil Pollution Control Regulation |
| 13 | Dangerous Chemicals Regulation |
| 14 | Environmental Monitoring Regulation |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | | Prof. Dr. Naime ARSLAN | **Date:** | | 11/05/2015 | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501112610 | **TITLE** | Environmental Pollution and Biomonitoring |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | |  |  | | | 3 | 7,5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 25 |
| Quiz | | | | | 1 | | 25 |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Clasification of natural and artificial pollutant, effect of pollutant on organisms, and research methods. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The main aim of this course is; aprehending of pollutant, distribution of pollutant in soil and water; explaining to basic form of pollution; interpreting effect of pollutant on environment and organisms. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Course will be contributed that environment and pollutant, effect of pollution on environment and organisms comprehended by students. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Be able to have high level information,  1. Ability of explanation the pollutant  2. Ability of explanation the chemical characteristics of pollutants  3. Ability of description of pollutants in different ecosystems (soil, water, atmosphere)  4. Ability of comparison of pollutants in different ecosystems  5. Ability of planning environmental pollution research  6. Ability of explanation effect of pollutants on environment  7. Ability of explanation effect of pollutants on organisms  8. Ability of classification of pollution level  9. Ability of make suggestion to prevent of environmental pollution | | | | | | | |
| **TEXTBOOK** | | | | | P. Aarne Vesilind, Butterworth-Heinemann, 1990. Environmental pollution and control , ISBN: 0409902721 | | | | | | | |
| **OTHER REFERENCES** | | | | | Des W. Connell, 2001. Chemistry and Ecotoxicology of Pollution (Environmental Science and Technology: A Wiley-Interscience Series of Texts and Monographs) ~ Wiley-Interscience ~ ISBN: 0471862495Jamil Kaiser, 2000. Bioindicators and Biomarkers of Environmental Pollution and Risk Assessment, Science Publishers, ISBN: 1578081629 | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | General characteristics of pollutant |
| 2 | Classification of pollutants |
| 3 | Chemical, biological and physical pollution |
| 4 | Pollutant of soil and atmosphere |
| 5 | Pollutant of water |
| 6 | Midterm Examination 1 |
| 7 | Relationship pollutant in which different ecosystems, Effect of pollutant on environment |
| 8 | Effect of pollutant on organisms |
| 9 | Turkish Environmental Regulation |
| 10 | World Environment Organisations and their duties |
| 11 | Midterm Examination 2 |
| 12 | Studies to prevent of environmental pollution |
| 13 | Rehabilitaion study for polluted ecosystems (soil and atmosphere) |
| 14 | Rehabilitaion study for polluted ecosystems (water) |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | | Prof. Dr. Naime ARSLAN | **Date:** | | 11/05/2015 | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501111624 | **TITLE** | Extinction of The Species |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 |  | COMPULSORY  (   ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 30 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 20 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Reasons for disappearance of species, occurences during period of disappearance, considerable extinction experienced in geological periods, lost species in the world and our country, population dynamics, species currently under threat at the present time, general situation of biodiversity of Turkey, national and international foundings aimed at the protection of species, activities, agreements and protocols agreed upon for this topic, red list and its categories, Bern and CITES agreements. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | To outline and contribute to solutions to the disappearance of species, accepted as the most important environmental problem all over the world | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course contributes to explore reasons for the disappearance of species and to carry out research aimed at finding solutions for this most important environmental issue. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1.Students taking this course are accepted that extinct species is a very important environmental issue.  2.have inform regarding the basic reasons for the disappearance of species.  3. explain the negative effect of species food and energy flow in nature.  4.research the changes the world has experienced throughout geological periods.  5.present five major past experienced extinction phases.  6.give information on population dynamics.  7.recognise both extinct and endangered species in the world and in our country.  8.are aware of the richness of our country in terms of the biodiversity.  9.research the national and international foundings and their activities aimed at the protection of species. | | | | | | | |
| **TEXTBOOK** | | | | | Mısırlıoğlu M. (2014) Türlerin Yok Oluşu, course notes. | | | | | | | |
| **OTHER REFERENCES** | | | | | 1. Campbell N. A. & Reece J. B. (2006) Biology, Translation of Sixth Edition, Palme Publication.2. Odum E. P. & Barrett G. W. (2008) Ekolojinin Temel İlkeleri, Ankara, Palme Publication.3. TÜBİTAK, Bilim ve Teknik Dergisi, Archives.4. Lavori della Societa Italıana Di Biogeografia (1999) Biogeografia dell'Anatolia ParteI-II (Articles related Turkish fauna).5. Documentaries related the course. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Why do species disappear? |
| 2 | The period of disappearance |
| 3 | Population dynamics |
| 4 | Major disappearances and their reasons experienced in geological periods |
| 5 | Some extinct species in the world and our country |
| 6 | Midterm Examination 1 |
| 7 | Examples of species presently under threat and suggestions for them |
| 8 | General situation of biological richness of Turkey |
| 9 | National organisations actively contributing to protection of species |
| 10 | International organisations actively contributing to protection of species |
| 11 | Midterm Examination 2 |
| 12 | Studıes carried out on extinct species |
| 13 | Red list and its categories |
| 14 | Notable agreements for the protection of species in particular Bern and CITES |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | | Assoc. Prof. Mete MISIRLIOĞLU | **Date:** | | 29.04.2015 | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501111601 | **TITLE** | EXTREME EUKARYOTA AND THEIR METABOLITES |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | TURKISH |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| 3 | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 25 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 25 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | The scope of this course will be included the extreme eukaryotes, their metabolisms and metabolic products. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aim of this course is to provide understanding of the basic knowledge for recognition of extreme eukaryotes and consideration in the industrial field by the students. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course will contribute to prepare for professional life by providing knowledge on the importance of extreme eukaryotic microorganisms in industrial fields. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1.To exemplify the properties of extreme habitats  2.To exemplify the extreme microorganisms  3.To understanding the isolation techniques of extreme microorganisms  4.To exemplify the metabolites of extrem microorganisms  5.To discuss the industrial importance of metabolites  6.Be able to follow the literatüre on the subject  7.To interpret development on extreme microorganisms exemplify the properties of extreme habitats exemplify the properties of extreme habita To exemplify the properties of extreme habitat To exemplify the properties of extreme habita | | | | | | | |
| **TEXTBOOK** | | | | | İLHAN S (2012) Ekstrem Ökaryotlar ve Metabolitleri Ders Notları, ESOGÜ Biyoloji Bölümü, ESKİŞEHİR | | | | | | | |
| **OTHER REFERENCES** | | | | | Charles Gerday and Nicolas Glansdorff (edited by) (2007) Physiology and biochemistry of extremophiles / Washington, D.C. : ASM Press,  G. Antranikian (1998) Biotechnology of extremophiles with contributions by G. Antranikian [et al.]. Berlin : Springer, 1998 Madigan MT and Martinko JM. (2006). Brock Mikroorganizmaların Biyolojisi. (Çeviri Editörü: Cumhur ÇÖKMÜŞ). Palme Yayıncılık, Ankara. Harisha, S. Biotechnology precedures and Experiments Handbook. INFINITY SCIENCE PRESS LLC Hingham, Massachusetts, New Delhi, India | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Extreme Eukaryota and Their Metabolites |
| 2 | Fungi |
| 3 | Fungi |
| 4 | Lichenes |
| 5 | Lichenes |
| 6 | Midterm Examination 1 |
| 7 | Algae |
| 8 | Industrial importance of fungal metabolites |
| 9 | Mycotoxines |
| 10 | Antibiotics |
| 11 | Midterm Examination 2 |
| 12 | Pigments |
| 13 | Antineoplastics agents |
| 14 | Production Techniques of fungal metabolites |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | | Prof. Dr. Semra İLHAN | **Date:** | | 14.05.2015 | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501101543 | **TITLE** | PHYTOTHERAPY, FREE RADİCALS AND ANTİOXİDANT SYSTEMS |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | TÜRKÇE |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | |  |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 25 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (Seminar) | | | | | 1 | | 25 |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | What are free radicals? Protection from free radicals. The role of antioxidants and herbs will be provided with information about treatment methods.. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The principal purpose of increasing the negative effects of free radicals present, with plant-derived antioxidants inactivation | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Free radicals are aware of the damage caused to live life with plants and become knowledgeable about the methods of treatment. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Students who have taken this course;  1. Source of free radicals and their effects on living systems to learn  2. General characteristics and classification of molecules Antioxidant detailed information about the Acquiring.  3. Phytotherapy and the importance of having information about the types.  4. Dose / concentration-response interactions compared in a meaningful way. | | | | | | | |
| **TEXTBOOK** | | | | | Principles and Practice of Phytotherapy, Modern Herbal Medicine, Kerry Bone, Simon Mills, 2013. | | | | | | | |
| **OTHER REFERENCES** | | | | | 1. Antioxidant Enzyme, Mohammed Amr El-Missiry, 2012.2. Techniques in Free-radical Research, Catherine A. Rice-Evans, Anthony T. Diplock3. Fitoterapi ve Aromaterapi, Nimet Özata. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | İntroduction the free radicals |
| 2 | Oxygen-derived free radicals, Nitric oxide radicals and others. |
| 3 | Carbon and carbon-oxygen centred radicals |
| 4 | Mechanisms of radical production |
| 5 | Physical and chemical generation of radicals |
| 6 | Midterm Examination 1 |
| 7 | Antioxidant defences |
| 8 | Antioxidant nutrients and antioxidant enzymes |
| 9 | Biomedical Therapies |
| 10 | Antioxidant Therapies for Hypolipidemia, Antioxidant Therapies for Hyperglycemia |
| 11 | Midterm Examination 2 |
| 12 | Mitochondrial Free Radicals, Antioxidants, Nutrient Substances |
| 13 | Antioxidant Defense in Antitumor Therapy |
| 14 | Antioxidants from Plants |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Doç. Dr. Hakan ŞENTÜRK | **Date:** | 20.05.2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501101540 | **TITLE** | Freshwater Ecosystem Management and Their Services |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | |  |  | | | 3 | 7,5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
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| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | |  |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 25 |
| Project | | | | |  | |  |
| Report | | | | | 1 | | 25 |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Definition and types of fresh water ecosystems, fauna and flora of fresh water ecosystems, how to benefit from fresh water ecosystems, biological diversity at fresh water ecosystem and their protection, quality of watershed, what is the biological monitoring and how that do, water framework directive, watershed management, place and importance of science and politics at water management, restoration of freshwater ecosystems. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | This course aims that students get equipped about types and structure of aquatic ecosystems, water quality, introduce of biological diversity, how make benefit from aquatic ecosystems as scientific and how apply to economy and country benefit of its outcomes. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course contributes appeared and examined role of continue ecosystems of its maintainability with realize place and importance of aquatic ecosystems in organisms lives. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Students who are complete this course learned types and structure of aquatic ecosystems and examined aquatic ecosystems with scientific approach by apprehended how benefit from fresh water ecosystems, arrangement of aquatic ecosystem, its biological diversity. | | | | | | | |
| **TEXTBOOK** | | | | | Wetzel, R. G., 2001. Limnology, Lake and River Ecosystems. Elsevier Academic Press, 1005p. | | | | | | | |
| **OTHER REFERENCES** | | | | | Cech, T. V., 2010. Principles of Water Resources, John Wiley & Sons Inc., 546p.Gordon, N. D., McMahon, T. A., Finlayson, B. L., Gippel, C. J. and Nathon, R. J., 2004. Stream Hydrology, an introduction for ecologist, John Wiley & Sons Inc., 429p.Welch, E. B. and Jacoby, J. M., 2008. Pollutant Effects in Freshwater, Applied Limnology. Taylor & Francis Group, 504p.Darby, S. and Sear, D., 2008. River Restoration, Managing the Uncertainty in Restoring Physical Habitat, Wiley& Sons Inc., 315p. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Definition, types and importance of aquatic ecosystems |
| 2 | Main fauna and flora elements at aquatic ecosystems and biological importance |
| 3 | Utilization from fresh water ecosystems |
| 4 | Protection of biological diversity at fresh water ecosystems |
| 5 | Quality of habitat |
| 6 | Midterm Examination 1 |
| 7 | Biological monitoring |
| 8 | Water Framework Directive |
| 9 | Watershed Management |
| 10 | Science and Politics at water management |
| 11 | Midterm Examination 2 |
| 12 | Transboundary freshwaters ,Global Climate Changes and its effects |
| 13 | Adaptation to effects of global climate change |
| 14 | Restoration of fresh water ecosystems |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Prof. Dr. Naime ARSLAN | **Date:** | 11/05/2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501111602 | **TITLE** | FUNGAL SAMPLING METHODS AND MODERN IDENTIFICATION |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( x ) | TURKISH |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| 3 | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 25 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 25 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | The scope of this course will be included the isolation methods of fungi and the modern methods for their identification. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aim of this course is to provide understanding of the importance of methods used in the determination of fungal biodiversity | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course will provide the students' understanding of the working principles of fungi that are part of biodiversity. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1.Able to distinguish the fungi from the other living groups  2.Able to explain the isolation methods of microfungi  3.Able to sort the morfological characteristics of microfungi  4.Able to explain the method on isolation of fungal DNA  5.Able to explain the principles of staining methods used in microfungi identification  6.Able to understand the principles of PCR and Real Time PCR | | | | | | | |
| **TEXTBOOK** | | | | | İLHAN S (2012) Fungal Sampling Methods and Modern Identification Ders Notları, ESOGÜ Biyoloji Bölümü, ESKİŞEHİR | | | | | | | |
| **OTHER REFERENCES** | | | | | Samson RA, JI Pitt, (Eds.). (2000) Integration of Modern taxonomic methods for Penicillium and Aspergillus Talbot N. (2001) Molecular and cellular biology of filamentous fungi : a practical approach. Oxford University Press Harisha, S. (2007) Biotechnology Procedures and Experiments Handbook. INFINITY SCIENCE PRESS LLC Hingham, Massachusetts, New Delhi, India Varga J, Samson RA. (Eds.). (2008) Aspergillus in the genomic era. Wageningen Academic classification. 510 pp. Harwood Academic Publishers.Singapore | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | General Characteristics of Fungi |
| 2 | Isolation Methods of Fungi |
| 3 | Classical Methods in Identification |
| 4 | Modern Methods in Identification |
| 5 | Modern Methods in Identification |
| 6 | Midterm Examination 1 |
| 7 | Staining Methods in Identification |
| 8 | DNA Isolation on Fungi |
| 9 | The Examination of Proteins on Polyacrilamide Gel Electroforesis |
| 10 | The Examination of DNA on Polyacrilamide Gel Electroforesis |
| 11 | Midterm Examination 2 |
| 12 | PCR |
| 13 | Real Time PCR |
| 14 | Evaluation of Data from Computer and Determination of Species |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | | Prof. Dr. Semra İLHAN | **Date:** | | 14.05.2015 | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501102525 | **TITLE** | Animal Cell Culture Technology |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | |  |  | | | 3 | 7.5 | COMPULSORY  ( x ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 50 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | This course will include topics introduction to animal cell culture and  practise area. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aim of the course is to have the ability of adjunction of concept and understanding about cell culture methods. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | To reveal what is the animal cell cultures, types and practise areas by student. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Understand general features of cell culture techniques  2. Apply the technique of preparation of cell culture labs  3. Understand different cell lines and this maintance  4. Identifying chemicals for culture  5. Apply to technique of preparation of cell preservation and storage  6. Understand general features of cell viability testsPlease write minimum four learning outcomes for the course. | | | | | | | |
| **TEXTBOOK** | | | | | 1- Freshney, R. Ian. 1988. Culture of Animal Cell Culture, A Manual of Basic Technique, Alan R. Liss, Inc., New York. | | | | | | | |
| **OTHER REFERENCES** | | | | | 1. S.J. Morgan ve D.C. Darling. Animal Cell Culture.2. Cooper G.M.: The Cell: a molecular approach.Oxford University Press, 1997. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Introduction to animal cell culture techniques |
| 2 | Design of the cell culture laboratory and equipment |
| 3 | The culture environment: media preparation and formulations |
| 4 | Sterilization |
| 5 | Isolation of animal cell from tissue and preparation of primary cell culture |
| 6 | Midterm Examination 1 |
| 7 | Solution to some cell culture problems |
| 8 | To learn about cell morphology in cell culture |
| 9 | Maintaining cells, media changes and passaging cells |
| 10 | Cell preservation and storage |
| 11 | Midterm Examination 2 |
| 12 | Cell viability tests |
| 13 | Researching paper about cell culture |
| 14 | Oral Presentation |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Assoc.Prof. Dr.Ayşe Pınar Öztopcu Vatan | **Date:** | 07.05.2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501112605 | **TITLE** | Cell Movements and Molecular Mechanisms |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | |  |  | | | 3 | 7.5 | COMPULSORY  ( x ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 50 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | The aim of this course are understanding general cell movement terms that are used for (required to) identification of movement mechanisms by the students | | | | | | | |
| **COURSE OBJECTIVES** | | | | | Cell movement is concerned with all types of movement at the cellular level. It covers cellular locomotion, as well as molecular mechanism which achieve movement Cell movements are crucial to cell life. The goal of this course is to enable the students to learn the basic concepts of cellular movements and movement types | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course will make contribution to comprehending terminologies of cell movements by the students. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Understand general features of cell movements  2. Distinguish terminological terms of cell movement mechanisms  3. Identifying cell movement types  4. Show to how to research cell movement,cell culture, biochemical and molecular techniques | | | | | | | |
| **TEXTBOOK** | | | | | 1. Harvey Lodish, Arnold Berk, Lawrence S. Zipursky, Paul Matsudaira, David Baltimore, James Darnell, Fourth Edition, , Molecular Cell Biology, Fifth Edition, 2003 | | | | | | | |
| **OTHER REFERENCES** | | | | | 1. Cooper G.M.: The Cell: a molecular approach.Oxford University Press, 1997.2. Concepts of GENETİC , Genetik Kavramlar 6. baskıdan çeviri, William S Klug, Michael R Cummings, Palme Yayıncılık, 2000 | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Cell structure |
| 2 | Cell cytoskeletal and structural elements types |
| 3 | Cellular movements and movement types |
| 4 | Mechanism of cell motility |
| 5 | The molecular basis of cell motility |
| 6 | Midterm Examination 1 |
| 7 | Regulation of cell locomation |
| 8 | Energy of cell motile |
| 9 | Focal contact formation |
| 10 | Cell migration |
| 11 | Midterm Examination 2 |
| 12 | Cancer cells and movement |
| 13 | How to research cell movement,cell culture, biochemical and molecular techniques |
| 14 | A role for ions and ions channel in cell movement |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | | Assoc.Prof.Dr. Ayşe Pınar ÖZTOPCU VATAN | **Date:** | | 07.05.2015 | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501111615 | **TITLE** | IDENTIFICATION OF MICROFUNGI |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | TURKISH |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| 3 | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 25 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 25 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | The scope of this course will be included isolation of microfungi and identification by classical and molecular techniques of microfungi | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aim of this course is to provide understanding of the basic knowledge for identification of microfungi by the students. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course will contribute to prepare for professional life by providing knowledge on microfungus identification. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1.To explain the morphological characteritics of microfungi  2.Expressing the techniques used in the isolation of microfungi  3.Use the keys to identification of microfungi  4.Sort the characteristics used to identify microfungi by classical methods  5.To express the molecular methods used in the identification of microfungi  6.Exemplify the pathogen microfungi | | | | | | | |
| **TEXTBOOK** | | | | | İLHAN S (2012) Mikrofungus İdentifikasyonu Ders Notları, ESOGÜ Biyoloji Bölümü, ESKİŞEHİR | | | | | | | |
| **OTHER REFERENCES** | | | | | ALEXOPOULOS CJ, Mims CW. 1996., Introductory Mycology, M. Blackwell. Wiley; DEACON J, 2006. Fungal Biology., Blackwell Publishing KLICH MA, 2002. Identification of common Aspergillus species. Utrecht, The Netherlands, Centraalbureau voor Schimmelcultures, 116 p. PITT JI, 1979. The Genus Penicillium and Teleomorphic States Eupenicillium and Talaromyces, 634 pp. London, Academic Press Inc. RAPER KB and FENNELL DI, 1965. The Genus Aspergillus, 686 pp. The Williams and Wilkins Comp. Baltimore, USA.; SAMSON RA and PITT JI, 2000. Integration of Modern Taxonomic Methods for Penicillium and Aspergillus Clasification, Harwood Academic Publishers. SAMSON RA and PITT JI, 1990. Modern Concepts in Penicillium and Aspergillus Clasification,. Plenum Press. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Fungi and their general characteristics |
| 2 | Morphology of microfungi |
| 3 | Diversity of microfungi |
| 4 | Moniliaceae |
| 5 | Moniliaceae |
| 6 | Midterm Examination 1 |
| 7 | Moniliaceae |
| 8 | Dematiaceae |
| 9 | Dematiaceae |
| 10 | Dematiaceae |
| 11 | Midterm Examination 2 |
| 12 | Identification of the other filamentous fungi |
| 13 | Identification of the other filamentous fungi |
| 14 | Identification of the other filamentous fungi |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | | Prof. Dr. Semra İLHAN | **Date:** | | 14.05.2015 | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501101525 | **TITLE** | ADVANCED BIOCHEMISTRY |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | |  |  | | | 3 | 7.5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | This course covers such subjects as amino acids, peptides, proteins, enzymes, co-enzymes, nucleic acids, regulation of gene activation, as well as naming, structure and functions of carbon hydrates, glycosylation, and lipids. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | This course aims to enable students to develop and understanding of structure and functions of biomolecules, and to explain chemical mechanisms of basic processes. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | By the end of this course, students will have learned structure and functions of biomolecules, apart from gaining a notion regarding the importance of biochemistry for biology as a result of their improved analytical thinking skills. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. To be able to comprehend chemical structures at a molecular level  2. To be able to recognise the relationship between molecular structure and functional groups in relation to physical properties of organism  3. To be able to explain structure and functions of monoacids  4. To be able to comprehend the effect of amino acids in proteins  5. To be able to relate structure of proteins with their functions  6. To be able to explain kinetics of enzymatic reactions  7. To be able to rate structure and functions of nucleic acids  8. To be able to comprehend the importance of the regulation of gene activation  9. To be able to name and classify carbon hydrates  10. To be able to define lipids according to their chemical and functions | | | | | | | |
| **TEXTBOOK** | | | | | P.C.Champe, R.A.Harvey Ed. Lippincott’s Illustrated Reviews: “Biochemistry”, Turkish Translation.: E.Ulukaya, Nobel Medical Book Store, (2007). | | | | | | | |
| **OTHER REFERENCES** | | | | | 1.Keha E.E.,Kührevioğlu I., " Biochemistry", (2004).2.Nelson, D.L. and Cox, M.M. (2004). Lehninger Principles of Biochemistry. Chapter 1-13), Worth Publishers, Wisconsin, USA (in Turkish version: Palme yayıncılık: Ed. Kılıç N.).3. Gözükara E., Biochemistry, Ankara (1990) | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Structure of biomolecules and functional groups |
| 2 | Proteins and amino acids |
| 3 | Structure and functions of amino acids |
| 4 | Three-dimensional structures of proteins |
| 5 | Structure characterization of proteins |
| 6 | Midterm Examination 1 |
| 7 | General properties and naming process of enzymes |
| 8 | Enzymatic reactions and catalytic mechanism |
| 9 | Monosaccharides and polysaccharides |
| 10 | Glycolipid and glycoproteins |
| 11 | Midterm Examination 2 |
| 12 | Structure and functions of nucleic acids |
| 13 | Classification and functions of lipids |
| 14 | Biological membranes and lipoproteins |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Associate Prof. Dr Adnan AYHANCI | **Date:** | 04.05.2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501101537 | **TITLE** | ADVANCED CELL PHYSIOLOGY |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | |  |  | | | 3 | 7.5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | This course will cover issues that deal with the basic structure of the cell and functions of its different regions in order to enable students to understand functions of the organs and tissues of the body. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | This course aims to enable students to understand metabolism through learning how organs works, as well as how their functions and systems interrelate at cellular levels. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course will provide students with an understanding of the functions of the cells that form the basis of living organisms, as well as those of the organs and tissues of the body. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. To be able to comprehend the fact that components of the cell are only functional when taken as a whole  2. To be able to explain functions of membrane, cytoplasm, and organelles.  3. To be able to fully understand the fact that life is only possible within a cellular unity  4. To able to comprehend the importance of cell membrane in the make-up of cell unity, as well as in giving the cell identity and transporting materials.  5. To be able to comprehend the importance of controlled cell proliferation and differentiation  6. To be able to study the reasons for and results of uncontrolled cell proliferation  7. To be able to explain the importance of intercellular connection and communication  8. To be able to understand the importance of tissue agreement antigens in organ transplantation | | | | | | | |
| **TEXTBOOK** | | | | | Ayhancı A. (2012) Hayvan Fizyolojisi Ders Notları. Eskişehir | | | | | | | |
| **OTHER REFERENCES** | | | | | 1. Guyton A C. (1991) Textbook of Medical Physiology. W.B. Saunders Company, Harcourt Brace Jovanovich, Inc.2. Doğan A. (Çeviri ed) (1995) Ganong Tıbbi Fizyoloji. Barış Kitabevi, İstanbul3. Çağlayan Ş. (1999) Yaşam Bilimi Fizyoloji. Panel Matbaacılık, İstanbul.4. Noyan A. (2003) Yaşamda ve Hekimlikte Fizyoloji. Meteksan, Ankara5. Randal D., Burggren, W. And French K. (1997) Animal Physiology. W.H. Freeman and Company, New York | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Functional organisation of organisms and indoor control |
| 2 | Homeostatic mechanisms and homeostasis |
| 3 | Control systems of the body |
| 4 | Organisation of the cell |
| 5 | Structure and organisation of cell membrane |
| 6 | Midterm Examination 1 |
| 7 | Cell activities |
| 8 | Transportation of substances through cell membrane |
| 9 | Cytoplasm and organelles |
| 10 | Protein traffic in the cell |
| 11 | Midterm Examination 2 |
| 12 | Cell proliferation and genetic control |
| 13 | Genetic and enzymatic regulation |
| 14 | Cancer |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Associate Prof. Dr Adnan AYHANCI | **Date:** | 04.05.2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501101532 | **TITLE** | IMMOBILIZED MICROBIAL CELLS |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( x ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| 3 | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 20 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 10 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | | 1 | | 20 |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | | Absent | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | The scope of this course will be included the properties of immobilized cells systems and their advantages, the microbial cells used on immobilization and their commercial uses, the supports and their properties. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aim of this course is to provide understanding of the basic knowledge for the immobilized cell systems and their use in biotechnology by the students. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course will contribute to prepare for professional life by providing knowledge on the immobilization techniques of microbial cells. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1.Understanding the importance of immobilized microbial cells  2.Expressing the historical development of immobilized microbial cells  3.Sort the advantages of immobilized microbial cells  4.To understand the properties of carriers used in the immobilization of microbial cells  5.To exemplify the carriers used for immobilization of microbial cells  6.To exemlplify the applications of immobilized microbial cells | | | | | | | |
| **TEXTBOOK** | | | | | İLHAN S (2012) Immobilized Microbial Cells Lecture Notes, ESOGÜ Biyoloji Bölümü, ESKİŞEHİR | | | | | | | |
| **OTHER REFERENCES** | | | | | Veliky IA. and McLean RJC, (1994). Immobilized Biosystems: Theory and Practical Applications. Blackie Academic and Professional; Phillips CR. and Poon YC, (1988). Immobilization of Cells. Springer Verlag; Woodward J, 1985. IRL PressOxford Washington DC; Wijffels RH, (2000). Immobilized Cells. Springer Lab Manuals; Guisan JM, (2006). Immobilization of Enzymes and Cells. Humana Press. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | The history and importance of immobilized microbial cells |
| 2 | The properties of microbial cells |
| 3 | The properties of microbial cells |
| 4 | The properties of immobilized microbial cells |
| 5 | The microbial cells used on immobilization |
| 6 | Midterm Examination 1 |
| 7 | The microbial cells used on immobilization |
| 8 | Growth cycle on microbial cells |
| 9 | The cariers used on immobilized cell systems |
| 10 | The cariers used on immobilized cell systems |
| 11 | Midterm Examination 2 |
| 12 | Student presentations |
| 13 | Student presentations |
| 14 | Student presentations |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Prof. Dr. Semra İLHAN | **Date:** | 14/05/2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501112627 | **TITLE** | Ecosystem Assessment on the Basis of İchthyological Hydroelectric Power Plants |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | |  |  | | | 3 | 7,5 | COMPULSORY  ( x ) | | ELECTIVE  (   ) | Turkısh |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 2 | | 50 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Hydroelectric Power Plants installed in areas where the identification of the ecological requirements of fish populations and methods to be used. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The world's energy needs are growing rapidly as well, especially carbon-based resources are being exhausted and carbon-based energy sources in the production consists of significant environmental impacts. Thus a skyrocketing demand in the world of renewable energy sources power plants are being built that can use. One of them is the hydroelectric power plants. However, based ecological done Hydroelectric power stations have been caused adverse ecological impacts. Hydroelectric power plants have been built in the water system, especially for breeding and feeding of fish migration routes are cut to reveal adverse effects. This negative impact of hydroelectric power plants on fish for the prevention of fish passages have been built in front of the set. This course also BIOLOGY, GEOLOGY OF CIVIL ENGINEERING and design of fish passage to the graduate students, giving information about dimensions and monitoring shortfalls experts on this issue in our country will contribute to. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Fish passage of hydroelectric power plants, which will be held in the design, dimensions and monitoring of these will be knowledge about | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Understanding varieties of world energy production  2. Renewable energy resources learning  3. Understand the general characteristics of hydroelectric power plants  4. Determination of the ecological impact of hydroelectric power plants  5. Understanding of the design of fish passage  6. Planning dimensions of fish passage  7. To learn monitoring of fish passage criteria  8. Determination of the necessity of collaboration between professional groups  9. Forest Water Affairs Department of the Ministry of Environmental Protection of Sensitive Areas understanding of fish passage monitoring criteria | | | | | | | |
| **TEXTBOOK** | | | | | 1. Fish Passes: Design, Dimensions and Monitoring. DWA, FAO ve DSİ : DSİ ISBN: 978-605-393-045-7 | | | | | | | |
| **OTHER REFERENCES** | | | | |  | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | World energy production and carbon-based sources |
| 2 | Processes and rentability of renewable energy generation |
| 3 | Types of hydroelectric power plant design working principals |
| 4 | Ecological principles |
| 5 | Ecological principles |
| 6 | Midterm Examination 1 |
| 7 | The basic rules of fish passage |
| 8 | Similar types of natural fish passage |
| 9 | Similar to natural fish passage types and designs |
| 10 | Technical types of fish passage |
| 11 | Midterm Examination 2 |
| 12 | Monitoring of fish passage |
| 13 | Monitoring and reporting of fish passage |
| 14 | Related legislations for fish passage |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | | Assoc.Prof.Dr.Özgür EMİROĞLU | **Date:** | | 07/05/2015 | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501112624 | **TITLE** | Invasive Species in Freshwater and Struggle |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | |  |  | | | 3 | 7,5 | COMPULSORY  ( x ) | | ELECTIVE  (   ) | Turkısh |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 2 | | 50 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | The aim of this course are Fresh Waters introduced invaders control methods will be discussed | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The recognition of invasive fish species in fresh waters in Turkey recognize, distribution, damage and is intended to teach methods of struggle | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course will enable students to learn the methods of struggle to recognize and invasive fish species. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1-Invasive alien species and species concepts to be learned  2-Inland waters, invasive species to be learned  3-Learn methods to struggle invasive species | | | | | | | |
| **TEXTBOOK** | | | | | www.fishbase.org LAGLER, F.K., 1956, Freshwater Fishery Biology, W.M.C. Brown Co. Publishers Dubuque, 421p, lowa | | | | | | | |
| **OTHER REFERENCES** | | | | | www.iucn.org, www.tusob.com.tr, www.fws.gov/invasives, www.dfo-mpo.gc.ca, www.epa.gov GELDİAY, R. ve BALIK, S., 1988 Türkiye Tatlı Su Balıkları, Ege Üniversitesi Fen Fakültesi Kitaplar Serisi, No: 97, s: 1-159, İzmir. ÖZDAMAR, K., 1989, Biyoistatistik, Bilim Teknik Yayınevi AVŞAR, D., 2005 Balıkçılık Biyolojisi ve Populasyon Dinamiği, Nobel Kitabevi Adana, 332 Su Ürünleri İstatistikleri 2006,TC. Başkakanlık İstatistik Kurumu, ISSN NİKOLSKY, G. W., 1963, The Ecology of Fishes. Academic Press London and Newyork, p:352 | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Introduction of alien fish in inland waters in the world which spreads an important |
| 2 | Distribution of the inland waters of Turkey of invasive species |
| 3 | To teach the definitions of invasive species and alien species |
| 4 | Showing the determination of the spread of alien species in inland waters in Turkey |
| 5 | Mechanisms of migration of invasive species in Turkey |
| 6 | Midterm Examination 1 |
| 7 | Turkey of invasive species population structure and ecological characteristics |
| 8 | Factors playing a role in the invasion |
| 9 | Factors playing a role in the invasion |
| 10 | Global warming's role in invasion |
| 11 | Midterm Examination 2 |
| 12 | Struggle methods of the invading populations |
| 13 | Struggle methods of the invading populations |
| 14 | Struggle methods of the invading populations |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | | Assoc.Prof.Dr.Özgür EMİROĞLU | **Date:** | | 07/05/2015 | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501111623 | **TITLE** | Fresh Water in Turkey |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | |  |  | | | 3 | 7,5 | COMPULSORY  ( x ) | | ELECTIVE  (   ) | Turkısh |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 2 | | 50 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Turkey's fresh water fishes learned | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The systematics of freshwater fish in inland waters with the course of Turkey, is to introduce the physiological and ecological characteristics of structures | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course will teach students to fish the fresh waters of Turkey | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1-Morphological and anatomical characteristics of freshwater fish to be learned,  2-Water environments to learn, live freshwater fish,  3-Turkey to learn key freshwater fish designated  4-Ecologically and economically important families of freshwater fish to be learned Please write minimum four learning outcomes for the course. | | | | | | | |
| **TEXTBOOK** | | | | | GELDİAY, R., BALIK, S. Türkiye Tatlı Su Balıkları, Ege Üniversitesi Basımevi Bornava İzmir 1988 | | | | | | | |
| **OTHER REFERENCES** | | | | | ÖZDAMAR, K., 1989, Biyoistatistik, Bilim Teknik YayıneviSu Ürünleri İstatistikleri 2010,TC. Başkakanlık İstatistik Kurumu, ISSN 1013-6177,60 s.NİKOLSKY, G. W., 1963, The Ecology of Fishes. Academic Press London and Newyork, p:352LAGLER, F.K., 1956, Freshwater Fishery Biology, W.M.C. Brown Co. Publishers Dubuque, 421p, lowa | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Evolution of Freshwater Fishes |
| 2 | Fish sex markers |
| 3 | Freshwater fish body parts |
| 4 | Anatomy of the fish |
| 5 | Sensory organs of fish |
| 6 | Midterm Examination 1 |
| 7 | Characteristics of the water to fish |
| 8 | Respiratory Mechanisms of fish |
| 9 | Turkey's main lakes and rivers |
| 10 | Systematics of freshwater fish |
| 11 | Midterm Examination 2 |
| 12 | Systematics of freshwater fish |
| 13 | Turkey identification key for freshwater fish |
| 14 | Introduction of major freshwater fish families in Turkey |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | | Assoc.Prof.Dr.Özgür EMİROĞLU | **Date:** | | 07/05/2015 | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501102536 | **TITLE** | Fishery and Population Dynamics |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | |  |  | | | 3 | 7,5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 2 | | 50 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | This course Populations of Fisheries Biology will be knowledgeable about | | | | | | | |
| **COURSE OBJECTIVES** | | | | | This course is an important economic and ecological importance in Turkey with natural populations of fish species and the sustainable production of structure is intended to give for necessary basic information | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course will provide the transfer of information to students about the management and fish populations. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1-Will learn the basic techniques used in fisheries applications  2-Fisheries biologists in the production and control of the areas to be learned  3-Fishing business model and credit to be learned  4-Production will learn the basic principles of natural- enstantif | | | | | | | |
| **TEXTBOOK** | | | | | AVŞAR, D., 2005 Balıkçılık Biyolojisi ve Populasyon Dinamiği, Nobel Kitabevi Adana, 332 | | | | | | | |
| **OTHER REFERENCES** | | | | | SARIHAN, E., 1995.Balıkçılık Biyolojisi,Çukurova Üniv Ziraat Fakültesi Ders Kitabı No:65,s1-121,Adana KARA, Ö,F., 1992. Balıkçılık Biyolojisi ve Populasyon Dinamiği,Ege Üniv Su Ürünleri Yüksekokulu Kitaplar Serisi No:27,s1-168, Bornova-İzmir KANDLER, R., Ders notları çevirisi, DEMİR,M., 1965.Balıkçılık Biyolojisine Giriş,İstanbul Üniv Yayınları Sayı 1129, s1-107, İstanbul ÖZDAMAR, K., 1989, Biyoistatistik, Bilim Teknik Yayınevi BİNGEL, F.,2002 BALIK Popülasyonlarının İncelenmesi, Baki Kitapevi Adana, 404s Su Ürünleri İstatistikleri 2006,TC. Başkakanlık İstatistik Kurumu, ISSN 1013-6177,60 s. NİKOLSKY, G. W., 1963, The Ecology of Fishes. Academic Press London and Newyork, p:352 LAGLER, F.K., 1956, Freshwater Fishery Biology, W.M.C. Brown Co. Publishers Dubuque, 421p, low | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | The overall growth characteristics of fish populations,, |
| 2 | Reproductive characteristics of fish populations |
| 3 | Application of basic principles of fisheries |
| 4 | Hunting practices |
| 5 | Turkey and the world fish catch statistics |
| 6 | Midterm Examination 1 |
| 7 | Exploitation, death and hunting efficiency calculations |
| 8 | Fish production environment |
| 9 | Fisheries-related environmental legislation and European Union law |
| 10 | Business credit models (KOSGEB Fisheries Fund and the European Union) |
| 11 | Midterm Examination 2 |
| 12 | Principles relating to fish food regulation and control applications, the basic principles of fish production |
| 13 | Economic importance of fish biology students about the basics of implementing |
| 14 | Fishing enterprises and project control mechanisms of production and ecological principles |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Assoc. Prof. Dr. Özgür EMİROĞLU | **Date:** | 07/05/2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501101539 | **TITLE** | Stagnant Water Fishing |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | |  |  | | | 3 | 7,5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 2 | | 50 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Information on fishing yields in Turkey will be introduced in the stagnant waters. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | With this course, the fish exports in 2011 exceeded $ 1 billion in exports stagnant water environments can contribute to the production of specialists with information to educate people. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course will provide students have knowledge about fishing in stagnant water. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1-Stagnant water habitats of fish production in Turkey to learn the appropriate  2-Learn about the types to the production of still waters  3-Learn about legal and environmental zorunluklarını production  4-Learn the basic principles of business  5-Credit and incentives to learn, benefit from | | | | | | | |
| **TEXTBOOK** | | | | | ÇAĞILTAY, F. İç Su Balıkları Yetiştiriciliği, Nobel Yayın Evi 2007 Ankara | | | | | | | |
| **OTHER REFERENCES** | | | | | JACK, A., MATHİAS, T., Baotog, Hu.,Integrated Fish Farming TİDWELL, J. Aquaculture Production Systems, Wılley-Balackwell 2012 GELDİAY, R., BALIK, S. Türkiye Tatlı Su Balıkları, Ege Üniversitesi Basımevi Bornava İzmir 1988 ÖZDAMAR, K., 1989, Biyoistatistik, Bilim Teknik Yayınevi Su Ürünleri İstatistikleri 2010,TC. Başkakanlık İstatistik Kurumu, ISSN 1013-6177,60 s. NİKOLSKY, G. W., 1963, The Ecology of Fishes. Academic Press London and Newyork, p:352 LAGLER, F.K., 1956, Freshwater Fishery Biology, W.M.C. Brown Co. Publishers Dubuque, 421p, lowa | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Introduction of stagnant water, natural and artificial environments in Turkey |
| 2 | Physico-chemical characteristics of water of suitable areas for fish production stood there |
| 3 | Introduction of species that can be used in production |
| 4 | Regional, fish, and production processes, criteria for identifying |
| 5 | Using the rights and responsibilities in stagnant water |
| 6 | Midterm Examination 1 |
| 7 | Fish production types and materials |
| 8 | The legal processes of production |
| 9 | Environmental processes of production |
| 10 | Inspections carried out by the Ministry |
| 11 | Midterm Examination 2 |
| 12 | Facility operator raporlayacağı analysis |
| 13 | The marketing process  Credit facility and the possibilities |
| 14 | Price Cost analysis and determination of product price  Incentives provided by the State |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Assoc. Prof. Dr. Özgür EMİROĞLU | **Date:** | 07/05/2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501111609 | **TITLE** | BLOOD PHYSIOLOGY |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | |  |  | | | 3 | 7.5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | This course will cover structure of plasma and blood cells, composition, functions and the importance of blood in homeostasis | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The purpose of this course is to enable students to understand the role of plasma in the maintenance of metabolism by recognising the structure and functions of blood. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course will enable students to explain the role of metabolism by learning how plasma transport food, respiratory gases, hormones, minerals and metabolic waste necessary for all kinds of cells. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. To be able to explain the role of blood in metabolism  2. To be able to explain component of blood  3. To be able to understand how oxygen is transported into tissues through the respiratory organs and how carbon dioxide is transported from tissues through the respiratory organs  4. To be able to explain how metabolic wastes are disposed of from  tissues and organs  5. To be able to explain how digested food is transported into tissues  6. To be able to figure out how such vital events as water, heat, pH are regulated by the blood tissue  7. To be able to figure out the fight the body system against harmful microorganisms and antigens  8. To be able to explain how loss of blood is prevented trough clotting mechanism | | | | | | | |
| **TEXTBOOK** | | | | | Guyton A C. (1991) Textbook of Medical Physiology. W.B. Saunders Company, Harcourt Brace Jovanovich, Inc.. | | | | | | | |
| **OTHER REFERENCES** | | | | | 1. Doğan A. (Çeviri ed) (1995) Ganong Tıbbi Fizyoloji. Barış Kitabevi, İstanbul2. Çağlayan Ş. (1999) Yaşam Bilimi Fizyoloji. Panel Matbaacılık, İstanbul.3. Noyan A. (2003) Yaşamda ve Hekimlikte Fizyoloji. Meteksan, Ankara4. Randal D., Burggren, W. And French K. (1997) Animal Physiology. W.H. Freeman and Company, New York | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Blood cells, plasma and serum |
| 2 | Erythrocytes, anaemia and polycythemia |
| 3 | Resistance of the body against infections, leukocytes, macrophage system and inflammation |
| 4 | Immunity and allergy |
| 5 | Blood types |
| 6 | Midterm Examination 1 |
| 7 | Transfusion and transplantation |
| 8 | Haemostasis and clotting of blood |
| 9 | Haemophilia, thrombocytopenia and thromembolic events |
| 10 | Tests for clotting of blood |
| 11 | Midterm Examination 2 |
| 12 | Anticoagulants |
| 13 | Leukaemia and types of leukaemia |
| 14 | Autoimmunological diseases |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Associate Prof. Dr Adnan AYHANCI | **Date:** | 04.05.2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501112617 | **TITLE** | The Process and The Molecular Mechanism of Cancer |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | |  |  | | | 3 | 7.5 | COMPULSORY  ( x ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
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| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 50 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | The aim of this course is understanding general the the process and the molecular mechanism of cancer by the students. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | Cancer is the uncontrolled growth of abnormal cells in the body. Cancer may affect people at all ages, even fetuses, but risk for the more common varieties tends to increase with age. Cancer causes about 13% of all deaths. The goal of this course is to enable the students to learn the basic concepts of cancer. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course will make contribution to understanding the process and the molecular mechanism of cancer by the students. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Understand general features of cancer  2. Distinguish the cancer inducible factors  3. Identifying between normal cell and cancer cells  4. Show to programmed Cell Death (Apoptosis) and Its relation of cancer | | | | | | | |
| **TEXTBOOK** | | | | | 1. Harvey Lodish, Arnold Berk, Lawrence S. Zipursky, Paul Matsudaira, David Baltimore, James Darnell, Fourth Edition, , Molecular Cell Biology, Fifth Edition, 2003. | | | | | | | |
| **OTHER REFERENCES** | | | | | 1. Cooper G.M.: The Cell: a molecular approach.Oxford University Press, 1997.2. Concepts of GENETİC , Genetik Kavramlar 6. baskıdan çeviri, William S Klug, Michael R Cummings, Palme Yayıncılık, 2000 | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Description of cancer and Cancer History |
| 2 | Comparison between normal cell and cancer cell (morphology, proliferation, antigenic and genetic) |
| 3 | Causes of cancers |
| 4 | Genes associated with cancer |
| 5 | Oncogen activation |
| 6 | Midterm Examination 1 |
| 7 | Tumor suppressor genes |
| 8 | Cell Development and growth control |
| 9 | Growth factor, Receptors and cancer |
| 10 | Movement cancer cell (Metastasis) |
| 11 | Midterm Examination 2 |
| 12 | Programmed Cell Death (Apoptosis) and Its relation of cancer |
| 13 | Specific Tumor Types |
| 14 | Cancer Models In vivo and In vitro |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | | Assoc.Prof.Dr. A. Pınar ÖZTOPCU VATAN | **Date:** | | 15.5.2015 | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501101538 | **TITLE** | Stem Cells |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | |  |  | | | 3 | 7.5 | COMPULSORY  ( x ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 50 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | This course will include topics introduction to use identification keys of stem cells. Subject of history of stem cells. Types of stem cells, differentiation mechanisms, giving information on the sources of obtaining recent studies on this subject last scan, seminars, information sharing among the students will be prepared. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The main aim of this course is the evolution of stem cell is investigated. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | To reveal what are the stem cells, types and develop into many different cell types in the body. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Stem cells have the remarkable potential to develop into many different cell types in the body during early life and growth.  In addition, in many tissues they serve as a sort of internal repair system, dividing essentially without limit to replenish other cells as long as the person or animal is still alive.  When a stem cell divides, each new cell has the potential either to remain a stem cell or become another type of cell with a more specialized function, such as a muscle cell, a red blood cell, or a brain cell. | | | | | | | |
| **TEXTBOOK** | | | | | 1. Klug, WS., Cummings, R. (2002), Genetik, çev. ed. Öner, C., Palme yayıncılık, ISBN 975-8624-21-0. | | | | | | | |
| **OTHER REFERENCES** | | | | | 1-) Dilsiz, N., (2004), Moleküler Biyoloji, Palme Yayıncılık2-) Turner, PC; McLennan; Bates AD; White MRH, Moleküler Biyoloji (2004), çev ed, Prof.Dr. Muhsin Konuk, Nobel Dağıtım3. Cooper G.M.: The Cell: a molecular approach.Oxford University Press, 1997. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | What are the stem cells |
| 2 | Types of stem cells |
| 3 | Types of embryonic stem cells |
| 4 | Methods of obtaining embryonic stem cells |
| 5 | Methods of obtaining embryonic stem cells |
| 6 | Midterm Examination 1 |
| 7 | What are the similarities and differences between embryonic and adult stem cells? |
| 8 | Types of adult stem cells |
| 9 | Adult stem cells |
| 10 | Fetal stem cells |
| 11 | Midterm Examination 2 |
| 12 | Cadaver stem cell |
| 13 | Parthenote stem cell |
| 14 | Stem cell therapy types |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Assoc. Prof. Dr. Ayşe Pınar ÖZTOPCU VATAN | **Date:** | 07.05.2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501112628 | **TITLE** | Lagoon Systems |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | |  |  | | | 3 | 7,5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | |  |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 25 |
| Project | | | | |  | |  |
| Report | | | | | 1 | | 25 |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Definition of lagoon systems, classification of lagoon systems, physical, chemical and biological features of lagoon systems, working process of lagoon systems, lagoon systems and structure in Turkey, problems of lagoon system and its solutions. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | This course aims that students get learned about identification, classification, features and working process of lagoon systems, getting information about problems of lagoon systems in Turkey and its solutions. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course contributes to student getting information about lagoon systems and its working and getting ability a studying by theoretical and applied in this field. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Students who are complete this course learned identification and classification of lagoon systems, arranged physical, chemical and biological features of lagoon systems, identification of lagoon systems in Turkey and offered problems of lagoon systems and its solutions. | | | | | | | |
| **TEXTBOOK** | | | | | Coastal Lagoons:Ecosystem processes and modeling for sustainable use and development, Gonenc, E., Wolflin, J.P., CRC Press, 500p, 2005, USA. | | | | | | | |
| **OTHER REFERENCES** | | | | | Coastal Lagoon Processes, Kjerfve, B. Elsevier Science, 1994. Netherlands. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | What are the lagoon systems? |
| 2 | What are the features of physical, chemical and biological? |
| 3 | Classification of lagoon systems |
| 4 | What are the living organisms in lagoon systems |
| 5 | Working process of lagoon systems |
| 6 | Midterm Examination 1 |
| 7 | Mediterranean region lagoons |
| 8 | Marmara region lagoons |
| 9 | Black sea region lagoons |
| 10 | Aegean region lagoons |
| 11 | Midterm Examination 2 |
| 12 | Problems of lagoon systems |
| 13 | Lagoons management and sustainability |
| 14 | Lagoons management and sustainability (continue) |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | | Prof. Dr. Naime ARSLAN | **Date:** | | 11/05/2015 | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501111619 | **TITLE** | Limnology |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | |  |  | | | 3 | 7,5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 25 |
| Quiz | | | | | 1 | | 25 |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Physical and chemical characteristics, its organisms, pollution and research methods of standing waters | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The main aim of this course is; aprehending research methods of standing waters;  aprehending of physical and chemical characteristics of standing waters;  aprehending of standing waters organisms | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | CCourse will be contributed that physical and chemical characteristics of standing waters, its biological characteristics and research methods comprehended by students. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Ability of explanation physical characteristics of standing waters,  2. Ability of explanation chemical characteristics of standing waters  3. Ability of descriptions of standing waters organism  4. Ability of prepare standing waters research  5. Ability of comparison different standing waters organisms  6. Ability of explanation importance of each standing waters component  7. Ability of apprehending conservation of standing waters systems  8. Ability of make monitoring study  9. Ability of explanation relationship between standing waters systems and human  10. Ability of explanation of chemical and physical properties of water | | | | | | | |
| **TEXTBOOK** | | | | | G. A. Cole , 2000. Textbook of Limnology | | | | | | | |
| **OTHER REFERENCES** | | | | | R. Wetzel, M. 1990. Limnology, Third Edition: Lake and River EcosystemsJeffries, M. And Mills, D., 1990. Freshwater ecology principles and applications. 283 p. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | General characteristics of standing waters |
| 2 | Chemical caracteristics of standing waters |
| 3 | Chemical caracteristics of rivers |
| 4 | Physical caracteristics of standing waters |
| 5 | Differences between standing waters and running waters |
| 6 | Midterm Examination 1 |
| 7 | Standing waters organisms, Standing waters organisms-Planktons |
| 8 | Standing waters organisms—Zooplankton and phytoplanktons |
| 9 | Anatomic and behavioral adaptations of standing waters organisms |
| 10 | Control factoring on distribution of standing waters organisms |
| 11 | Midterm Examination 2 |
| 12 | Lake pollution, Quantitative studies on lake systems |
| 13 | Lake fish species, ecological factors on lake fishes |
| 14 | Special standing waters (lagoon, wetlands, estuary) |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | | Prof. Dr. Naime ARSLAN | **Date:** | | 11/05/2015 | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501111606 | **TITLE** | MICROORGANISMS AND METAL RELATIONS |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | |  |  | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 2 | | 50 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Interaction between microorganisms and metals as an environmental factor and a function at metabolic processes will be included within in this course. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | This course aims to comprehend students the importance of metals for microbial life and provide students perceived efficiency of microorganisms for metal treatment. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course will contribute to production of alternative solutions for metal pollution by using microorganisms. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Be able to learn biomolecules interest in metal Be able to comprehend the importance of metals in metabolic processes of microorganisms Be able to develop biosorbent Be able to benefit microorganisms in mining industry | | | | | | | |
| **TEXTBOOK** | | | | | Microorganisms and Metal Relations, Lecture notes, ESOGU | | | | | | | |
| **OTHER REFERENCES** | | | | | Biosorption of Heavy Metals, Volesky, B, CRC Press, 1990. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Chemical properties of metals |
| 2 | Interest in metal of biomolecules |
| 3 | Biosorption, bioaccumulation and biomagnifications concepts |
| 4 | Biosorbent and properties of biosorbent: bacterial, fungal |
| 5 | Biosorbent and properties of biosorbent: algal |
| 6 | Midterm Examination 1 |
| 7 | Mechanisms of metal adsorption of biomolecules I |
| 8 | Mechanisms of metal adsorption of biomolecules II |
| 9 | Microbial metal enrichment |
| 10 | Bioremediation (in-situ ve ex-situ) |
| 11 | Midterm Examination 2 |
| 12 | Geomicrobiology |
| 13 | Metalloproteins |
| 14 | Biosorbent development for the passive treatment technologies |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Prof. Dr. Ahmet Çabuk | **Date:** | 15/05/2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501101511 | **TITLE** | MICROBIAL PHYSIOLOGY |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( 0 ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| 3 | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 20 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 10 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | | 1 | | 20 |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | This course is the study of the structure, metabolic prosses of microorganisms. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | This course aims to provide students with understanding the metabolic properties of microorganisms | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course will provide with improving microbial solution suggestions for corresponding application problems by perceiving metabolic importances of microorganisms and microbial life. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Be able to comprehend factors that control nutrition and reproduction of microorganisms  2. Be able to understand the metabolic diversity of microorganisms  3. Be able to associate the metabolic properties of microorganisms with their habitats  4. Be able to understand the reason for using microorganisms for the biodegradation of pollutant.  5. Be able to generate solution proposes for the problems in the related application areas.. | | | | | | | |
| **TEXTBOOK** | | | | | Madigan MT, Martinko JM, Parker J, and Clark DP(2009) Brock Biology of Microorganisms. Pearson Prentice Hall. | | | | | | | |
| **OTHER REFERENCES** | | | | | Eltem, R. (1999) Mikrobiyal Fizyoloji.http://www.textbookofbacteriology.net | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Microbial Physiology and Overview of Metabolism |
| 2 | Energy Mechanisms, Energy Release in Biological Systems |
| 3 | Fermentation, Respiration, Tricarboxylic Acid Cycle, Anaerobic Respiration |
| 4 | Biosynthetic Pathways, Metabolism of Sugar and Biosynthesis of Amino Acid |
| 5 | Biosynthesis of Purine and Pyrimidine, Biosynthesis of Porphyrin Ring, Metabolism of Organic Acid Metabolism of Oil acids |
| 6 | Midterm Examination 1 |
| 7 | Regulation of Enzyme Activity |
| 8 | Metabolism of nitrogen, |
| 9 | Metabolism of sulphur |
| 10 | Metabolism of Phosporus |
| 11 | Midterm Examination 2 |
| 12 | Influence of inorganic elements on Microbial Growth |
| 13 | Organic Growth Factors |
| 14 | Regulation of metabolism |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Professor Dr. Semra İLHAN | **Date:** | 14/05/2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501102514 | **TITLE** | Herbarium Tecniques |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 2 | | 50 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | In this course, herbarium samples collected from their habitats need to be known and techniques for making herbariums structural, design, conservation and use features. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | This course aims to provide students with understanding what is a good example of an herbarium and what should be the characteristics of herbariums. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course will contribute to herbarium is a good example of students to prepare, maintain, and it will help to know the features that should be considered in the establishment of herbariums. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Be able to understand the purposes of herbariums  Be able to know herbarium building features  Be able to perceive preparation of herbarium specimens  Be able to know protect herbarium samples  Be able to perceive importance of taxonomy | | | | | | | |
| **TEXTBOOK** | | | | | Bridson, D., Forman, L. (1999). The Herbarium Handbook. Kew Royal Botanic Gardens, UK. | | | | | | | |
| **OTHER REFERENCES** | | | | | Wondafrash, M. (2008). A Preliminary Guide to Plant Collection, Identification and Herbarium Techniques. National Herbarium, AAU.Maden, K. (2004). Plant Collection and Herbarium Techniques. Tribhuvan University Department of Botany, Biratnagar, Nepal.Seçmen, Ö., Gemici, Y., Leblebici, E., Görk, G., Bekat, L. (2000). Tohumlu Bitkiler Sistematiği. Ege Üniversitesi Basımevi, Bornova, İzmir. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | What is Herbarium? The purposes of herbaria |
| 2 | Types of herbarium |
| 3 | Types of herbarium |
| 4 | Herbarium building features |
| 5 | MHerbarium building features |
| 6 | Midterm Examination 1 |
| 7 | Collection of plants |
| 8 | Preparation of herbarium specimens-Angiospermae |
| 9 | Preparation of herbarium specimens-Gymnospermae and Thallophyta |
| 10 | Storage of herbarium specimens |
| 11 | Midterm Examination 2 |
| 12 | Herbarium labeling and index |
| 13 | Herbarium control of pests |
| 14 | Botanical nomenclature |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Assoc. Prof. Dr. Ebru ATAŞLAR | **Date:** | 21.09.2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501101526 | **TITLE** | ADVANCED PALYNOLOGY |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7.5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | | Definition of Palynology; relationships with the other science of palynology; pollen and spore morphology; investigations of light microscope, SEM and TEM; investigations of atmospheric pollen and spore morphology; pollen analyses in honey. | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | The main aim of this course is: determining of palynology in science; explaining to their phylogenic relationships of palynology with taxonomy and paleontology; introducing to general remarks of pollen and spore morphology, evaluating to investigation of atmospheric and allergen pollen and spore morphology and pollen analyses in honey. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | 1.distinguish pollens from other objects  2. comment of relationship with the other science of palynology  3. analyse of pollen and spore morphology  4. plan of scientific research with the pollens | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Be able to Definiton and Investigation of Pollen and Spore Morphology,  Be able to determining of palynology in science; explaining to their phylogenic relationships of paleontology with taxonomy and paleontology. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1.be able to distinguish pollens from other objects  2.be able to comment of relationship with the other science of palynology  3.be able to analyse of pollen and spore morphology  4.be able to plan of scientific research with the pollens | | | | | | | |
| **TEXTBOOK** | | | | | ADVANCED PALYNOLOGY Course Notes (2012) | | | | | | | |
| **OTHER REFERENCES** | | | | | 1. Charpin, J., Surinyach, R. and Frankland, A.W. 1974. Atlas of European allergenic pollens. Sandoz Editions, Paris, pp. 20-23.2. Cronquist, A. 1968. The evolution and classification of the flowering plants. Thomas Nelson Ltd. Edinburgh, London.3. Erdtman, G. 1969. Handbook of Palynology Morphology, Taxonomy, Ecology. An Introduction to the Study of Pollen Grains and Spores. Hafner Pub. New York.4. Faegri, K. and Iversen, J. 1975. Textbook of pollen analysis. 3rd edition. Munksgaard, Copenhagen.5. Kuprianova A. 1967. Apertures of pollen grains and their evolution in Angiosperms. Paleobot. Playnology, 3: 73-80.6. Skvarla, J.J. 1966. Techniques of pollen and spore electron microscopy. I. Staining, dehydration and embedding. Oklah. Geol. Notes, 26: 179-186.7. Takhtajan, A.L. 1980. Outline of the classification of flowering plants (Magnoliophyta). Bot. Rev, 46.8. Walker, J.W. 1974a. Evolution of exine structure in the pollen of primitive Angiosperms. Amer. J. Bot, 61: 891-902.9. Walker, J.W. 1974b. Aperture evolution in the pollen of primitive Angiosperms. Amer. J. Bot, 61: 1112-1137. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Intoduction to Palynology |
| 2 | Palnology and Contribute to Other Sciences |
| 3 | Reproductive Organs |
| 4 | Pollen and Spore Morphology |
| 5 | Sporoderm and Ornamentation |
| 6 | Midterm Examination 1 |
| 7 | Aperture, Pollen and Spore Types |
| 8 | Gymnospermae pollens |
| 9 | Lycen, Moss, spore morphology |
| 10 | Investigation of pollen and spore morphology with wodehouse and erdtman methods by light microscobe. |
| 11 | Midterm Examination 2 |
| 12 | Investigation of Exine with SEM-TEM |
| 13 | Investigation of airborne and allergen pollen and spore |
| 14 | Analyses of Pollen in Honey |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Assoc. Prof. Dr. İsmühan POTOĞLU ERKARA | **Date:** |  |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501111620 | **TITLE** | Aeropalynology |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7.5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | In this course, topics will include aeropalynology and their effects. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aim of this course, the atmosphere carried by palynological structure is to understand the basic and applied knowledge. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course Aeropalynology in relation to the atmosphere of indoor and outdoor applications for the determination of the pollens is understood, will contribute to the understanding of the relationship between health and aeropalynology. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1.Defining Aerobiology  2. Relating with other disciplines to contribute to Aerobiology  3. Polinization types, atmospheric conditions, the effects of the event  4. Modelling and forecasting techniques, new  5. Air Quality, Air Pollution, to define the interaction of respiratory allergies and air pollution  6. Aerobiology and occupational health, indoor climate and biological particles, human and animal pathogens in the air transportation, to discuss the impact of aerobiology and animal health. | | | | | | | |
| **TEXTBOOK** | | | | | Potoğlu Erkara I (2010) Aerobiology Lecture Notes, ESOGÜ Department of Biology, Eskisehir | | | | | | | |
| **OTHER REFERENCES** | | | | | 1. Agashe S and Caulton E. 2009. pollen and spores. Applications with special emphasis on Aerobiology and Allergy. Science publishers.ISBN978-1-57808-532-32. Emberlin J. 2008 ”Grass , tree and weed pollen" in Allergy and Allergic Diseases AB Kay (Ed) 2nd edition Wiley-Blackwell.3. Mandrioli, P., Comtois, P. & Levizzani, V. (eds) (1998) Methods in Aerobiology. Pitagora Editirce S .r. l., Bologna, Italy ISBN 88-371-1043-X | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Introduction to Aeropalynology, history, and historical practices |
| 2 | Flower biology and ecology of pollinization |
| 3 | Pollen production in plants and the offspring's receiving functions of spore |
| 4 | Pollinization types, atmospheric conditions, the effects of the event pollinization |
| 5 | Observation techniques of pollen and spores, pollen emission, meteorological factors affecting the distribution and transport |
| 6 | Midterm Examination 1 |
| 7 | Aeroallergens, Allergy, Aerobiological studies carried out in the world and in Turkey. |
| 8 | Structure and types of spores and pollens, fungal spores and health effects |
| 9 | Modelling and forecasting techniques, new methods in aerobiology |
| 10 | Pollen and spores blog, sports report, pollen, pollen allergy is its effect on pollen morphology |
| 11 | Midterm Examination 2 |
| 12 | Pollinization event location and function of applied sciences, the health effects of airborne organic compounds |
| 13 | Air Quality, Air Pollution, respiratory allergies and air pollution interactions |
| 14 | Aeropalnology and occupational health, indoor climate and biological particles in the air transportation of human and animal pathogens, and their effects on animal health. |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | | Assoc. Prof. Dr. İsmühan POTOĞLU ERKARA | **Date:** | |  | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501112618 | **TITLE** | Applies of Pollen Analyses |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7.5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Investigations of pollen and spore morphology; techniques of palynological preparation; investigations of light microscope, SEM and TEM; investigations of atmospheric pollen and spore morphology; pollen analyses in honey. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The main aim of this course is: determining of pollen analyses in palynology; analising of pollen and spore morphology, evaluating to investigation of atmospheric and allergen pollen and spore morphology and pollen analyses in honey. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | The main aim of this course is: determining of pollen analyses in palynology; analising of pollen and spore morphology, evaluating to investigation of atmospheric and allergen pollen and spore morphology and pollen analyses in honey. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1.be able to distinguish pollens from other objects  2.be able to analyse of pollen and spore morphology  3.be able to determine of exine structure in electrone microscopes  4.be able to determine of pollen types according to family, genera and species. | | | | | | | |
| **TEXTBOOK** | | | | | Sevil Pehlivan (1995) Allerjen Polen Atlası | | | | | | | |
| **OTHER REFERENCES** | | | | | 1. Charpin, J., Surinyach, R. and Frankland, A.W. 1974. Atlas of European allergenic pollens. Sandoz Editions, Paris, pp. 20-23.2. Cronquist, A. 1968. The evolution and classification of the flowering plants. Thomas Nelson Ltd. Edinburgh, London.3. Erdtman, G. 1969. Handbook of Palynology Morphology, Taxonomy, Ecology. An Introduction to the Study of Pollen Grains and Spores. Hafner Pub. New York.4. Faegri, K. and Iversen, J. 1975. Textbook of pollen analysis. 3rd edition. Munksgaard, Copenhagen.5. Kuprianova A. 1967. Apertures of pollen grains and their evolution in Angiosperms. Paleobot. Playnology, 3: 73-80.6. Skvarla, J.J. 1966. Techniques of pollen and spore electron microscopy. I. Staining, dehydration and embedding. Oklah. Geol. Notes, 26: 179-186.7. Takhtajan, A.L. 1980. Outline of the classification of flowering plants (Magnoliophyta). Bot. Rev, 46. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Pollen Morphology |
| 2 | Spore Morphology |
| 3 | Preparation technique of Palynological |
| 4 | Pollen types to family, genus, species |
| 5 | Investigation of Light Microscobe |
| 6 | Midterm Examination 1 |
| 7 | Investigation of SEM |
| 8 | Investigation of TEM |
| 9 | Investigation of Airborne pollen |
| 10 | Investigation of Airborne spore |
| 11 | Midterm Examination 2 |
| 12 | Investigation of allergen pollen |
| 13 | Investigation of allergen spore |
| 14 | Analyses of pollen in honey |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | | Ass0c. Prof. Dr. İsmühan POTOĞLU ERKARA | **Date:** | |  | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501111608 | **TITLE** | Ultrastructure and Functionf of Cell Organelles |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  ( x ) | | ELECTIVE  (   ) | TURKISH |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
|  | |  | | | | x | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 25 |
| Quiz | | | | | 1 | | 25 |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (Oral Presentation) | | | | | 1 | | 50 |
| **Final Examination** | | | | | | |  |
| **PREREQUISITE(S)** | | | | | No | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | In this course; morphological comparison of the cells, examination of fine structure of the cell; observing metaboli events that occurs in cells. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The purpose of this course; investigating the activities of live cells in terms of their morphological structure, learning morphological structure with light and electron microscope applications. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course provides, learning the structure and functions of cells and establish connections between them. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. To understand the general properties of the cell  2. To understand organelles and relating their functions  3. To understand the organelle dependent disorders  4. To understand the movements of the cytoskeleton and cell | | | | | | | |
| **TEXTBOOK** | | | | | 1.Molecular biology of the cell, 1989 (Arthor Miller)2.Hücrenin moleküler biyolojisi 4. Basım 2008 (Alberts B. at all) | | | | | | | |
| **OTHER REFERENCES** | | | | | 1..Biology (Norman K. Wessells, Janet L. Hopson)2.Cells and tissues (A.W. Rogers) | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Morphology of the cell |
| 2 | Cell membrane and its structure |
| 3 | Morphological changes of cell surface, microvillus, phagocytosis, pinocytosis, cilias |
| 4 | Structures that makes connection and transport, on dorsal and lateral surfaces of cell |
| 5 | Endoplasmic reticulum and functional properties |
| 6 | Midterm Examination 1 |
| 7 | Ribosomes and their interaction with endoplasmic reticulum |
| 8 | Functional properties of Golgi apparatus and lysosome |
| 9 | Mitochondrial organisation and function |
| 10 | Nuclear envelope structure, internal organisation of the nucleus, nucleolus |
| 11 | Midterm Examination 2 |
| 12 | Nucleus during mitosis |
| 13 | Centrioles and centrosomes |
| 14 | Cell skeleton |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | | Assoc. Prof. Dr. Mediha CANBEK | **Date:** | |  | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501112614 | **TITLE** | Cell Damage |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7.5 | COMPULSORY  ( x ) | | ELECTIVE  (   ) | TURKISH |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
|  | |  | | | | x | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 25 |
| Quiz | | | | | 1 | | 25 |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (Oral Presentation) | | | | | 1 | | 50 |
| **Final Examination** | | | | | | |  |
| **PREREQUISITE(S)** | | | | | No | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | In this course; cell damage and causes, adaptations, revesible and irreversible damages, agents that cause cell damage, catabolism of lysosome, haterophagy, autophagy, smooth endoplasmic reticulum and mitochondrial changes, mechanisim of necrosis and apoptosis, inner cell inclusions, inner cell lesions , inflammation, cellular aging. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The purpose of this course; students are gonig to learn damages that may occur in the cell and mechanisms of cell damages. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course provides, students to able to explain the causes of cell damages morphologically and biologically | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Understanding the causes of cell damage  2. To distinguish types of cell damage  3. Be able to determine the differences between apoptosis and necrosis  4. Explaining cell aging  5. Understanding regenaration and relationship between cell growth | | | | | | | |
| **TEXTBOOK** | | | | | 1.Basic pathology, (Kumar, Cotran, Robbins, 2000)2.Genel patoloji (Prof Dr. Münevver Yenerman, 1994) | | | | | | | |
| **OTHER REFERENCES** | | | | | 1.Basic pathology, (Kumar, Cotran, Robbins, 2000)2.Genel patoloji (Prof Dr. Münevver Yenerman, 1994) | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Cell damage and occasions |
| 2 | Cell damage and adaptations |
| 3 | Reversible and irreversible damages, methabolism of inflammation |
| 4 | Role of free radicals on cell damage |
| 5 | Ischemic and hypoxic damage, ischemia and reperfusion damage |
| 6 | Midterm Examination 1 |
| 7 | Morphology and biochemistry of necrosis and apoptosis |
| 8 | Catabolism of lysosomes, induction of smooth endoplasmic reticulum and mitochondrial changes |
| 9 | Pathological calsification, hyalin change |
| 10 | Inner cell inclusions |
| 11 | Midterm Examination 2 |
| 12 | Lesions of cell skeleton |
| 13 | Growth, differantiation and cellular adaptation |
| 14 | Cellular aging and causes, cell growth, regeneration and control of cell growth |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | | Assoc. Prof. Dr. Mediha CANBEK | **Date:** | |  | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501111617 | **TITLE** | Principles of Plant Identification |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
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| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 30 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 30 |
| Project | | | | | 1 | | 40 |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | |  |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | The identification of exsiccata plant specimens with helping of the Flora of Turkey and the East Aegean Islands especially and the other floras. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | To teach the methods of plant identification | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | To understand the characters used in the identification of plants and gives the ability to recognize plants. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Student learns the methods of plant identification  Knows about plants' properties  Learns nomenclature and practices  Learn the relationship between major plant groups. | | | | | | | |
| **TEXTBOOK** | | | | | Boissier, E. Flora Orientalis, vpl. 1-6, Geneva 1865-1888. Davis, P.H., Flora of Turkey and the East Aegean Islands, vol. 1-9, Edinburgh 1965-1985. Halacsy, E., Conspectus Florae Graecae, vol. 1-3, Leipzig 1900-1912. Hayek, A., Prodromus Florae Peninsulae Balcanicae, vol. 1-3, Berlin 1924-1933. Komarov, V.L., Flora of the USSR, vol. 1-30, Mosqua & Leningrad 1934-1964. Rechinger, K.H., Flora Iranica, several volumes, Graz 1965-1977. Tutin, T.G., & al., Flora Europaea, vol. 1-5, Cambridge 1964-1980. | | | | | | | |
| **OTHER REFERENCES** | | | | |  | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | The objective and material of methods of plant identification (Theoretical) - Plant collecting, drying, pressing |
| 2 | Kinds of methods of plant identification (Theoretical) - Identification of plant specimen |
| 3 | The references of methods of plant identification |
| 4 | Literature review and using in plant identification |
| 5 | Aceraceae, Apiaceae, Asteraceae (Theoretical) - Identification of Aceraceae, Apiaceae, Asteraceae families |
| 6 | Midterm Examination 1 |
| 7 | Berberidaceae, Boraginaceae, Brassicaceae (Theoretical) - Identification of Berberidaceae, Boraginaceae, Brassicaceae families |
| 8 | Campanulaceae,Chenopodiaceae, Cistaceae, Fagaceae (Theoretical) - Identification of Campanulaceae,Chenopodiaceae, Cistaceae, Fagaceae families |
| 9 | Geraniaceae, Hypericaceae, Lamiaceae (Theoretical) - Identification of Geraniaceae, Hypericaceae, Lamiaceae families |
| 10 | Papaveraceae, Polygalaceae, Salicaceae (Theoretical) - Identification of Papaveraceae, Polygalaceae, Salicaceae families |
| 11 | Midterm Examination 2 |
| 12 | Scrophulariaceae, Thymeleaeaceae (Theoretical) - Identification of Scrophulariaceae, Thymeleaeaceae families |
| 13 | Amaryllidaceae, Cyperaceae, Irıdaceae, Juncaceae (Theoretical) - Identification of Amaryllidaceae, Cyperaceae, Irıdaceae, Juncaceae families |
| 14 | Liliaceae, Orchidaceae (Theoretical) - Identification of Liliaceae, Orchidaceae families |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | | Prof. Dr. Atila Ocak | **Date:** | |  | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501111621 | **TITLE** | Taxonomical Revision |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
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| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 60 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | |  |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | In the scope of this course; knowledge on revision concept, revision techniques, literature rewiev, herbaria techniques, naming plant groups and also making an article from revision work by the students. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aim of this course is to provent;  knowledge on revision concept, revision techniques, literature rewiev, herbaria techniques, naming plant groups and also making an article from revision work by the students. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Students will be able to know revision concept, revision techniques, literature rewiev, herbaria techniques, naming plant groups and also making an article from revision work. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | In the end of this course students can;  describe the revision concept.  comprehend methodes of revision works.  identify the problems in plant groups.  comprehend basis of taxonomy.  comprehend using of the taxonomical rules in revision works. | | | | | | | |
| **TEXTBOOK** | | | | | SÜMBÜL, H., Taksonomik Revizyon. | | | | | | | |
| **OTHER REFERENCES** | | | | | BARAN, İ. (1976), Türkiye Yılanlarının Taksonomik Revizyonu ve Coğrafik Dağılışları, 177 s., Ankara. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Introduction and revision concept. |
| 2 | Metodology of revision works. |
| 3 | Literature review and material collection for revision |
| 4 | Literature review and material collection for revision |
| 5 | Examination of specimens |
| 6 | Midterm Examination 1 |
| 7 | Naming of created grooups. |
| 8 | Preparation of articles from revision works. |
| 9 | Preparation of articles from revision works. |
| 10 | Planning an example revision work. |
| 11 | Midterm Examination 2 |
| 12 | Planning an example revision work. |
| 13 | Presentation of example work. |
| 14 | Presentation of example work. |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | | Prof. Dr. Atila Ocak | **Date:** | |  | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501112622 | **TITLE** | THE TERMINOLOGY OF SPERMATOPHYTA |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
|  | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 60 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | |  |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | This course will include detailed information about vegetation concept, methods of vegetation studies, literature review and material collection for a vegetation study. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The primary objective of the course is admitted to the underlying terms of Botanical Science, within the meaning of issues that pass through to give consideration to explain the meaning. The second aim of this course is more specific than "Principles of Plant Taxonomy, " is to provide detailed information on the subject. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Course objectives, scope and contents of the universal science of signification according to the rules. Access to information and issues to evaluate in light of the relevant literature. Put forward a scientific problem and to develop research strategies. Information on the types of scientific writing. A scientific work, present written and oral. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | In the end of this course, students will be able to:  1. Terms that are common to all branches of the science of Biology.  2. Terms that are common to all branches of the science of botany.  3. True on plant taxonomy terms with science.  4. Nomenclature and the International Plant Naming of Plants Act.  5. General grammatical rules of language and the use of Latin nomenclature of plants.  6. In general meaning of taxonomic categories and the category of particular species and different sizes | | | | | | | |
| **TEXTBOOK** | | | | |  | | | | | | | |
| **OTHER REFERENCES** | | | | |  | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Introduction: The aim of the course and scope of the course content and plan. The term of the word meaning in science, its importance and forms of usage. |
| 2 | Biological science and the general terms and their meanings are available |
| 3 | Botanical science in general and the current terms and meanings |
| 4 | And the meanings of terms used in plant taxonomy. |
| 5 | And the meanings of terms used in plant taxonomy(continue). |
| 6 | Midterm Examination 1 |
| 7 | "International Law of Botanical Nomenclature". |
| 8 | Principles of Plant Taxonomy. Taxonomic categories, their meaning and naming of taxa. |
| 9 | Plant taxonomy and Latin language and the use of rules. |
| 10 | Plant taxonomy and Latin language and the use of rules(continue). |
| 11 | Midterm Examination 2 |
| 12 | Species writing descriptions |
| 13 | The newly discovered species, making scientific papers |
| 14 | Examination of reports and oral presentations prepared for the Type depictions. |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | | Prof. Dr. Atila Ocak | **Date:** | |  | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501112620 | **TITLE** | PRACTICUM OF PLANT TAXONOMY |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
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| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 30 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 30 |
| Project | | | | | 1 | | 40 |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | |  |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | The collecting plant specimens from field, drying, preservation of specimens, identification, mounting, labeling, handling and arrangements, various collections, fontions, conservation, dictionary. The history of botanic gardens and arboretums, arrangement, fonction, development. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | To teach collecting of plant specimens from field and successive treatments besides the terms concerning of topic; to give some information about botanical gardens and arboretums. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Gives the ability to cope with problems encountered in the diagnosis of plant. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Collecting plant specimens from field  Drying of plant species  Preservation of specimens  Learns successive treatments besides the terms concerning of topic  Give some information about botanical gardens and arboretums | | | | | | | |
| **TEXTBOOK** | | | | | Forman, L., Bridson, D. The Herbarium Handbook, Kew 1989. Holmgren, P.K., Index Herbariorum, Utrecht 1974. Leenhouts, P.W., A guide to the Practice of Herbarium | | | | | | | |
| **OTHER REFERENCES** | | | | |  | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Herbaria and their properties (Theoretical) - Herbaria and their properties |
| 2 | How to collect plant spesimens? (Theoretical) - Collecting plant specimens from field, having a field book, pressing |
| 3 | Drying the plant specimens (Theoretical) - Drying the plant specimens and numbering |
| 4 | Preparing plant specimens for being a herbarium material |
| 5 | Mounting (Theoretical) - Attaching dry plant specimens to herbarium carton and labeling |
| 6 | Midterm Examination 1 |
| 7 | Accession and arrangement (Theoretical) - Accession the specimens and arrangement of herbarium material |
| 8 | Handling and loaned (Theoretical) - Using herbarium in plant identification |
| 9 | Maintenance, registration and report herbarium dictionary (Theoretical) - Taking samples from herbarium and keeping record |
| 10 | Botanical garden and arbotretum (Theoretical) - Plant identification practices |
| 11 | Midterm Examination 2 |
| 12 | History of herbaria in the world and Turkey (Theoretical) - Plant collecting, drying, pressing, identification, preparing herbarium specimen practices and using herbarium |
| 13 | Arrangement and development (Theoretical) - Plant collecting, drying, pressing, identification, preparing herbarium specimen practices and using herbarium |
| 14 | Functions (Theoretical) - Plant collecting, drying, pressing, identification, preparing herbarium specimen practices and using herbarium |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | | Prof. Dr. Atila Ocak | **Date:** | |  | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501111603 | **TITLE** | Protein Chemistry |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( x ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | |  |
| Quiz | | | | | 1 | | 25 |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (seminar) | | | | | 1 | | 25 |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | | - | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | This course includes chemical information of proteins for understand the structure and function relationships of the proteins and protein-protein interactions | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The main aim of the course is to provide information to the students about; structure and function of proteins and enzymes, improve their capacity to evaluate the consequences of the use of biological areas | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | At the end of this course, students will learn basic structures and behaviors of proteins. Therefore will gain ability to study with proteins | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Access to current knowledge of protein structure and function relationships  2. Understanding protein-protein interactions  3. Using digital software on Protein Chemistry  4. Comment three-dimensional structure of proteins  5. To explain postranslasyonel modifications of proteins | | | | | | | |
| **TEXTBOOK** | | | | | P.D. Bailey. "An introduction to peptide chemistry"Chichester : J. Wiley, 1990. ISBN 0-471-93532-8. | | | | | | | |
| **OTHER REFERENCES** | | | | | 1.John E. McMurry, Tadhg P. Begley " The organic chemistry of biological pathways" Englewood, Colo. : Roberts, 2005. ISBN 097470771-6.2.D.Voet, J.G.Voet, "Biochemistry" 3rd Ed. Wiley Int. Ed., (Chapter 4,8) 2004. ISBN 0-471-19350-X. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Definition of proteins and amino acids |
| 2 | Amino acid structure and chemistry , general features of amino acids, |
| 3 | Chemical classification of amino acids, isoelectric point |
| 4 | Detailed overview of protein biosynthesis: from gene to functional protein |
| 5 | Post translational modifications of proteins,Peptid bonds |
| 6 | Midterm Examination 1 |
| 7 | Protein structures and functions |
| 8 | Enzyme mechanisms, |
| 9 | Detection methods of protein structures, 3D of proteins |
| 10 | Protein classification,Analysis methods of protein amount |
| 11 | Midterm Examination 2 |
| 12 | Denaturation and renaturation |
| 13 | Hydrolysis of proteins and protein hydrolysates and recent developments |
| 14 | Proteins and bioinformatic: protein BLAST, MEGA5 software |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | | Dr.Figen CALISKAN | **Date:** | | 18.05.2015 | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501112608 | **TITLE** | Protein Purification Methods |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( x ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | |  |
| Quiz | | | | | 1 | | 25 |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (Seminar) | | | | | 1 | | 25 |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | | - | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | This course include theoretical and practical knowledge which required for the creation of protein purification strategy | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The main aim of the course is to provide information to the students about; purification methods and steps of the protein which is to be purified is very important and plays a central role in designing the purification strategy. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | At the end of this course, students will be develop biomaterials protein purification knowledge and may be develop commercial peptide products for diagnosis and treatment purpose | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. To learn strategies of protein purification  2. To apply the methods of protein purification  3. To apply clarification techniques  4. Chromatographically analysing of proteins  5. Electrophoretically analysing of proteins  6. Identify peptide products fromnatural resources for commercial purposes | | | | | | | |
| **TEXTBOOK** | | | | | 1 . Simon Roe." Protein purification techniques : a practical approach", Oxford : Oxford University Press, 2001. ISBN 0-19-963673-7. | | | | | | | |
| **OTHER REFERENCES** | | | | | 1. D.Voet, J.G.Voet, "Biochemistry" 3rd Ed. Wiley Int. Ed., (Chapter 6) 2004. ISBN 0-471-19350-X.2. Deutscher M. " Methods in Enzymology", Volume 182 Guide to Protein Purification, Academic Press, INC,1990. ISBN 0-12-213585-7 | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | A Short review of protein structure and historical background, |
| 2 | Purification strategy |
| 3 | Overview of laboratory equipment |
| 4 | Analyses of purity |
| 5 | Clarification techniques |
| 6 | Midterm Examination 1 |
| 7 | Cell disintegration and extraction methods |
| 8 | separation on the basis of chemistry |
| 9 | precipitation of proteins |
| 10 | Dialysis |
| 11 | Midterm Examination 2 |
| 12 | Proteins and chromatographic methods |
| 13 | Proteins and electrophoretic methods |
| 14 | introduce to determination of peptide and protein sequences. |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | | Dr.Figen CALISKAN | **Date:** | | 18.05.2015 | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501112606 | **TITLE** | PLANT EMBRYOLOGY |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | History of Plant Embryology, Flower, Microsporangium, Male Gametophyt, Megasporangium, Female Gametophyt, Pollination, Fertilization, Sex incompatibility, Endosperma, Embryo, Polyembryon, Apomicsis, Seed | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The main aim of this course is the evolution of Plant Embryologyis is investigated. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | 1. Reveal of Plant Embryology  2. Reveal of Pollination, Fertilization, Sex incompatibility, Endosperma, Embryo. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Please write minimum four learning outcomes for the course. | | | | | | | |
| **TEXTBOOK** | | | | | Ünal, M. 2004. Bitki (Angiosperm Embriyolojisi). Marmara Üniversitesi Fen Ed. Fak Yayınları ISBN: 975-400-040-9. 2. Baskı. | | | | | | | |
| **OTHER REFERENCES** | | | | | Yentür, S. 1984. Bitki Anatomisi, İstanbul. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | History of Plant Embryology |
| 2 | Flower |
| 3 | Microsporangium |
| 4 | Male Gametophyt |
| 5 | Megasporangium, |
| 6 | Midterm Examination 1 |
| 7 | Female Gametophyt |
| 8 | Pollination |
| 9 | Fertilization |
| 10 | Sex incompatibility |
| 11 | Midterm Examination 2 |
| 12 | Endosperma |
| 13 | Embryo, Polyembryon |
| 14 | Apomicsis, Seed |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | | Assoc. Prof. Dr. İsmühan POTOĞLU ERKARA | **Date:** | |  | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501102517 | **TITLE** | Park and Garden Ornamental Plants |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 3 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
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| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 30 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 30 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | | 1 | | 40 |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | |  |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | The history of arrangement of garden and greenhouse culture. Ecological needs of plants. Important points of the garden arrangement and its maintenance. The maintenance of decorative flowers, matlocking of the soil, fighting against the herbal disorders. Irrigation. Fertilization Equipments for arrangement of garden and greenhouseculture Herbs used in garden arrangement. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aims of this course are to comprehend the plants and tools that are used in landscaping studies. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Course will contribute . practical garden arrengement and curation; inner and outer arrengements. to make the students self-confident in works of gardening. To teach conciousness of nature to the students. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Learning general concept of garden designing and greenhouse techniques.  Learning historical development process of gardening.  Comprehending the ecological needs of plants.  Comment about the ecological needs of plants.  Comprehending subjects that is paid attention about gardening.  Recognized the plants that are used in gardening. | | | | | | | |
| **TEXTBOOK** | | | | | Hartmann, H. T., Kestee, D: E:; 1961, Plant Propagation Principles And Practices. Englewood. Cliffs, New Jersey, Prentice-Hall, Inc. USA. | | | | | | | |
| **OTHER REFERENCES** | | | | | PAMAY, B., 1979-Park ve Peyzaj Mimarisi, İ.Ü Orman Fakültesi. Yayın No=264, İstanbul.0KONEMANN, 1999. BOTANICA, The Illustrated A-Z of over 10000 garden plants and how to cultivate them. Pg:1020, Random House Australia, ISBN:3-8290-3068-1. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | The historical development of gardening. |
| 2 | Ecological needs of plants(Climatical properties). |
| 3 | Ecological needs of plants(Soil properties). |
| 4 | Mosaic plans and upholstery plants. |
| 5 | Mosaic plans and upholstery plants. |
| 6 | Midterm Examination 1 |
| 7 | Mosaic plans and upholstery plants. |
| 8 | Squat, creeping plants. |
| 9 | Squat, creeping plants. |
| 10 | Grass plants.. |
| 11 | Midterm Examination 2 |
| 12 | Grass plants. |
| 13 | Trees and shrubs. |
| 14 | Trees and shrubs. |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Assoc. Prof. Dr. Onur Koyuncu | **Date:** |  |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501102506 | **TITLE** | RELATIONSHIP BETWEEN SOIL AND PLANT |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 3 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
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| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 30 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 30 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | | 1 | | 40 |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | |  |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Properties and types of soil water.The movement of water in plant..The movement of water in continuity of the soil-plant-atmosphere. Water requirement of plants, the importance and effect of water on availability of nutrients. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | Provide better plant development and create the optimum plant root conditions in rhizosphere by examining the relation among plant root, soil, atmosphere and water | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | It provides the essential nutrients of the soil and plants to grasp the relationship with these types of land plants. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Knows environmental factors which are important for plant growth and agricultural production and how to ensure the environmental factors in optimum level condition which are important for agricultural production  Knows the relationships between soil mass and volume in soil phases, a change in a phase how would lead to change to the other phases and its effect to plant development.  Knows the function of water and the effects of the changes in water status ( transition solid, liquid and gas phases of water) on plant and soil  Knows the potential energy of soil water, can make assessments about the status of soil water  Knows the movement of the water in the continuity of soil-plant-atmosphere and can evaluate its effect on plant growth.  Evaluate the availability and intaking to plant of nutrients in soil-plant and water medium and their probable effects on plant production | | | | | | | |
| **TEXTBOOK** | | | | | Kramer, P.J. and Boyer, J.S. 1995. Water Relations of Plants and Soils. Academic Press. UK | | | | | | | |
| **OTHER REFERENCES** | | | | |  | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Description of the topics which are given as week, examinations of the course and their contribution to the success score, course process, statements about students’ expectations |
| 2 | Environment, environmental factors and its characteristics, soil and soil description |
| 3 | Soil as a factor of environment, soil formation and soil types |
| 4 | Relative water content of soil and relations of other mass and volume. |
| 5 | Definition of soil texture, texture classes, mechanical analysis method, importance of soil texture. |
| 6 | Midterm Examination 1 |
| 7 | Properties and structure of clays, |
| 8 | The importance of soil clays in plant production and availability of soil water |
| 9 | Functions of water as an environment factor and its important properties, |
| 10 | The problems in plant production in low-water and high-water statements. |
| 11 | Midterm Examination 2 |
| 12 | Water in soil:Properties and types of soil water |
| 13 | Water in Plant |
| 14 | The movement of water in plant |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Prof. Dr. Atila Ocak | **Date:** |  |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501101510 | **TITLE** | Flora Of Turkey |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 3 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
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| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 30 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 30 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | | 1 | | 40 |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | |  |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | The comparison of flora and vegetation, history, the effect of several biotic factors on flora and vegetation, paleoflora and root of Turkey’s flora, properties of today’s flora, important families and species , plants of several habitats, endemism with our country’s endemic plants, general view of our country’s vegetation | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The objective of this course is to introduce and give information about definitions and comparison of flora and vegetation, history and geography of flora, flora and vegetation formation, the effect of several biotic factors on flora and vegetation, paleoflora and origin of Turkey’s flora, properties and important taxa of today’s flora, plants of several habitats, endemism with our country’s endemic plants | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Detection of Turkey's biological diversity-owned and will provide the ability to protect sensitive areas. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Learning basic concepts  Relating our country’s flora and vegetation formation with other disciplines  Questioning the plant diversity at nature in daily life  To understand the diversity of plants that Turkey has .. | | | | | | | |
| **TEXTBOOK** | | | | | Ö.Seçmen, “Türkiye Florası (Ders Notları)” Ege Üniv.,Fen Fak. Teksirler Serisi No:120, Bornova,İzmir, 2008. YARDIMCI KİTAPLAR: Islands P.H. Davis. Flora of Turkey and East Aegean Islands. Edinburgh Univ.Press. vol. 1-9.1965-1985 | | | | | | | |
| **OTHER REFERENCES** | | | | |  | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Introduction (the comparison of flora and vegetation), history |
| 2 | Brief information about our country’s geography (landforms, climate, soil) |
| 3 | Flora and vegetation formation, (climate changes and disjunct areas, biotic factors) |
| 4 | Effects of several biotic factors to our country’s flora and vegetation |
| 5 | The origin and paleoflora of Turkey’s flora (general information, origin flora’s) |
| 6 | Midterm Examination 1 |
| 7 | Paleoflora (Tertiary Flora) |
| 8 | Paleoflora (Holocene flora) |
| 9 | General view to current Turkey’s Flora I. (General properties) |
| 10 | General view to current Turkey’s Flora II. (Flora regions and elements, several habitat plants, important forest trees and bushes. |
| 11 | Midterm Examination 2 |
| 12 | General view to current Turkey’s Flora III. Naturally used plants (edible, paint, fiber v.s) |
| 13 | Endemism (definition and general information) |
| 14 | Endemism in our country and the comparison of endemic groups |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** |  | **Date:** |  |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501102505 | **TITLE** | Forrest Vegetation of Turkey |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 3 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
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| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | |  |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 40 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | | 1 | | 60 |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | |  |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Identification of big plant families and their important genera and species that naturally distributed in Turkey | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aim of this course is to gain identification and recognation abilities by students. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Students can identificate the plants by the flora of Turkey. Also they have information about endemic plant species and their distribution. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | In the of this course students will be able to;  idenficate the plants by flora of Turkey.  comprehend methodes that used for plant identification.  knows plants of Turkey.  knows important properities of diffirent plant taxa.  knows big plant families which naturally distributed in Turkey.  knows endemism concept and also can recognize them. | | | | | | | |
| **TEXTBOOK** | | | | |  | | | | | | | |
| **OTHER REFERENCES** | | | | |  | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Idenfication works on stated families. |
| 2 | Works on Compositae taxa. |
| 3 | Works on Compositae taxa. |
| 4 | Works on Boraginaceae taxa. |
| 5 | Works on Compositae Scrophulariaceae taxa. |
| 6 | Midterm Examination 1 |
| 7 | Works on Labiatae taxa. |
| 8 | Works on Liliaceae taxa. |
| 9 | Works on Amaryllidaceae taxa. |
| 10 | Works on Iridaceae taxa. |
| 11 | Midterm Examination 2 |
| 12 | Works on Gramineae taxa. |
| 13 | Works on Orchidaceae taxa. |
| 14 | Works on Orchidaceae taxa. |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |

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| **Prepared by :** | Prof. Dr. Atila Ocak | **Date:** |  |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501102507 | **TITLE** | ECOLOGY OF VEGETATION AND APPLICATION METHODS |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 3 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
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| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 30 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 30 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | | 1 | | 40 |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | |  |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Turkey, with vegetation, ecosystem-level biodiversity and ecological management of plant communities. The theoretical part of the course, a holistic approach, by vegetation synthetic (integrative) values are discussed, laboratory studies, in light of more reductive approach, trying to teach different methods of vegetation analysis | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aim of the course, the basic cover by plant species in biological systems over a multi-dimensional and multi-faceted scrutinize Kommünitelerinin. "Vegetation Ecology, Sinekoloji, Landscape Ecology, Fitosönoloji, Fitososyoloji" Vegetation Information referred to in different names, such as lessons, until the populations of different systems include ecosystems. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Ability understanding terms of vegetation; flora and gives the ability to understand the difference between the vegetation. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | The importance of vegetation departments of biological knowledge lesson  Within the scope of co-evolution of plant-animal relationships  Species over the perception of biological systems  Computer assisted vegetation analysis  Vegetation and natural resource management information  Environmental impact assessment and impact and importance of place-value hypothesis, knowledge of vegetation  Important quantitative assessment of ecosystem components | | | | | | | |
| **TEXTBOOK** | | | | | Emberger, L vd., 1967, Code Pour le Relevé Méthodique de la Végétation et du Milieu, CNRS, Paris. Gemici, Y, 2004, Genetik Çeşitliliğin Yerinde Korunması Survey Envanter Kursu Notları, Akçay, Edremit. Kılınç, M, 2005, Bitki Sosyolojisi (Vejetasyon Bilimi), Palme Yayıncılık, Ankara. Kılınç, M, Kutbay, HG, Yalçın, E, Bilgin, A., 2006, Bitki Ekolojisi ve Bitki Sosyolojisi Uygulamaları, Palme Yayıncılık, Ankara. | | | | | | | |
| **OTHER REFERENCES** | | | | |  | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Vegetation Science course objective, scope and importance of the course content, curriculum and laboratory studies, information on resources to be utilized with the course. |
| 2 | Type above overview of biological systems: Population perceived as a kind of approach, community, ecosystem, landscape, Biome, Ecosphere. |
| 3 | Population Biology: Population characteristics, population dynamics, population, biotic potential, carrying capacity of the environment, population size and population size of the basic concepts of |
| 4 | Plant Communities, Community formation and evolution: Species, reproduction, distribution (expansion of the distribution), adaptation (adaptation), and competitive capabilities. Life forms of plants. Interaction between species. Together evolution (co-evolition) |
| 5 | Factors affecting the formation of plant communities: competition, cooperation and cooperation in inter-species evolution (group selection). Habitat, biotope, ecological tolerances of species, ecological niche and niche groups. |
| 6 | Midterm Examination 1 |
| 7 | Plant Commünities (continued): plant commünity general characteristics: the distinctive (analytical) characters: building (structure), formation type, stratification (stratification), density (density), unified (dominance) and abundance (Abondance), sosyabilite, litalite (vitality), periodisite (phenological properties) |
| 8 | Plant Commünities (continued): Plant Commünity general characteristics: Synthesis (synthetic) characters: Repeat Itself (frequency) of existence (presans), continuity (constancy), loyalty (fidelity). |
| 9 | Plant Commünities and Physical Environment: Plant commünities limiting elements of physical environment: topography, climate and bioclimate; soil physical and chemical properties, soil types, the main rock types and properties. |
| 10 | Syntaxonomy: International Syntaxonomy naming code (Zurich - Montpellier school). Exfoliating and assigned to the characteristic species concepts. Plant associations of the description and naming of the characteristic and distinctive from species to species. The classification of plant associations and syntaxonomic categories. Vegetation classification of the different schools. |
| 11 | Midterm Examination 2 |
| 12 | Ecosystem: Ecosystem succession and the formation of the basic principles of süksesyonun. And types of climax. Environmental Impact Assessment (EIA) çalışmalarındabiyotop, community and ecosystem analysis |
| 13 | Landscape Ecology: Definitions and basic concepts. Landscape elements. Ekotonlar and biological values. Time and space are seen in the context of changes in landscape. |
| 14 | European Union adaptation process (habitat directives) and adapted to Turkey |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. | | |  | |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. | | |  | |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. | | |  | |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. | | |  | |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. | | |  | |  |  |
| **LO 7** | Develops attitude towards project-based work. | | |  | |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. | | |  | |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. | | |  | |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. | | |  | |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage | | |  | |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. | | |  | |  |  |
| **Prepared by :** | | Prof. Dr. Atila Ocak | **Date:** | |  | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501102515 | **TITLE** | Harmful\_Insects |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | TURKİSH |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 10 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Description of damage and pest damage, damage style, nutritional characteristic of pest, reproduction and development, the environment relationships and natural enemies of pests, common pests in crop production and its control methods. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The purpose of the course is describing what are harm and the harmful concerning in relation of human and insect, to give knowledge to the students kinds of harms and basic harmful and general combat technique. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | At the end of the this course the student's will use own knowledge to contribute to the  Economical use of areas. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Determination of injurious way of insects  2. Collection and analysis methods of pest  3. Identification of pests  4. General recognition of common pests in our country and in Eskisehir  5. The general application of pest combat  6. Learning of natural enemies  7. recognition of the animals utilized in biological control of our country  8. Appropriate methods of pest detection techniques for dealing with biological properties  9. Weaknesses and advantage of pest and criteria for success of control against pests | | | | | | | |
| **TEXTBOOK** | | | | | Demirsoy, A., (2004), Yaşamın Temel Kuralları Entomoloji. Cilt II, Kısım II. Meteksan Ankara | | | | | | | |
| **OTHER REFERENCES** | | | | | 1-Kaygısız. H., (1999). Bitkisel üretimde zararlı böcekler. İstanbul. Hasad Yayıncılık2- Öncüer, C. (1991), Türkiye Bitki Zararlısı Böceklerin Parazit ve Predatör Kataloğu. İzmir, Ege Üniversitesi.3- Çanakçıoğlu, Hasan (1998). Orman Entomolojisi. İstanbul. İstanbul Üniversitesi Orman Fakültesi.4- Oğuroğlu, İ. (2000). Biyolojik Mücadele. Isparta. Süleyman Demirel Üniversitesi.5- Yaşar. B. (1996). Endüstri Bitkileri zararlıları. Van. Van Yüzüncü Yıl Üniv.6- Yaşar. B. (1996). Tahıl, Baklagil ve Yem Bitkileri Zararlıları. Van Yüzüncü Yıl Üniv. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Determination of injurious style of insects |
| 2 | Collecting harmful insects and basic examination methods |
| 3 | Determination of harmful insects |
| 4 | General recognition of common pests in Eskisehir and in our country |
| 5 | General pest control methods |
| 6 | Midterm Examination 1 |
| 7 | Learning of natural enemies |
| 8 | Recognizing animals which are utilized in biological control |
| 9 | Appropriate methods of pest detection techniques for dealing with biological properties |
| 10 | Weaknesses and benefit from them, and criteria of success on biological control . Forensic science and terms, Some Harmful Insects Orders (Hemiptera) |
| 11 | Midterm Examination 2 |
| 12 | Homoptera, Coleoptera |
| 13 | Hymenoptera |
| 14 | Diptera Lepidoptera |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |

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| **Prepared by :** | Assistant Professor Hakan ÇALIŞKAN | **Date:** | 18.05.2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501101533 | **TITLE** | ADVANCED MICROBIAL TECHNOLOGY |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | |  | 7,5 | COMPULSORY  ( x ) | | ELECTIVE  (   ) | TURKISH |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | | 30 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | | 20 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | | NONE | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Industrial Product Derivation By Microbial Fermentation, Operational Units ın A Fermentation Institution, Factors Controlling Yield of Fermentation, Biotechnological Usage of Some Yeast,mold and Bacterial Species | | | | | | | |
| **COURSE OBJECTIVES** | | | | | To give detailed knowledge about microorganisms which are used in biotechnology and their products manufactured via microbial technology. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Gets information about area of usage of microbial technology. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Learns, microorganisms which are used in biotechnology and products of these microorganisms. Improves his knowledge about microbial technologies. | | | | | | | |
| **TEXTBOOK** | | | | | Alagawadi, A. R.,Microbial biotechnology, New Delhi : Narosa Pub. House. Walker, Graeme M., Yeast physiology and biotechnology, Chichester : J. Wiley and Sons. | | | | | | | |
| **OTHER REFERENCES** | | | | | Michael T.Madıgan, John M.Martingo, Brock Biology of Microorganisms.Pearson Edu., Publish. Prentice Hall. Rose, A.H.: Economic Microbiology, Academic Pres. Berry, D. R., ed., Fungal Biotechnology, British Mycological Society, London Academic. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Industrial Product Derivation By Microbial Fermentation |
| 2 | Operational Units In A Fermentation Institution |
| 3 | Factors Controlling Yield Of Fermentation |
| 4 | Microbial Organic Acid Production |
| 5 | Microbial Organic Acid, Vitamin Production |
| 6 | Midterm Examination 1 |
| 7 | Microbial Antibiotic Production |
| 8 | Biotechnological Usage Of Some Yeast Species |
| 9 | Biotechnological Usage Of Some Mold Species |
| 10 | Biotechnological Usage Of Some Bacterial Species |
| 11 | Midterm Examination 2 |
| 12 | Microbial Steroid Transformation, Bioinsecticides |
| 13 | Microbial Steroid Transformation, Bioinsecticides |
| 14 | Biotechnological Vaccines, Probiotics |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Yrd.Doç. Dr. Sevil PİLATİN | **Date:** |  |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501101612 | **TITLE** | Ethnobotany |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 3 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
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| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 30 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 30 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | | 1 | | 40 |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | |  |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Science of biology and its historical development; structure of life, the functional and structural properties of cell; heritage; reproduction and process of development of life form will be in this course content. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aims of this course comprehends the science of biology and its historical development; explains the structure of life; compares the functional and structural properties of different cells types; have information about process of developments of the life forms by the students. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Course create substructure for the further courses by giving basic fields and structure of the science of biology to the students. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1- Explaining the chronological steps of plants’ usage that have economical and industrial value, applying the techniques that are used at economical botany laboratory  2- Explaining the importance of economical and industrial plants and their product usage, showing the starch and its types at monocotyledone and dicotyledone  3- Comprehending importance of categorizing of economical and industrial plants and their product, showing empirically the protein and its assignation  4- Comprehending growth area of economical and industrial plants and their product, showing empirically oil and its component.  5- Comprehending the component of economical and industrial plants, showing empirically caffeine having at economical and industrial plants  6- Comprehending different parts of economical and industrial plants and their processing mechanism, showing empirically sitric acid producing at some types of fruit plants .  7- Annotating between economical plants and industrial plants and their economical and industrial value, their manipulating, showing empirically etherical oil producing from some plants and their general properties.  8- Comprehending development and commercial information of the economical and industrial plants all over the world and our country, gathering the plants that have economical value from the nature and their economical process.  9- Showing economical and industrial plants all over the world and our country using by samples. | | | | | | | |
| **TEXTBOOK** | | | | | Ketenoğlu,O.,Obalı,O.,Kurt.,Güney,K.,Tuğ,g.,Geven,F.,Bingöl,Ü.,Körüklü,T. (2011).,Ekonomik Bitkiler, Palme Yayınları:594.,ISBN: 978-605-4414-44-4 | | | | | | | |
| **OTHER REFERENCES** | | | | | Özyurt,S.,(1992), Ekonomik Botanik Erciyes Üniv.Yay. no.47.Öztürk, M., Pirdal, M.,(1990). Ekonomik Botanik Uygulama Kitabı, Ege Ünv. Fen Fak. Kitaplar Serisi No:133, Ege Ünv. Basımevi,Özyurt,S.,(1992), Ekonomik Botanik Erciyes Üniv.Yay. no.47.Simpson, B. B. ve Ogarzaly, M.(2001), Economic Botany – Plants in Our World, (3rd. Ed.)Özer, Z., Tursun, N., Önen, H.,(2001) Yabancı otlarla Sağlıklı Yaşam (Gıda ve Tedavi) Krenk Yayınları ISBN: 975-8205-08-0 | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | The chronological steps of plants’ usage that have economical and industrial value. |
| 2 | Classification of plant that have economical and industrial value, their basic families and general information of their taxonomical diversity. |
| 3 | Description of nutritious plants and their classification. Their component, usage area, processing mechanism and manipulating. |
| 4 | Description of grain crops and their classification. Their component, usage area, processing mechanism and manipulating |
| 5 | Description of vegetables and their classification. Their component, usage area, processing mechanism and manipulating |
| 6 | Midterm Examination 1 |
| 7 | Description of fruit plants and their classification. Their component, usage area, processing mechanism and manipulating |
| 8 | Description of spice plants and their classification. Their component, usage area, processing mechanism and manipulating |
| 9 | Description of cautionary plants and their classification. Their component, usage area, processing mechanism and manipulating. |
| 10 | Description of industrial plants and their classification. Their component, usage area, processing mechanism and manipulating. |
| 11 | Midterm Examination 2 |
| 12 | Description of industrial plants and their classification. Their component, usage area, processing mechanism and manipulating. |
| 13 | Bringing in the wild plants that have economical potential to the economy |
| 14 | Information of the economical and industrial plants all over the world and our country. |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. | | |  | |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. | | |  | |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. | | |  | |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. | | |  | |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. | | |  | |  |  |
| **LO 7** | Develops attitude towards project-based work. | | |  | |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. | | |  | |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. | | |  | |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. | | |  | |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage | | |  | |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. | | |  | |  |  |
| **Prepared by :** | | Assoc. Prof. Dr. Onur Koyuncu | **Date:** | |  | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501101509 | **TITLE** | HISTOLOGICAL PREPARATION TECHNIQUES |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7.5 | COMPULSORY  ( x ) | | ELECTIVE  (   ) | TURKISH |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
|  | |  | | | | x | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 25 |
| Quiz | | | | | 1 | | 25 |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | | 1 | | 50 |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | |  |
| **PREREQUISITE(S)** | | | | | No | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | In this course;there is, basic principles of investigating biological objects, histological techniques, preparing of histological specimens, staining methods that are used in lab., general criteira of diagnosis. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The purpose of this course; students are going to learn basic tecniques of histology and obtain to identificaion of tissues in basic way. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course provides, students can prepare histological specimens by themselves and they can determine the general properties of tissues. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Applying of the methods of histological preparations  2. Preaparing of fixatives and fixation methods are used in common  3. To understand the construction of the histological preparation  4. Preparing cross-sections from tissues  5. Staining of tissue sections  6. Finding solutions to the possible problems in preparation  7. Distinguish of tissue sections in microscopic level | | | | | | | |
| **TEXTBOOK** | | | | | 1.Histojik Ayırıcı Tanı ( Prof. Dr. Johannes W. Rohen Çeviren: Prof.Dr. Hayati İMREN)2.A texbook of histology (William Bloom, Don W. Fawcett) | | | | | | | |
| **OTHER REFERENCES** | | | | | 1. Histolojik boyama teknikleri (Prof. Dr. Ramazan Demir)2.Histoloji Atlası (Çev.: Ramazan Demir) | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Basic principles of investigating biological objects, general rules for identificating tissues |
| 2 | Histological techniques (vital and avital investigating) |
| 3 | Fixing solutions and their properties |
| 4 | Decalsification (nitric acid and formic acid methods) |
| 5 | Preparing histological specimens, paraffin technique |
| 6 | Midterm Examination 1 |
| 7 | Taking sections, problems encountered in taking sections |
| 8 | Importance of the direction of sections, investigating various section surfaces |
| 9 | Certain staining techniques used in lab |
| 10 | Staining methods for ordinary tissues and colours encountered |
| 11 | Midterm Examination 2 |
| 12 | Connective tissue stains, staining techniques for blood and bone tissues |
| 13 | Artifacts mostly used for histological specimens |
| 14 | General criteria used in diagnosis |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Assoc. Prof. Dr. Mediha CANBEK | **Date:** |  |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501101515 | **TITLE** | BIOLOGICAL RESEARCH METHODS IN NATURE |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 10 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Scientific study methods, Basic rules of nature life, identification of basic equipments, the rules of natural living environment of different nature, sheltering, nutrition, dressing, state of emergency, first aid principles, biological sample acquisition rules, storage of biological samples, keeping records, nature observation, team work and principles, social values that should be considered in the nature . | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The purpose of this course is to give the basic knowledge which necessary for biological studies in nature for the students. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | To use of the gained experience with safe and efficient on their professional application areas | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Scientific research methods  2. Adapt to outdoors  3. Research and planning skills  4. To gain self-sufficiency in nature  5. To dope and pre-preparation for problems  6. Biological sampling  7. Personal equipment selection and use it  8. use of the technical equipment skills  9. To understand pay attention to the cultural and regional values | | | | | | | |
| **TEXTBOOK** | | | | | 1. Doğada Yaşam Temel Eğitim Notları, Dr. Hakan ÇALIŞKAN, 20062. Biyolojik Koleksiyonlar, Ömer Kaya Gülen, Hacettepe –Taş Kitapçılık, 1985 | | | | | | | |
| **OTHER REFERENCES** | | | | | 1. Gould. J.E. ( ) Handbook of Methods fort the Behavioral and Biological Sciences..CRC pres2. Aydıngün, H. (1997). Doğada Yaşam ve Gezi Notları. İstanbul, Yayınevi yayıncılık.3. Gülen,Ö.K., (1985). Biyolojik Koleksiyonlar. Ankara. Hacettepe Taş Kitapçılık B. (2002).4. Tilton, B., (2000). Doğada ilk yardım.İstanbul.5. Kıyak, S. , (2000). Entomolojik Müze Materyalleri. Ankara6. Howes, C.(2003). Caving.7. Çanakcıoğlu, H. (1993). Böceklerin Toplanma-Preparasyon Muhafaza ve teşhisleri.8. Kuş gözlemciliği9. Amfibiler, Prof. Dr. Ali Demirsoy, Meteksan, 199710. Türkiye Sürüngenleri I-II, Prof. Dr. Muhtar Başoğlu, Doç Dr. İbrahim Baran, 1980Türkiye Kuşları, Prof. Dr. İlhami Kiziroğlu, Türkiye Kuşları, OGM yayınları, 1989 | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Basic scientific methods |
| 2 | Basic rules of nature life |
| 3 | Living rules of nature in different environments |
| 4 | Description of basic equipment |
| 5 | Sheltering |
| 6 | Midterm Examination 1 |
| 7 | Nutrition, Dressing |
| 8 | State of emergency, first aid principles |
| 9 | Biological studies; planning |
| 10 | Preparation, appilication, evaluation , Team work and its important |
| 11 | Midterm Examination 2 |
| 12 | Biological sampling rules |
| 13 | Storage of biological samples |
| 14 | Nature observation, keeping records, Social values that should be considered in the nature . |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Assistant Professor Hakan ÇALIŞKAN | **Date:** | 18.05.2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501101529 | **TITLE** | Current Research Topics in Biochemistry |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( x ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | |  |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 25 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (seminar) | | | | | 1 | | 25 |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | | - | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | This course includes access, reading and comprehension to the current literature in the field of biochemistry, and with the use of effective presentation techniques transferring and discussion knowledges. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The main aim of the course is to provide information to the students about accession, examination, presentation and discussion of biochemical researches which are recently published in the scientific journals. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | At the end of this course, students will develop analytical thinking skills with publications discussing and they will gain ability of follow the current research topics in the field of biochemistry. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. To understand the ways of achieving scientific knowledge  2. Sort the articles in journals with internet access scanning methods  3. Classification of articles according to the fields of science  4. To examine the articles in the field of biochemistry by the method of IMRAD  5. To express the articles in the field of biochemistry with purpose & results.  6. To summarize and transfer the articles by the effective presentation methods  7. To compare of the different articles in I terms of biochemical methods  8. To analyze and discuss of scientific articles | | | | | | | |
| **TEXTBOOK** | | | | | Scientific papers about field (http://www.ncbi.nlm.nih.gov) | | | | | | | |
| **OTHER REFERENCES** | | | | | www.sciencedirect.com, http://www.springerlink.com, http://onlinebooks.library.upenn.edu/lists.html, http://www.ulakbim.gov.tr/cabim/vt/ http://www.freemedicaljournals.com/, http://isiknowledge.com http://www.biomedcentral.com/inst/gateway/, | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Biochemical control mechanisms, the biochemistry of membrane transport and bioenergetics |
| 2 | Concept of sample topics and effective presentation techniques samples |
| 3 | Literature discussing: Topic is; biochemical processes in organism, chemistry of biomolecules |
| 4 | Literature discussing: Topic is amino acids, peptides, proteins, lipids, carbohydrates, nucleic acids etc. |
| 5 | Literature discussing: Topic is structure and function of biomolecules |
| 6 | Midterm Examination 1 |
| 7 | Literature discussing: Topic is , kinetics of enzyme-catalyzed reactions |
| 8 | Literature discussing: Topic is , immunochemistry, membrane functions, |
| 9 | Literature discussing: Topic is vitamins and minerals |
| 10 | Literature discussing: Topic is lipoproteins, |
| 11 | Midterm Examination 2 |
| 12 | Literature discussing: Topic is xenobiotics |
| 13 | Literature discussing: Topic is biochemical control mechanisms |
| 14 | Literature discussing: Topic is the biochemistry of membrane transport and bioenergetics |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Dr.Figen CALISKAN | **Date:** | 18.05.2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501102519 | **TITLE** | Advanced Cell Biology |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7.5 | COMPULSORY  ( x ) | | ELECTIVE  (   ) | TURKISH |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
|  | |  | | | | x | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 25 |
| Quiz | | | | | 1 | | 25 |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | | 1 | | 50 |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | |  |
| **PREREQUISITE(S)** | | | | | No | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | In this course; cell cycle and programmed cell death, mechanisms of cell differentiation, fundamentals of embryonal cell differentiation, the ability of regulation in multicellular organisms, regeneration mechanism,cell signalling systems,cell aging and death. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The purpose of this course; learning the mechanisms of cell growth, mitosis differentiation and death | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course allows to learning the biology of the cells that make up an organism | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Learning the cell cycle  2. Distinguish between the mechanisms of cell differentiation  3. To explain the mechanism of cell signalling systems  4. To explain the mechanisms of regeneration  5. To understand the aging and cell death | | | | | | | |
| **TEXTBOOK** | | | | | 1.Molecular Biology of The Cell (Albert B. at all, 2008)2.Hücre Biyolojisi Ders Notları (Dr. Mediha Canbek) | | | | | | | |
| **OTHER REFERENCES** | | | | | 1.Moleküler Hücre Biyoloji (Hasan Veysi Güneş 2012) | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Cell cycle and regulators |
| 2 | Types of cell division |
| 3 | Factors that affect cell growth and cell size |
| 4 | Mechanisms of cell differentiation, embryonal basis of cell differentiation |
| 5 | The importance of the distribution of matter of cytoplasm in cell differentiation |
| 6 | Midterm Examination 1 |
| 7 | The ability of regulation in multiple-celled organisms |
| 8 | Mechanisms of regeneration |
| 9 | Morphogenesis and studies in various organisms |
| 10 | The ability of regulation in multicellular organisms |
| 11 | Midterm Examination 2 |
| 12 | Cell signalling systems |
| 13 | Cell senescence and death |
| 14 | Immune system, diversity of immunoglobines, complementary factors and autoimmune diseases |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Assoc. Prof. Dr. Mediha CANBEK | **Date:** |  |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501102527 | **TITLE** | Principles ‎ of Liquid Chromatography (HPLC) |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( x ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | |  |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 25 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (Seminar) | | | | | 1 | | 25 |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | | - | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | This course is includes theoretical and practical use of High Performance Liquid Chromatography (HPLC) instrument which is use a wide range of purification and structural characterization of the biomolecules. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The main aim of the course is to provide information to the students about fundamental principles of separation and the main separation mechanisms used in HPLC. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | At the end of this course, students will be able to learn importance of biomolecules on purification studies, technology of the equipment, and principles of operation and ability how to use. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. To understand the importance of chromatographic purification of biochemical molecules  2. To understand of relation chromatographic principles with liquid chromatography  3. To explain HPLC and its working principles  4. To understand of relation HPLC equipment and its components  5. To classify liquid chromatography separation steps  6. To understand of relation molecules and its mechanisms of differentiation  7. To explain diversity of HPLC column  8. To comment HPLC study results (chromatogram) | | | | | | | |
| **TEXTBOOK** | | | | | 1. McMaster, Marvin C." HPLC, a practical user's guide", Hoboken, N.J. : Wiley-Interscience, 2007. ISBN 0-471-75401-3, ISBN 978-0-471-75401-5. | | | | | | | |
| **OTHER REFERENCES** | | | | | 1.Yuri Kazakevich, Rosario LoBrutto. " HPLC for pharmaceutical scientists", Hoboken, N.J. : Wiley-Interscience, 2007. ISBN 978-0-471-68162-5. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Terminology of chromatography |
| 2 | Preparation of solvents; quality, buffers, filtration, degassing |
| 3 | Solvent use, changing solvents, solvent properties, buffer properties, column cleaning |
| 4 | HPLC parts and working principles |
| 5 | HPLC parts; columns |
| 6 | Midterm Examination 1 |
| 7 | HPLC parts; pumps,oven |
| 8 | HPLC parts; dedectors |
| 9 | Method development |
| 10 | Choice of mode of chromatography; Normal-phase and rerverse-phase liquid chromatography |
| 11 | Midterm Examination 2 |
| 12 | Choice of mode of chromatography; Ion-exchange chromatography, size-exclusion chromatography |
| 13 | HPLC application in biomedical , forensic analysis, environmental analysis., food, organic, and pharmacological areas. |
| 14 | Problem solving in HPLC |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Dr.Figen CALISKAN | **Date:** | 18.05.2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** |  | **TITLE** | Microbial Deterioration |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | |  |  | | |  | 7.5 | COMPULSORY  ( x ) | | ELECTIVE  (   ) | TURKISH |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 30 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 20 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Physiologic aspects of biodeterioration, Biodeterioration and the environment, Biodeterioration of wool, leather, metals, tabacco, fuil, oil, rubber, plastic and food | | | | | | | |
| **COURSE OBJECTIVES** | | | | | To give detailed knowledge,to teach the physiology of the deterioration caused by microorganisms that restricts the usage of many industrial products and to give an objective about the factors that causes deterioration | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Gets information about area of usage of microbial deterioration | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Learns to explain biodeterioration, microbiological degradation and corrosion Acquires information about the mechanisms of microbiological degradation and corrosion of industrially important materials Learns about the methods for the protection of industrially important materials against biodeterioration. | | | | | | | |
| **TEXTBOOK** | | | | | Lectures notes | | | | | | | |
| **OTHER REFERENCES** | | | | | 1.Rose, A.H.: Microbial Biodeterioration in: Economic Microbiology Volume 7, Academic Press, 1982.2. Allsopp, D., Seal, K.J., Gaylarde, C.C.: Introduction to Biodeterioration Cambridge University Press, 2004 | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | History of biodeterioration and Physiologic aspects of biodeterioration |
| 2 | Biodeterioration and the environment |
| 3 | Biodeterioration and the environment |
| 4 | Biodeterioration of food and the preventation tecniques |
| 5 | Biodeterioration of food and the preventation tecniques |
| 6 | Midterm Examination 1 |
| 7 | Biodeterioration of tabacco and the preventation tecniques |
| 8 | Biodeterioration of wood and the preventation tecniques |
| 9 | Biodeterioration of leather and the preventation tecniques |
| 10 | Biodeterioration of wool and the preventation tecniques |
| 11 | Midterm Examination 2 |
| 12 | Biodeterioration of oil and fuel and the preventation tecniques |
| 13 | Biodeterioration of rubber and plastic and the preventation tecniques |
| 14 | Biodeterioration of metals and the preventation tecniques |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Yrd.Doç.Dr.SEVİL PİLATİN | **Date:** | 17.04 2105 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501101506 | **TITLE** | Pesticides and Mechanism of Effect |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | |  |  | | | 3 | 7,5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | | - | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Contents of the course are: What is pesticide? Formulation of pesticides, Entrance ways of pesticides to animals, Effects of pesticides to humans, Acut and cronic poisoning, Cancerogen effects , First aid in pesticide poisoning, Effects of pesticides to environment | | | | | | | |
| **COURSE OBJECTIVES** | | | | | Main objective of the course are Explaining the metabolically effects of widely used pesticides. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Öğrencilerin pestisitler ve etki mekanizmaları konusunda bilgi sahibi olabilmelerini sağlar. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. To become conscious about the effects of pesticides to environment and living things.  2. Obtaining talent to perform first aid in pesticide poisonings | | | | | | | |
| **TEXTBOOK** | | | | | Tarımsal Zararlılarla Savaş Yöntemleri, Prof. Dr. Cezmi Öncüer | | | | | | | |
| **OTHER REFERENCES** | | | | | Tarım İlaçları, Dr. Saffet Öztürk | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | General Information About Pesticides |
| 2 | Pesticides Types |
| 3 | Fight Against agricultural pests |
| 4 | Investigation of Biological Pest |
| 5 | Monitoring of plant phenology |
| 6 | Midterm Examination 1 |
| 7 | Struggles on Pests |
| 8 | Toxicity in Pesticides |
| 9 | Dispersal of Pesticides |
| 10 | Use Of Different Types Of Pesticides |
| 11 | Midterm Examination 2 |
| 12 | Problems caused by pesticides |
| 13 | Acute effects of pesticides |
| 14 | Chronic Healty Effects of Pesticides |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Assoc. Prof. Ünal ÖZELMAS | **Date:** | 18.05.2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501101519 | **TITLE** | Medical and Poisonous Plants |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | |  |  | | | 3 | 7,5 | COMPULSORY  ( x ) | | ELECTIVE  (   ) | Turkısh |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 2 | | 50 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Properties and usage of medicinal plants and medical plants growing in Turkey, Poisonous plants | | | | | | | |
| **COURSE OBJECTIVES** | | | | | This course aims to provide students with understanding medical plants and poisonous plants | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | TThis course will contribute to Medical and poisonous plants, properties, uses and distributions in Turkey | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Be able to know properties of medical plants  Be able to know cultivation of medical plants  Be able to perceive drug preparation  Be able to know effects and uses of medical plants  Be able to know medical plants growing in Turkey  Be able to know properties of poisonous plants  Be able to know poisonous plants growing in Turkey | | | | | | | |
| **TEXTBOOK** | | | | | Baytop, T. (1999). Türkiye’de Bitkiler ile Tedavi. Nobel Tıp Kitabevleri, İstanbul.Seçmen, Ö., Leblebici, E. (2000). Yurdumuzun Zehirli Bitkileri. Ege Üniversitesi, Fen Fakültesi, Bornova, İzmir. | | | | | | | |
| **OTHER REFERENCES** | | | | | Buhner, S.H. (2001). Bitkisel Antibiyotikler. Platform Yayınları, İstanbul.Davis PH (ed) (1965-1985). Flora of Turkey and the East Aegean Islans. Vols. 1-9. Edinburg: Edinburg University Press.Davis PH, Mill RR & Tan K (eds) (1988). Flora of Turkey and the East Aegean Islans. Vol. 10. Edinburg: Edinburg University Press.Güner A, Özhatay N, Ekim T & Başer KHC (eds) (2000). Flora of Turkey and the East Aegean Islans. Vol. 11. Edinburg: Edinburg University Press. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Medical Plants; history, taxonomy, morphology and anatomy |
| 2 | Cultivation of medical plants |
| 3 | Drug preparation |
| 4 | Medical Plants; contents, effects and usage |
| 5 | Medical plants growing in Turkey |
| 6 | Midterm Examination 1 |
| 7 | Medical plants growing in Turkey |
| 8 | Medical plants growing in Turkey |
| 9 | Medical plants growing in Turkey |
| 10 | Medical plants growing in Turkey |
| 11 | Midterm Examination 2 |
| 12 | Poisonous Plants; taxonomy, morphology and anatomy |
| 13 | Poisonous Plants growing in Turkey |
| 14 | Poisonous Plants growing in Turkey |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | | Assoc. Prof. Dr. Ebru ATAŞLAR | **Date:** | | 21.09.2015 | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501112625 | **TITLE** | Phylogeography |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | |  |  | | | 3 | 7,5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 25 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 25 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Within the scope of this course, examined how to explain phylogeography which is a science tested alternative process and events causing distribution of species with dispersal and vicariance. It is situated in this course that research reasons of organisms recent geographic distributions, quest historical processes in the population demography and studies of reveal how to form evolutionary tree. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The main aim of this course gets able to understand how to explain main reasons of organisms recent distribution with dispersal and vicariance and comprehend and interpret how to form evolutionary tree by students. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | The aim of this course provides apprehended able to apply and interpret taxonomic and phylogeographic study methods. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Ability of explanation basic rules of animal classification  2. Ability of interpreting alternative process and events causing distribution of species  3. Ability of explanation dispersal and vicariance  4. Ability of explanation historical processes in the population demography  5. Ability of explanation importance of dispersal and vicariance in the description of new taxa  6. Ability of explanation how to form evolutionary tree and interpreting clades | | | | | | | |
| **TEXTBOOK** | | | | | Near, M. 2001. Molecular Ecology. 10: 2235–2240: Intraspecific phylogeography.Brito, P. 2005. Molecular Ecology. | | | | | | | |
| **OTHER REFERENCES** | | | | | Mayr E. .S. Systematic and origin of the species. New York Columbia Uthvenuty Press. 1942. 334 p.Mayr E. .S..Methods and priciples of systematic zoology. New York: McGraw-Hill. 1953. 328 p.George Gaylord Simpson. Principles of Animal Taxonomy., Columbia University Pres, ISBN: 0231024274 | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | What is the phlogeography? How to considered? |
| 2 | What are the main rules of organisms distributions? |
| 3 | What are the dispersal and vicariance? How to effect distribution? |
| 4 | Effect to dispersal and vicariance (continued) |
| 5 | Synapomorphy |
| 6 | Midterm Examination 1 |
| 7 | Geographic isolation in description of new taxa |
| 8 | Sexual isolation in description of new taxa |
| 9 | Bottleneck effect, speciation mechanisms |
| 10 | Sibling species |
| 11 | Midterm Examination 2 |
| 12 | What is the clade? How to constitute? |
| 13 | Interpret of clades in past and present systematic |
| 14 | Methods using understand relation and distribution of organisms |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | | Prof. Dr. Naime ARSLAN | **Date:** | | 11/05/2015 | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501102522 | **TITLE** | DIGESTIVE SYSTEM PHYSIOLOGY |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | |  |  | | | 3 | 7.5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | This course will cover the structure and functions of the digestive system, digestive organs, and supplementary organs. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | This course aims to enable students to understand how water, electrolyte, and food, all of which essential for the body, are utilised in consideration of the functions of the digestive system. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course is supposed to help students learn what functions every single region involved in digestion have in the utilization of the food that is taken in. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1.To be able to understand structure and functions of the mouth, oesophagus, the stomach, the intestine, the pancreas, the liver, and the gall bladder  2. To be able to recognise that the essential function of the digestive system is to provide water, minerals and food for the body  3. To be able to assimilate the fact that the digestion process shows a variation depending on where it occurs in the digestive system  4. To be able to understand that every single region occurring in the digestive system has a different function  5. To be able to recognise that various food may be digested and absorbed in different regions of the digestive tract  6. To be able to classify secretion glands and relevant glands involved in digestion  7. To be able to understand functions of such organs as the liver, the gall bladder and the pancreas.  8. To be able to explain absorption of the food, water and minerals that have been digested  9. To be able to make an association between functions of the structures making up the digestive system | | | | | | | |
| **TEXTBOOK** | | | | | Ayhancı A. (2012) Hayvan Fizyolojisi Ders Notları. Eskişehir | | | | | | | |
| **OTHER REFERENCES** | | | | | 1. Guyton A C. (1991) Textbook of Medical Physiology. W.B. Saunders Company, Harcourt Brace Jovanovich, Inc.2. Doğan A. (Çeviri ed) (1995) Ganong Tıbbi Fizyoloji. Barış Kitabevi, İstanbul3. Çağlayan Ş. (1999) Yaşam Bilimi Fizyoloji. Panel Matbaacılık, İstanbul.4. Noyan A. (2003) Yaşamda ve Hekimlikte Fizyoloji. Meteksan, Ankara5. Randal D., Burggren, W. And French K. (1997) Animal Physiology. W.H. Freeman and Company, New York | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Structure and organisation of the digestive system |
| 2 | Advancement and treatment of the food going through the digestive tract |
| 3 | Structure of the mouth, the oesophagus, the stomach and the intestine |
| 4 | Secretions occurring in the digestive tract |
| 5 | Functions of the stomach and the intestine apart from those related to digestion |
| 6 | Midterm Examination 1 |
| 7 | Activities of the stomach and the intestine |
| 8 | Secretion of the bladder and its functions |
| 9 | Digestion and absorption within the digestive tract |
| 10 | Absorption of food, water and ions |
| 11 | Midterm Examination 2 |
| 12 | Forming of faeces in the intestine |
| 13 | Gastrointestinal diseases |
| 14 | Ulcers, circle and malabsorption |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Associate Prof. Dr Adnan AYHANCI | **Date:** | 04.05.2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501102521 | **TITLE** | NERVOUS SYSTEM PHYSIOLOGY |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | |  |  | | | 3 | 7.5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | | 1 | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | This course will cover such issues as structure and function of nerve system, as well as nervous control and integration. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The objective of this lesson is to provide students discover that the nerve system is responsible for controlling and coordinating the organs in the body | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course will enable students recognise that the nerve system integrate a good deal of information that it obtains from sensory organs in a way to be able to provide responses of the body, and that the nerve system forms the core of these mechanisms. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1.To be able to explain neuron known as structure and function unit of the nerve system.  2.To enable students have an overall understanding of the general organization of the nerve system.  3. To be able to comprehend the spinal cord, lower and upper brains play a role in the function of the nerve system  4. To be able to comprehend neurotic mechanisms and circuits  5. To be able to explain sensory receptors and basic procedures of the mechanisms  6. To be able to compare the functions of somatic and autonomous nerves and the difference between them  7. To be able to explain how reflex mechanisms work  8. To be able to explain neurotic mechanisms of pain  9. To be able to comprehend functions of the sensory organs  10. To be able to explain physiological basis of thought, consciousness and memory | | | | | | | |
| **TEXTBOOK** | | | | | Ayhancı A. (2012) Hayvan Fizyolojisi Ders Notları. Eskişehir | | | | | | | |
| **OTHER REFERENCES** | | | | | 1. Guyton A C. (1991) Textbook of Medical Physiology. W.B. Saunders Company, Harcourt Brace Jovanovich, Inc.2. Doğan A. (Çeviri ed) (1995) Ganong Tıbbi Fizyoloji. Barış Kitabevi, İstanbul3. Çağlayan Ş. (1999) Yaşam Bilimi Fizyoloji. Panel Matbaacılık, İstanbul.4. Noyan A. (2003) Yaşamda ve Hekimlikte Fizyoloji. Meteksan, Ankara5. Randal D., Burggren, W. And French K. (1997) Animal Physiology. W.H. Freeman and Company, New York | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Structure and function of the neuron |
| 2 | Organisation of the nerve system and synapses |
| 3 | Processing of knowledge and integrative function of the nerve system |
| 4 | The spinal cord, the lower and upper brains in relation to the central nerve system |
| 5 | Means of transmitting nervous signals |
| 6 | Midterm Examination 1 |
| 7 | Sensory receptors |
| 8 | Somatic sense |
| 9 | Sense of pain and its transportation |
| 10 | Motor functions of the spinal cord and spinal reflexes |
| 11 | Midterm Examination 2 |
| 12 | The brain stem and motor functions of basal ganglions |
| 13 | Five sensory organs and their functions |
| 14 | Functions of the cerebellum |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. | | |  | |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. | | |  | |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. | | |  | |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. | | |  | |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. | | |  | |  |  |
| **LO 7** | Develops attitude towards project-based work. | | |  | |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. | | |  | |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. | | |  | |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. | | |  | |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage | | |  | |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. | | |  | |  |  |
| **LO 13** |  | | |  | |  |  |
| **Prepared by :** | | Associate Prof. Dr Adnan AYHANCI | **Date:** | | 04.05.2015 | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501102537 | **TITLE** | Soil Ecology |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 |  | COMPULSORY  (   ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 30 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 20 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Introduction to soil ecosystem, ecosystem models, the role of soil in nutrient and energy flow and matter cycles, interspecific-intraspesifik coactions in soil, soil pollution, relationship of soil and water resources, soil indicator organisms, soil organisms and their niches, land-use planning, soil erosion | | | | | | | |
| **COURSE OBJECTIVES** | | | | | To present and explain the ecological aspect of the soil which is one of the great and main ecosystems of earth | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | At the end of the course, students know ecological characteristics of the soil which is an important ecosystem and learn the vital importance of it | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1.Students taking this course are knowledgible of soil ecosystem  2.Are able to explain Ecosystem models  3. Are able to summarise nutrient and energy flow in soil,  4.Are able to explain the role of soil in matter cycle  5.Has knowledge about soil pollution and indicator organisms  6.Are able to recognise soil organisms  7.Are able summarise land use planning  8. Are able to explain the relationship between land and water resources,  9.Has knowledge about soil erosion | | | | | | | |
| **TEXTBOOK** | | | | | Boşgelmez A., Boşgelmez İ., Savaşçı S., Paslı N. (2001) Ekoloji I-II, Ankara, Hacettepe University Publication | | | | | | | |
| **OTHER REFERENCES** | | | | | 1.Campbell N. A. & Reece J. B. (2006) Biyoloji, Altıncı Baskıdan Çeviri, Palme Publication.2.Baker G. H. (1998) The ecology, management and benefits of earthworms in agricultural soils, with particular reference to southern Australia. In “Earthworm Ecology” (Ed. C. A. Edwards) pp. 229–257.3. Lee K. E. and Pankhurst C. E. (1992) Soil Organisms and Sustainable Productivity.4. Lee K. E. (1991) The Diversity of Soil Organisms. In “The Biodiversity of Microorganisms and Invertebrates: Its Role in Sustainable Agriculture” (Ed. D. L. Hawksworth) 73–87.5. Lee K. E. (1994) The biodiversity of soil organisms, Applied Soil Ecology, 1, 251–254.6. Mısırlıoğlu M. (2014) Toprak Faunası, Nobel Publication, Ankara.7. Mısırlıoğlu M. (2011) Toprak solucanları, Biyolojileri, ekolojileri ve Türkiye türleri, Nobel Publication, Ankara.8. Mısırlıoğlu M. (2012) Toprak Bilimi, Course Notes.9. Odum E. P. & Barrett G. W. (2008) Ekolojinin Temel İlkeleri, Ankara, Palme Publication. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Introduction to soil ecosystem |
| 2 | Ecosystem models |
| 3 | The role of soil in nutrient and energy flow |
| 4 | The role of soil in matter cycles |
| 5 | interspecific-intraspesifik coactions in soil |
| 6 | Midterm Examination 1 |
| 7 | Soil pollution |
| 8 | Relationship between soil and water resources |
| 9 | Soil indicator organisms |
| 10 | Soil organisms and their niches |
| 11 | Midterm Examination 2 |
| 12 | Soil organisms and their niches |
| 13 | Land-use planning |
| 14 | Soil erosion |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | | Assoc. Prof. Mete MISIRLIOĞLU | **Date:** | | 29.04.2015 | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501111607 | **TITLE** | CHARACTERISTICS BEHAVIOUR OF ANIMAL GROUPS |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | |  |  | | | 3 | 7,5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | |  |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | |  |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | This course gives an introduction to ethology the biological approach to the study of animal behavior. It surveys the study of behavior at a variety of levels and in a broad diversity of taxa. Ethology is a branch of biological sciences dealing with the definition, description, analysis and integration of different behavior patterns displayed by any living organism. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | A behavior pattern is the eventual resultant “response” of an interaction between certain environmental stimulus and the motivation of the living organism. These behavioral responses are adoptive for the survival of the individual and / or the species. Learning in animals is known to be restricted and guided, directly or indirectly, by the original instinctive behavior of the animal, while in human it is unlimited and is mainly related to both “mind” and memory. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | |  | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Depth analysis of some special behaviours in major animal groups.  2. Determining and description of differences among instinctive and learnig behaviours in animals  3. Description of social behaviours in some animal groups and main consepts about social behaviours. | | | | | | | |
| **TEXTBOOK** | | | | | Rüştü Şahin: Etoloji (Karşılaştırmalı Hayvan Davranışları Bilimi), Diyarbakır, 1997 | | | | | | | |
| **OTHER REFERENCES** | | | | | Ayla Öber: Hayvan Davranışları, Nobel Yayınları, 2008 | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | What is Anima Behaviour? General Knowledges about Animal Behaviour. |
| 2 | Reflex |
| 3 | Instinct Behaviours |
| 4 | Learned Behaviours |
| 5 | Social Behaviours in Animals |
| 6 | Midterm Examination 1 |
| 7 | Hormones and Behaviours |
| 8 | Foraging Behaviours |
| 9 | Shelter seeking |
| 10 | Agnostic Behaviours |
| 11 | Midterm Examination 2 |
| 12 | Sexual Behaviours |
| 13 | Care Giving Behaviours |
| 14 | Intelligent Animals |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Assoc. Prof. Ünal Özelmas | **Date:** | 18.05.2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501112604 | **TITLE** | SYSTEMATIC BIOLOGY AND ZOOLOGIC NOMENCLATURE |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | |  |  | | | 3 | 7,5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 25 |
| Quiz | | | | | 1 | | 25 |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Animal classification, rules of animal classification, duties and authorities of International Commission on Zoological Nomenclture (ICZN), descriptions of new species and genus etc., taxonomical collection and revision research methods. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The main aim of this course is; aprehending basic rules of animal classification, aprehending of duties and authorities of International Commission on Zoological Nomenclture, doing taxonomical research methods. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | The aim of this course provide apprehended taxonomical research by students. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Ability of explanation basic rules of animal classification  2. Ability of interpreting basic differences of animal classification  3. Ability of explanation of duties and authorities of International Commission on Zoological Nomenclture (ICZN),  4. Ability of explanation basic rules of new taxon description  5. Ability of explanation taxonomical collection and revision  6. Ability of explanation and interpreting of taxonomic classification methods | | | | | | | |
| **TEXTBOOK** | | | | | International Commission on Zoological Nomenclature, http://www.iczn.org | | | | | | | |
| **OTHER REFERENCES** | | | | | Mayr E. .S. Systematic and origin of the species. New York Columbia Uthvenuty Press. 1942. 334 p.Mayr E. .S..Methods and priciples of systematic zoology. New York: McGraw-Hill. 1953. 328 p.George Gaylord Simpson. Principles of Animal Taxonomy., Columbia University Pres, ISBN: 0231024274 | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Duties and authorities of International Commission on Zoological Nomenclture |
| 2 | Importance of International Commission on Zoological Nomenclture |
| 3 | Limit of Taxons |
| 4 | Rules of descriptions of new taxon |
| 5 | Valid name synonym |
| 6 | Midterm Examination 1 |
| 7 | Homonym and its rules |
| 8 | Holotyp, syntyp, paratyp and lectotyp kind of collection |
| 9 | New methods in taxonomy |
| 10 | New methods in taxonomy |
| 11 | Midterm Examination 2 |
| 12 | Prepare of taxonomical collection |
| 13 | Revision studies |
| 14 | Rules of written scientific taxonomical study |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | | Prof. Dr. Naime ARSLAN | **Date:** | | 11/05/2015 | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501112609 | **TITLE** | TECHNIQUES IN MICROBIAL ECOLOGY |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( x ) | TURKISH |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| 3 | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 25 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 25 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | The scope of this course will be included the microbial ecology issues relating to classical and modern techniques. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aim of this course is to provide understanding of the basic knowledge for microbial ecology techniques by the students. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course will contribute to prepare for professional life by providing knowledge on ecological planning, operation and evaluation. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1.Internalizing the concepts related to ecological techniques  2.Able to apply the principles of microbial ecology to solve the ecological or environmental problems Able to apply the principles of microbial ecology to solve the ecological or environmental problems  3.Able to recognize the current applications, such as environmental genomics, molecular analysis Able to recognize the current applications, such as environmental genomics, molecular analysis  4.Understanding the published articles in the field of ecology Understanding the published articles in the field of ecology  5.Analyzing the published articles in the field of ecology Analyzing the published articles in the field of ecology  6.Able to design a study in the field of ecology Able to design a study in the field of ecology  7.Able to apply the methods used in microbial ecology Able to apply the methods used in microbial ecology | | | | | | | |
| **TEXTBOOK** | | | | | İLHAN S (2012) Mikrobiyal Ekolojide Teknikler Ders Notları, ESOGÜ Biyoloji Bölümü, ESKİŞEHİR | | | | | | | |
| **OTHER REFERENCES** | | | | | Brock Mikroorganizmaların Biyolojisi, Madigan MT and Martinko JM. (2006). (Çeviri Editörü: Cumhur ÇÖKMÜŞ). Palme Yayıncılık, Ankara. McArthur JV. (2006) Microbial Ecology.. Elsevier Inc. Osborn AM, Smith CJ (Eds) (2005) Molecular Microbial Ecology. Taylor and Francis. http://www2.nau.edu/~bah/BIO471/Home.html http://www.agen.ufl.edu/~chyn/age2062/lect/lect\_12/lect\_12.htm | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Microbial Ecosystems |
| 2 | Culture-Dependent Analyses of Microbial Communities |
| 3 | Enrichment and isolation |
| 4 | Isolation of pure culture |
| 5 | Culture-Independent Analyses of Microbial Communities |
| 6 | Midterm Examination 1 |
| 7 | Counting and Determination of Viability by Staining Methods |
| 8 | Genetic Stainings |
| 9 | PCR Methods of Microbial Community Analysis |
| 10 | Environmental Genomics |
| 11 | Midterm Examination 2 |
| 12 | Measurement of Microbial Activity in Nature |
| 13 | Chemical Assays, Radioisotopic Methods, and Microelectrodes |
| 14 | Microbial bioremediation, Microbe- Plant Relations |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | | Prof. Dr. Semra İLHAN | **Date:** | | 14.05.2015 | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501102535 | **TITLE** | The Terminology of Bryophytes |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | |  |  | | | 3 | 7.5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 30 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 10 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | | 1 | | 10 |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | This course will include topics introduction to use identification keys of bryophyta, general terminologies used in identification keys to the level of genus, detailed terminological terms retaining alternate characters to use between the subspecies taxa, terminologies used in species descriptions in Bryology, Making a diagnostic key by the help of similarities and differences of between species for bryophyte flora of the region studied. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aim of this course are understanding general terminological (morphologic and anatomic) terms that are used for (required to) identification of bryophytes by the students. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course will make contribution to comprehending terminologies of Bryophytes by the students. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Understand general features of bryophytes  2. Apply the technique of preparation of bryophyte samples  3. Distinguish terminological terms of bryophytes  4. Identifying bryophyte samples  5. Show the characters belong to bryophytes on the plant  6. Create bryophyte flora of research area | | | | | | | |
| **TEXTBOOK** | | | | | Smith AJE (2004). The Moss Flora of Britain and Ireland. (2nd Edn), pp. 1012. Cambridge University Press, London. | | | | | | | |
| **OTHER REFERENCES** | | | | | Richardson DHS (1981). The Biology of Mosses. pp. 220, Blackwell Scientific Publications, London.Glime Janice M (2007). Bryophyte Ecology. Volume 1. Physiological Ecology. Ebook sponsored by MTU and IAB. <http://www.bryoecol.mtu.edu/>Greven HC (2003). Grimmias of the World. pp. 247. Backhuys Publishers BV, Leiden, The Netherlands. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | General features of division Bryophyta |
| 2 | Learning the technique of preparation of bryophyte samples |
| 3 | Introducing the keys used for the identification of mosses and liverworts |
| 4 | Explaining the terms seen in the keys during the determination in genera level of different moss  species in different floras and showing the characters on the plants |
| 5 | Students’ trying to determine a moss sample, never studied before by them, by going over various flora and keys |
| 6 | Midterm Examination 1 |
| 7 | Explaining all the terminological terms seen during determination of samples in species level in different flora and literatures, and showing the characters on plants or over the preparation |
| 8 | Explaining the terminological terms and showing the characters on plants or over the preparation |
| 9 | Studies to determine a moss sample, the genus of which is known, by using various flora, revisions and monographs |
| 10 | Explaining all the terminological terms used during the determination of a liverwort sample in genera level from the different floras, showing the characters on plants or over the preparation |
| 11 | Midterm Examination 2 |
| 12 | Students’ trying to determine a liverwort sample, never studied before by them, by going over various flora and keys |
| 13 | Explaining all the terminological terms of a liverwort sample, the genus of which is known, by using various flora, revisions and monographs and showing the characters over the samples or preparations |
| 14 | Making a key by the help of similarities and differences of bryophyte species of a certain region |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. | | |  | |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. | | |  | |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. | | |  | |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. | | |  | |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. | | |  | |  |  |
| **LO 7** | Develops attitude towards project-based work. | | |  | |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. | | |  | |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. | | |  | |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. | | |  | |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage | | |  | |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. | | |  | |  |  |
| **Prepared by :** | | Assoc. Prof. Dr. Filiz SAVAROĞLU | **Date:** | | 08.05.2015 | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501111622 | **TITLE** | Fauna of Turkey |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 |  | COMPULSORY  (   ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 30 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 20 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Over all introduction to Turkish fauna, rated among one of the richest in the World, the geological and climatic reasons for this richness, comparison of Turkish fauna during different geological periods and the present day situation, species that we have lost, related national and international projects and agreements and the means of protection of faunistic richness. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | General introduction to the richness of Turkey’s fauna and of its protection together with relevant research to allow it to continue | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This lesson contributes to understand the richness about the biodiversity and fauna of Turkey and to the efforts of protecting this richness | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1.Students taking this course are knowledgible of Turkey’s general fauna and biodiversity.  2.Are aware of the reasons that brought about this richness  3.Are able to summarise the geological cycles that have occured in Anatolia.  4.Are able to explain how these changes have affected the fauna.  5.Are knowledgible about the extinction of these species.  6.Can identify extinct species and those under threat.  7.Can summarise national and international activities and agreements regarding the protection of the species.  8.Research ways of fulfilling these activities.  9.Are informed about all studies carried out on Turkish fauna until now and the scientists conducting the researh | | | | | | | |
| **TEXTBOOK** | | | | | Mısırlıoğlu M. (2014) Türkiye Faunası, Course Notes | | | | | | | |
| **OTHER REFERENCES** | | | | | 1.Documentaries related the course. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | General outline of Turkish fauna |
| 2 | Comparison of Turkish fauna and that of other countries and geographical origin considering similarities and differences |
| 3 | A brief geological history of Anatolia and reasons of faunistic richness |
| 4 | Comparison of Anatolian fauna of different periods in the light of paleontological findings |
| 5 | Anatolia’s different fauna types with different biotopes and the reasons for this |
| 6 | Midterm Examination 1 |
| 7 | Important refigiyum and barriers affecting the spread of Anatolian species |
| 8 | Important extinct species in Anatolia |
| 9 | Anatolian important species under threat |
| 10 | Reasons for disappearence of species and past mass extinction |
| 11 | Midterm Examination 2 |
| 12 | National projects and agreements regarding disappearing species |
| 13 | International projects and agreements regarding disappearing species |
| 14 | Significant studies on Turkish fauna until now, theTurkish and foreign scientists involved and academic research planed for the future |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. |  |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. |  |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. |  |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. |  |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. |  |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. |  |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. |  |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. |  |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. |  |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. |  |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. |  |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. |  |  |  |

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| **Prepared by :** | Assoc. Prof. Mete MISIRLIOĞLU | **Date:** | 29.04.2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501102503 | **TITLE** | Wildlife Ecology |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | |  |  | | | 3 | 7,5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | | - | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Contents of the course are General relationships in wildlife, Predator-prey interactions, Faunal regions, biomes and biotopes, Habitat of wildlife, Biotic succession and wildlife, Natality and mortality, Population dynamics in wildlife, Variation and cycles in populations | | | | | | | |
| **COURSE OBJECTIVES** | | | | | Main objective of the course is explaining the adaptations of various creatures to their ecological environment. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Öğrencilerin yaban hayatı konusunda bilgi sahibi olmalarını sağlar. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Obtaining the knowledge of general realtionsihps of wildlife  2. Obtaining a holistik approach to nature  3. Learning how to be a good wildlife biologists | | | | | | | |
| **TEXTBOOK** | | | | | Yaban Hayatı Ekolojisi; Prof. Dr. İdris Oğurlu | | | | | | | |
| **OTHER REFERENCES** | | | | | Ekoloji-Çevre Biyolojisi, Prof. Dr. Ahmet Kocataş | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | General Behaviours in Wildlife |
| 2 | Fauna Regions, Bioms and Biotops |
| 3 | Habitat in Wildlife |
| 4 | Characteristics of Wild Animal Populations |
| 5 | Wildlife Population Dynamics |
| 6 | Midterm Examination 1 |
| 7 | Genetic Variations in Population |
| 8 | Distribution, Migration and Invasion Movements |
| 9 | Regulation of wild animal populations |
| 10 | Population Dynamics-I |
| 11 | Midterm Examination 2 |
| 12 | Population Dynamics-I |
| 13 | Metapopulation Dynamics |
| 14 | Marking of Wild Animals |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Assoc. Prof. Ünal ÖZELMAS | **Date:** | 18.05.2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501102538 | **TITLE** | Water Directives |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | |  |  | | | 3 | 7,5 | COMPULSORY  ( x ) | | ELECTIVE  (   ) | Turkısh |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 2 | | 50 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Use of official organizations of the Republic of Turkey on the water regulations will be examined | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The accession negotiations between Turkey and the European Union in the opening chapter on environment and within the framework of the EU Water Directive on the protection of our wetlands have been many new regulations. For this reason, in our country have knowledge on this subject specialists trained personnel are lacking. This course also technical and legal basis of the new regulations by reading the information given to students about implementation strategies will contribute to training specialized personnel. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | With the Ministry of Environment and Urban Planning Department of Water Affairs and Forestry and the protection of water resources monitoring will contribute to training specialized personnel. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Protection of Wetlands in Turkey learning about the application and enforcement  2. Monitoring of Wetlands in Turkey learning about the application and enforcement  3. Protection and monitoring of wetlands have information about technical parameters  4. Ralated to the protection of wetlands and monitoring the examination of the legal basis  5.Protection of wetlands and related agencies responsible for monitoring to determine  6. Protection of wetlands and monitoring to determine occupational group responsible for dealing with  7. Related to the protection of wetlands and monitoring to evaluate the results of measurement and analysis  8..Protection of wetlands and monitoring  report preparation  9. Related to the protection of wetlands and monitoring the evaluation of the report can be made | | | | | | | |
| **TEXTBOOK** | | | | | 1.T.C With the Ministry of Environment and Urban Planning of the Ministry of Forestry and Water Affairs published in the official gazette issued laws, regulations and notifications | | | | | | | |
| **OTHER REFERENCES** | | | | | European Union Water Framework Directive text Implementation Handbook for the Implementation of the Water Framework Directive in Turkey | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Fisheries Law on code 1380 |
| 2 | Fisheries Law on code 1380 |
| 3 | Aquaculture Directive |
| 4 | Water Pollution Control Regulations |
| 5 | Water Pollution Control Regulations |
| 6 | Midterm Examination 1 |
| 7 | Surface Water Quality Management Regulation |
| 8 | Regulation on Water for Human Consumption |
| 9 | Regulation on Water for Human Consumption |
| 10 | Water - Water Intended for Human Consumption TSE 266 |
| 11 | Midterm Examination 2 |
| 12 | Basin Water Pollution Control Directive Assessment Study in the Special Provisions Relating to the Communique on Principles and Procedures |
| 13 | Basin Water Pollution Control Directive Assessment Study in the Special Provisions Relating to the Communiqué on Principles and Procedures |
| 14 | Investigation of Special Provisions Porsuk Assessment Study |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Associate Prof. Dr. Özgür EMİROĞLU | **Date:** | 07/05/2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501112616 | **TITLE** | Zootaxonomy |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 |  | COMPULSORY  (   ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 30 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 20 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Zootaxonomy is the branch of taxonomy which is interested in animal classification. Course content the principles and methods of animal classification. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | Are able to explain and apply the principles and methods of animal classification | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Course contribute to the studies related animal taxonomy | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | P1.Students taking this course are knowledgible of subjects like extent and history of taxonomy.  2.Are aware of the Importance of taxonomy and systematics on classification of animals  3.Are able to summarise methods and technics of taxonomy  4.Are able to explain taxonomic categories  5.Are knowledgible about the taxonomic characters  6.Can identify international principles of zoological nomenclature,  7.Can summarise taxonomic studies.  8.Research ways of latin and greek words and expression which are frequently used in taxonomic studies,  9.Are able to explain ethics in taxonomic studies | | | | | | | |
| **TEXTBOOK** | | | | | Mısırlıoğlu (2012) Basic Principles os sistematics ve taksonomy, Ders Notları. | | | | | | | |
| **OTHER REFERENCES** | | | | | 1.Ashlock, Peter D.; Mayr, Ernst (1991). Principles of systematic zoology. New York: McGraw-Hill. ISBN 0-07-041144-12. Campbell N. A. & Reece J. B. (2006) Biyoloji, Palme Publication.3.Mısırlıoğlu M. (2012) Biyolojik Terminoloji, Ders Notları.4.Baccetti B. (Ed) (1999) Biogeographia, Biogeographia dell’Anatolia, Parte I.5. Baccetti B. (Ed) (1999) Biogeographia, Biogeographia dell’Anatolia, Parte II. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Definition and history of taxonomy |
| 2 | Importance of taxonomy and systematics |
| 3 | methods and technics of taxonomy |
| 4 | taxonomic criters which are used in animal classification |
| 5 | taxonomic categories |
| 6 | Midterm Examination 1 |
| 7 | taxonomic characters |
| 8 | latin and greek words and expression which are frequently used in taxonomic studies |
| 9 | international principles of zoological nomenclature |
| 10 | Type definitions |
| 11 | Midterm Examination 2 |
| 12 | taxonomic studies |
| 13 | description of new species |
| 14 | ethics in taxonomic studies |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. |  |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. |  |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. |  |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. |  |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. |  |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. |  |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. |  |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. |  |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. |  |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. |  |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. |  |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. |  |  |  |

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| **Prepared by :** | Assoc. Prof. Mete MISIRLIOĞLU | **Date:** | 29.04.2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** |  | **TITLE** | POPULATION GENETICS |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  ( x ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
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| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 50 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | This course will include information on description, scope and historical development of genetics, Mendelian genetics, basic subjects of inheritance, chromosome mapping, mutation types and population genetics, genetic diseases and cell’s division, karyogram and ideogram, polythene chromosomes, chiasma frequency in plants, sex determination and genetic crossings. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aim of this course are comprehending the basic concepts of population genetics, comprehending the Mendelian laws, having analytical thinking about the genetic issues, developing genetic preparation skills, associating karyograms and idiograms, identifying mutagenic effects, applying sex determination in some living groups, banding techniques and crossing methods by the students. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course will teach the students basic rules of population genetics which is the rule of living organizms. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | By the end of this course students will be able to;  1. Comprehend basic concepts of genetics and the mechanisms of cell division.  2. Establish the association between genotype and phenotype, associate karyograms and idiograms.  3. Have analytical thinking about genetic issues and identify mutagenic effects of chemicals.  4. Develop the experimental logic and solve genetic problems and identify polythene chromosomes.  5. Explain the Mendelian laws, deviations from Mendelian ratios, inheritance models, laws of probabilities and family trees.  6. Plan gene connections and chromosome mapping.  7. Identify mutagenic effects and sex determination processes in some organisms.  8. Analyze population genetics and apply genetic crossing methods. | | | | | | | |
| **TEXTBOOK** | | | | | • Klug, W. S., Cummings, M.,R., Genetik Kavramlar(Çeviri Editörü, Öner, C), Palme yayıncılık, Ankara, 2002.• Yıldırım A., Kandemir N., Genetik, Nobel yayınevi, Ankara, 2008. | | | | | | | |
| **OTHER REFERENCES** | | | | | • Gillespie, J.H., Population Genetics-A Concise Guide• Hamilton M. B. 2009. Population Genetics• Soysal M. 2000. Genetik-I “ Soya çekim Bilgisi” yayın no: 74, ders notu no:135, 2000.• Temizkan G., 1999. Genetik II, İstanbul Üniversitesi Fen Fak | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Parameters and parametric quess |
| 2 | Theory and hypothesis |
| 3 | Molecular evolution |
| 4 | Genotype frequency |
| 5 | Genetic drift and effective population size |
| 6 | Midterm Examination 1 |
| 7 | Population structure and gene flow |
| 8 | Mutation |
| 9 | Principles of natural selection |
| 10 | Models of natural selection |
| 11 | Midterm Examination 2 |
| 12 | Molecular evolution |
| 13 | Quantitative variation and change |
| 14 | Quantitative inheritance variation based on the mendel and Population genetics problems |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. |  |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. |  |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. |  |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. |  |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. |  |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. |  |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. |  |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. |  |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. |  |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. |  |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. |  |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. |  |  |  |

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| **Prepared by :** | Assoc. Prof. Dr. Onur KOYUNCU | **Date:** | 27,11,2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** |  | **TITLE** | USE OF PLANTS |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
|  | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 50 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | The scope of this course will be included that history, description, importance and scope of phytotherapy, botanical features, description and classification of medical plants, floristic richness of medical plants of Turkey and sample plants, use of medical plants in Turkey and world and so economical dimensions of phytotherapy, obtainment techniques of medical plants and sample applications, substances of medical plants and some mechanisms of action, scientific research methods on medical plants, introduction of used tools and manipulation methods of plants, drugs and herbal cures, classification of medical plants according to their cure effects and sample plants, preparation of medical plants for after treatment and using techniques, naming, manipulating and storage techniques of medical plants and sample application. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aim of this course is to provide comprehending history, description and importance of phytotherapy, description, classification, active substances and preparation and usages for after treatment of medical plants, herbal drugs and cures, collecting, manipulating, storing, packing and selling techniques of medical-aromatic plants, household remedies which used in Turkey and their economical dimensions and so botanical features of medical-aromatic plants by the students. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | The course provides to using biological knowledge in phytotherapy by the students. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | By the end of this course students will be able to;  1. Comprehend history, description and importance of phytotherapy.  2. Comprehend botanical features, description and classification of medical-aromatic plants.  3. Comprehend floristic richness of medical plants in Turkey and usage of medical plants and so economical dimensions of phytotherapy in Turkey and world.  4. Comment on obtainment techniques, substances and some mechanisms of action of medical plants.  5. Comprehend scientific research methods, tools which used in phytotherapy and manipulation methods of medical-aromatic plants, drugs and herbal cures.  6. Classify medical-aromatic plants according to their cure effects.  7. Prepare and use medical-aromatic plants for after treatment.  8. Naming, classification and storing of medical-aromatic plants. | | | | | | | |
| **TEXTBOOK** | | | | |  | | | | | | | |
| **OTHER REFERENCES** | | | | |  | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | History, description, importance and scope of phytotherapy. |
| 2 | Botanical features, description and classification of medical plants. |
| 3 | Floristic richness of medical plants of Turkey and sample plants. |
| 4 | Use of medical plants in Turkey and world and so economical dimensions of phytotherapy. |
| 5 | Obtainment techniques of medical plants and sample applications. |
| 6 | Midterm Examination 1 |
| 7 | Substances of medical plants and some mechanisms of action. |
| 8 | Scientific research methods on medical plants, introduction of used tools and manipulation methods of plants, drugs and herbal cures I. |
| 9 | Scientific research methods on medical plants, introduction of used tools and manipulation methods of plants, drugs and herbal cures II. |
| 10 | Classification of medical plants according to their cure effects and sample plants |
| 11 | Midterm Examination 2 |
| 12 | Preparation of medical plants for after treatment and using techniques I. |
| 13 | Preparation of medical plants for after treatment and using techniques II. |
| 14 | Naming, manipulating and storage techniques of medical plants and sample application. |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. |  |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. |  |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. |  |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. |  |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. |  |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. |  |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. |  |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. |  |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. |  |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. |  |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. |  |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. |  |  |  |

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| **Prepared by :** | Assoc. Prof. Dr. Onur KOYUNCU | **Date:** | 03/05/2016 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** |  | **TITLE** | Design and Analysis In Biological Research |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  ( x ) | | ELECTIVE  (   ) | TURKISH |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 25 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 25 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | The scope of this course will be included basic and advanced methods to ensure use of statistical analysis in biological research. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aim of this course is to provide understanding of the basic knowledge for problem identification, data collection, modelling and analysis to show the skills in biological research, analyzing of collected data with computer, interpreting of data and demonsrating to use ability in decision making process, fundamental and advanced statistical consepts learn to use in biological research. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course will contribute to prepare for professional life by providing knowledge on statistical methods in bioloical research, collected data analyze to use of statistical analysis techniques. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Selecting the statistical methods for biological research,  2. Analyzing the data  3. Interpreting the results of analysis  4. Writing report | | | | | | | |
| **TEXTBOOK** | | | | | Lecture Notes | | | | | | | |
| **OTHER REFERENCES** | | | | | Fay, D.S and Gerow, K., 2013, A biologist's guide to statistical thinking and analysis, WormBook.orgErbaş, S. O. 2008 Olasılık ve İstatistik, Gazi Kitapevi | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Variable and Scale, Data Types, Frequency Distributions, Central Tendency and Measures of Dispersion |
| 2 | Discrete and Continuous Probabilty Distributions |
| 3 | Normal Distribution, Control of Statistical Assumptions |
| 4 | Diagnostics of Outliers, definition of the data matrix |
| 5 | The decision-making process in Parametric and NonParametric Statistical Techniques |
| 6 | Midterm Examination 1 |
| 7 | Test of Hypothesis and Confidence Interval |
| 8 | Parametric and Non-Parametric Hypothesis Testing For One Population Parameter |
| 9 | Parametric Hypothesis Testing For The Difference Between Two Population Parameters |
| 10 | Non-Parametric Hypothesis Testing For The Difference Between Two Population Parameters |
| 11 | Midterm Examination 2 |
| 12 | Comparison of two or more Population Means, Analysis of Variance (ANOVA), Non-Parametric Statistical Techniques (Mann-Whitney U, Friedman) |
| 13 | Analysis of Correlation |
| 14 | Analysis of Regression |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. |  |  |  |

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| **Prepared by :** | Doç. Dr. Arzu ALTIN YAVUZ, Prof. Dr. Veysel YILMAZ, Prof. Dr. Zeki YILDIZ | **Date:** | 20/06/2016 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | Joint Course for the Institute | **SEMESTER** | Fall-Spring |

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| **COURSE** | | | |
| **CODE** | 501011101 | **TITLE** | The Scientific Research Methods and Its Ethics |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| MSc-  Ph.D | 3 | | 0 | 0 | | | 3+0 | 7,5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| 1,5 | | 1,5 | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Science, the scientific thought and other fundamental concepts, the scientific research process and its techniques, Methodology: Data Collecting-Analysis-Interpretation, Reporting the scientific research (Preparation of a thesis, oral presentation, article, project), Ethics, Ethics of scientific research and publication. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The main objectives are: To examine the foundations of scientific research and the scientific research methods, to teach the principles of both the methodology and the ethics, to realize the process on a scientific research and to evaluate the results of research, to teach reporting the results of research (on a thesis, presentation, article). | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Applying the scientific research methods and the ethical rules in their professional life. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Gaining awareness on ethical principles at basic research methods, becoming skillful at analyzing and reporting the data obtained in scientific researches, being able to have researcher qualification with occupational sense of responsibility, having the scientific and vocational ethics’ understanding and being able to defend this understanding in every medium. | | | | | | | |
| **TEXTBOOK (Turkish)** | | | | | Karasar, N. (2015). Bilimsel Araştırma Yöntemi. Nobel Akademi Yayıncılık, Ankara. | | | | | | | |
| **OTHER REFERENCES** | | | | | **1-**Büyüköztürk, Ş., Çakmak, E. K., Akgün, Ö. E., Karadeniz, Ş., Demirel, F. (2012). Bilimsel Araştırma Yöntemleri. Pegem Akademi Yayınevi, Ankara.  **2-**Tanrıöğen, A. (Editör). (2014). Bilimsel Araştırma Yöntemleri. Anı Yayıncılık, Ankara.  **3-**Türkiye Bilimler Akademisi Bilim Etiği Komitesi. Bilimsel Araştırmada Etik ve Sorunları, Ankara: TÜBA Yayınları, (2002).  **4-**Ekiz, D. (2009). Bilimsel Araştırma Yöntemleri: Yaklaşım, Yöntem ve Teknikler. Anı Yayıncılık, Ankara.  **5-**Day, Robert A. (Çeviri: G. Aşkay Altay). (1996). Bilimsel Makale Nasıl Yazılır ve Nasıl Yayımlanır?, TÜBİTAK Yayınları, Ankara.  **6-**Özdamar, K. (2003). Modern Bilimsel Araştırma Yöntemleri. Kaan Kitabevi, Eskişehir.  **7-**Cebeci, S. (1997). Bilimsel Araştırma ve Yazma Teknikleri. Alfa Basım Yayım Dağıtım, İstanbul.  **8-**Wilson, E. B. (1990). An Introduction to Scientific Research. Dover Pub. Inc., New York.  **9-**Çömlekçi, N. (2001). Bilimsel Araştırma Yöntemi ve İstatistiksel Anlamlılık Sınamaları. Bilim Teknik Kitabevi, Eskişehir. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Science, scientific thought and other basic concepts (University, history of university, higher education, science, scientific thought and other related concepts) |
| 2 | Science, scientific thought and other basic concepts (University, history of university, higher education, science, scientific thought and other related concepts) |
| 3 | The scientific research and its types (Importance of the scientific research, types of science, scientific approach) |
| 4 | The scientific research process and its techniques (Access to the scientific knowledge, literature search, determining the research issue, definition of the problem, planning) |
| 5 | The scientific research process and its techniques (Access to the scientific knowledge, literature search, determining the research issue, definition of the problem, planning) |
| 6 | The scientific research process and its techniques (Access to the scientific knowledge, literature search, determining the research issue, definition of the problem, planning) |
| 7 | The method and the approach: Collecting, analysis and interpretation of the data (Data, data types, measurement and measurement tools, collecting data, organizing data, summarizing data, analysis and the interpretation of data) |
| 8 | The method and the approach: Collecting, analysis and interpretation of the data (Data, data types, measurement and measurement tools, collecting data, organizing data, summarizing data, analysis and the interpretation of data) |
| 9 | Finalizing the scientific research (Reporting, preparing the thesis, oral presentation, preparing an article and a project) |
| 10 | Finalizing the scientific research (Reporting, preparing the thesis, oral presentation, preparing an article and a project) |
| 11 | Finalizing the scientific research (Reporting, preparing the thesis, oral presentation, preparing an article and a project) |
| 12 | Ethics, scientific research and publication ethics (Ethics, rules of ethics, occupational ethics, non-ethical behaviors) |
| 13 | Ethics, scientific research and publication ethics (Ethics, rules of ethics, occupational ethics, non-ethical behaviors) |
| 14 | Ethics, scientific research and publication ethics (Ethics, rules of ethics, occupational ethics, non-ethical behaviors) |
| 15,16 | Mid-term exam, Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE INSTITUTE’S GRADUATE PROGRAMME’S LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (M.Sc.-Ph.D.)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Having the scientific and vocational ethics’ understanding and being able to defend this understanding in every medium. | | |  | |  |  |
| **LO 2** | Being able to have researcher qualification with occupational sense of responsibility. | | |  | |  |  |
| **LO 3** | Becoming skillful at analyzing and reporting the data obtained in scientific researches. | | |  | |  |  |
| **LO 4** | Gaining awareness on ethical principles at basic research methods. | | |  | |  |  |
| **Prepared by :** | | |  | **Date:** | | 14.06.2016 | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501112602 | **TITLE** | LANDSCAPING TECHNIQUES AND APPLICATIONS |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
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| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | In this course content, description, importance and chronological development of landscaping; general principles of landscaping and its terminology, classifications of tools that are used for landscaping, classifications of plants that are used in landscaping, and applications of these knowledge will include. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aims of this course are to comprehend the plants and tools that are used in landscaping studies. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | The course provides the students to have skills as they use their hands in the field of landscaping will contribute to biological informations. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | By the end of this course students will be able to;  1. Comprehend description, importance and chronological development of landscaping.  2. Comprehend general principles of landscaping and its terminology,  classifications of tools that are used for landscaping  3. Cognizing landscaping squad that are not plants.  4. Cognizing the tools that are used for landscaping.  5. Classifications of plants that are used in landscaping.  6. Making a plan for landscaping studies.  7. Appraise the landscaping studies. | | | | | | | |
| **TEXTBOOK** | | | | | Hartmann, H. T., Kestee, D: E:; 1961, Plant Propagation Principles And Practices. Englewood. Cliffs, New Jersey, Prentice-Hall, Inc. USA. | | | | | | | |
| **OTHER REFERENCES** | | | | | PAMAY, B., 1979-Park ve Peyzaj Mimarisi, İ.Ü Orman Fakültesi. Yayın No=264, İstanbul. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Description, importance and chronological development of landscaping. |
| 2 | General principles of landscaping and its terminology. |
| 3 | Classifications of tools that are used in landscaping. |
| 4 | Landscaping squad that are not plants I. |
| 5 | Landscaping squad that are not plants II. |
| 6 | Midterm Examination 1 |
| 7 | Classifications of plants that are used in landscaping and appraising these plants I. |
| 8 | Classifications of plants that are used in landscaping and appraising these plants II. |
| 9 | Classifications of plants that are used in landscaping and appraising these plants III. |
| 10 | Classifications of plants that are used in landscaping and appraising these plants IV. |
| 11 | Midterm Examination 2 |
| 12 | Classifications of plants that are used in landscaping and appraising these plants V. |
| 13 | Special fancy thar are used for landscaping. |
| 14 | Plan studies for landscaping I - II and Analyse the landscaping applications. |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | | |  | |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | | |  | |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | | |  | |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | | |  | |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | | |  | |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | | |  | |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | | |  | |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | | |  | |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | | |  | |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | | |  | |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | | |  | |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | | |  | |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | | |  | |  |  |
| **Prepared by :** | | Assoc. Prof. Dr. Onur KOYUNCU | **Date:** | | 24.11.2017 | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** |  | **TITLE** | Oxidative Stress and Antioxidant Metabolism in Plants |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 3 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( x ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 30 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 30 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | | 1 | | 40 |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | |  |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | In this course, general principles of reactive oxygen species generation and the sources, scavenging of reactive oxygen species, functions and roles of enzymatic and non-enzymatic components of antioxidant metabolism, importance of antioxidant metabolism in plants, transgenic approaches to develop oxidative stress tolerant plants. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The scope of this course, reactive oxygen species and antioxidants, acting as signals that trigger the evidence for the defense reactions will be discussed. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Teaching the fundamentals of oxidative stress generation and components of antioxidant metabolism in plants and provide evaluation skill with applied biological sciences. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1- Realize the source of various abiotic and biotic environmental stress,  2- Understand the oxidative stress mechanism with respect to various abiotic and biotic environmental stresses,  3- Comprehend reactive oxygen species and their general effects to the plants,  4 Have knowledge of antioxidant systems in plants,  5 Comprehend the basic principles of signal transduction mechanism triggering by oxidative stress. | | | | | | | |
| **TEXTBOOK** | | | | | Oxidative Stress in Plants, Inzé, D., Montagu, M. V., Taylor Francis Group, GB, 2002. | | | | | | | |
| **OTHER REFERENCES** | | | | | 1-Reactive Oxygen Species: Metabolism, Oxidative Stress, and Signal Transduction” Annual Review of Plant Biology 55, 373-399 Lichtenthaler,H.K., 20072-Biosynthesis,Accumulation and Emission of Carotenoids, a-Tocopherol, Plastoquinone, and Isoprene in Leaves under High Photosynthetic Irradiance” Photosynthesis Research 92,163-179. Edreva, A. 2005.3-Generation and Scavenging of Reactive oxygen Species in Chloroplasts: a submolecular approach” Agriculture, Ecosystems and Environment 106, 119-133. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Comprehend importance of antioxidant metabolism in plants. Definition of oxidative stress |
| 2 | Factors causing to oxidative stress. |
| 3 | Reactive oxigen species and free radicals. |
| 4 | Sources of ROS; chloroplasts, mitocondria and peroxisomes. |
| 5 | Interconversion and scavenging reactive oxygen species |
| 6 | Midterm Examination 1 |
| 7 | Antioxidant system |
| 8 | Enzymatic components of antioxidant metabolism; peroxidase, catalase, superoxide dismutase etc. |
| 9 | Non-enzymatic components of antioxidant metabolism; ascorbic acid, glutathione, tocopherol etc |
| 10 | Major secondary metabolites having antioxidant activity; phenols, flavonoids, isoprene etc |
| 11 | Midterm Examination 2 |
| 12 | Determination of the damage caused by oxidative stress |
| 13 | Increased of resistance against oxidative stress in plants |
| 14 | Transgenic approaches to develop oxidative stress tolerant plants |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Assoc. Prof. Dr. Murat ARDIÇ | **Date:** |  |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** |  | **TITLE** | Photosystems and Pigment Systems In Plants |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 3 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( x ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 30 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 30 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | | 1 | | 40 |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | |  |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | In this course, the role of light in photosynthesis, the structure of devices that perform photosynthesis. By stimulating the ATP and NADPH from light by chlorophyll in the synthesis was completed with the events. CO2 fixation and reduction of cyclical reactions will be discussed that. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | In this course, Details of photosynthetic apparatus in plants, electron chain systems, steps of photosynthetic processes and importance for living things, discussion of photosynthesis to depend upon new progress of stomatal physiology, discussion of pigments with results of effects of environmental stresses on photosynthesis | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Photosynthesis can use light energy to a single biological event. In addition, all the energy resources of our planet was formed as a result of photosynthesis. In this respect, a broader perspective by looking at basic physical principles related to the photosynthetic and photosynthetic energy storage devices will be considered in detail the structure and function is important for the studies | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1- Have knowledge of steps of photosynthetic processes and importance for living things  2-Have knowledge of photosystem systems in plants,  3- Have knowledge of plant pigments types  4- Have knowledge of environmenal effects of plant pigments compositions | | | | | | | |
| **TEXTBOOK** | | | | | Taiz, L., Zeiger, E., 2008, Bitki Fizyolojisi, 3. Baskıdan Çeviri (Ed. İsmail TÜRKAN, Palme Yayıncılık, ANKARA. | | | | | | | |
| **OTHER REFERENCES** | | | | | 1-Akman ,Y.,Küçüködük ,M.,Evren ,H.,Öncel ,I.,DüzenliFOTOSENTEZ (Fotorespirasyon,4 C'lu Karbon döngüsü ve Crassulacean Asit Metabolizması),2000, Kariyer Matbacılık LTD.ŞTİ2-Kadıoğlu, A., 2011, Bitki Fizyolojisi, Trabzon, Türkiye3-Pessarakli ,M . 1996 . Handbook of Photosdynthesis . 1027 pp. Marcvel Dekker, INC. New York.Basel.Hong Kong. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Principles of photosynthesis in higher plants ,basic ideas and concepts. |
| 2 | Structural properties of the pigment systems of photosystem. and photosynthetic pigments |
| 3 | Photosynthesis is the structure of devices |
| 4 | Molecuar structure and types of Chlorophylls. Structure of light harvesting complexes |
| 5 | Molecuar structure and types of Carotenoids. Molecuar structure and types of Lycopen |
| 6 | Midterm Examination 1 |
| 7 | Molecuar structure and types of Phytochrome. |
| 8 | Effects of phytochrome on plant growth and development |
| 9 | Environmenal effects of plant pigments compositions |
| 10 | The effects of light on plant pigments |
| 11 | Midterm Examination 2 |
| 12 | The Evolution of plant pigments (Endosymbiont Theory). Genetically modified organisms and plant pigments. |
| 13 | The importance and function of the natural balance of photosynthesis and plant production. |
| 14 | Photosynthesis under environmental stres conditions. |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Assoc. Prof. Dr. Murat ARDIÇ | **Date:** |  |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| --- | --- | --- | --- |
| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** |  | **TITLE** | Use of plants in environmental pollution |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( x ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 30 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 30 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | | 1 | | 40 |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | |  |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Environmental pollution is an important problem in our day. In thıs course; organic and inorganic sustances in the polluted areas that contaminated with metals could be cleaned by using plant biological materials through the phytoremediation technology. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The scope of this course,To learn how to remediate Pollutants, toxic materials like some heavy metals from the contaminated soils with them and to clean the soils by using plants in environmental pollution techniques | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | In the end of this course, students will be able to learn the effects of environmental and endustrial pollutiuon on soil and plants. Teach the fundamentals of phytoremediation , phytoremidation techniques and so provide evaluation skill with applied biological sciences. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1- Learned about the effects of environmental and endustrial pollutiuon on soil and plants,  2- Comprehend heavy metals and accumulation of them in plants, removing  heavy metals using some special plant species,  3- Have knowledge of use plants in environmental pollution techniques, | | | | | | | |
| **TEXTBOOK** | | | | | Plant Adaptation and Phytoremediation, Ashraf, M., Ozturk, M., Ahmad, M. S. A, Springer Netherlands, 2014 | | | | | | | |
| **OTHER REFERENCES** | | | | | 1-Soil Remediation and Plants: Prospects and Challenges, Hakeem K., Sabir M., Ozturk M., Murmet A., Academic Press, Elsevier, New York, 2014.2-Phytoremediation of toxic metals; using plants to clean up the environment , Raskin I., Ensley B.D.,John Wiley & Sons, Inc, 2000 | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Environmental pollution and use of plants in environmental pollution |
| 2 | Heavy metals and their toxic effects in living things. |
| 3 | Hyperaccumulator plants which accumulates heavy metals in it. |
| 4 | Plant defense mechanisms in soil contaminated by heavy metals |
| 5 | Factors affecting the use of plants in environmental pollution. |
| 6 | Midterm Examination 1 |
| 7 | Useage mechanisms and adaptations of plants in phytoremediation |
| 8 | Phytoextraction; Rhizofiltration, Phytostabiliation, Phytovolatilization, Phytodegration |
| 9 | The positive and negative aspects of Phytoremediation |
| 10 | Useage advantages of plants in environmental pollution |
| 11 | Midterm Examination 2 |
| 12 | Disadvantages of using plants in environmental pollution |
| 13 | Development of plants for use plants in environmental pollution |
| 14 | Recent Trends and Approaches in use plants in environmental pollution on the earth |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Assoc. Prof. Dr. Murat ARDIÇ | **Date:** |  |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** |  | **TITLE** | Plant Ecophysiology |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( x ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 30 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 30 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | | 1 | | 40 |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | |  |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | To demonstrate the physiological and biochemical responses of plants to various environmental factors. To make contribution to solutions for the stress factors that occur in the plants with natural and economical prescription and cause the damage. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | Plants are found in abiotic and biotic interactions in a variety of environments on earth. The aims of this course are teach the plant stresses and factors that occur during these interactions, to understand the mechanisms determining shape and function, and to teach the importance of these processes in plant physiology, ecology and agriculture. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Determination of environmental factors that affecting plant growth and development, how various plants respond to stress conditions and their solutions, and how these concepts are related to the application areas of biology. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1-Examines the relationship between ecological factors and plant growth,  2- Discusses the relationship between stress factors in natural areas and agricultural areas.  3-Learn the relationship between atmospheric and geographic stress mechanisms  4-Describe the mechanisms of plant stress factors in the narrow and wide circles  5-Learn factors that affect plant development negatively and change physiological properties | | | | | | | |
| **TEXTBOOK** | | | | | 1-Plant Ecophysiology; L.J. De Kok, M.J. Hawkesford , Springer, 2014.2-Plant Ecophysiology; M. N. V. Prasad, John Wiley & Sons, India, 1997. | | | | | | | |
| **OTHER REFERENCES** | | | | | 1- Plant Physiological Ecology; Hans Lambers, F Stuart Chapin III, Thijs L. Pons, Springer Science & Business Media, 2008.2-Handbook of Plant Ecophysiology Techniques; M. J. Reigosa Roger, Springer Science & Business Media, 2001.3-Physicochemical and environmental plant physiology 4th edition; Park S. Nobel, Academic Press, 2009. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Environmental factors and plant development |
| 2 | Abiotic and biotic stress factors in plants |
| 3 | Plant stresses in plants due to deficiency and excess of plant nutrients |
| 4 | Oxygen deficiency, roots and aneorobic soil water |
| 5 | Water floatings, aeration, mineral uptake and root development and plant growth relations |
| 6 | Midterm Examination 1 |
| 7 | Water drought and drought tolerance in plants |
| 8 | Heat stress, heat shock, low temperature and freezing stress in plants |
| 9 | Salt stress |
| 10 | Heavy metal stress, allelochemical stress |
| 11 | Midterm Examination 2 |
| 12 | Air pollution and effects of pollutants in plants |
| 13 | Bioclimate types and their effects on agricultural ecosystems |
| 14 | Contributions of plant ecophysiology to ecology, economics and today's world |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |
| **LO 13** |  |  |  |  |

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| **Prepared by :** | Assoc. Prof. Dr. Murat ARDIÇ | **Date:** |  |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** |  | **TITLE** | Toxicology |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  () | | ELECTIVE  (x) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 2 | | 50 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | The course includes the basic prencips of toxicology science and effect mechanism of toxic substances. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aim of this course that, students learn the concepts related to toxicology and comprehend the forms of poisons and effects. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | After graduating from the students, they will be able to evaluate and solve the problems that are encountered in the field of toxicology from a scientific point of view, such as industry and health. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1-To be able to define the science of toxicology and to list the descendants  2- To be able to have knowledge about introduction routes, distribution and biotransformation of poisons  3- To be able to classify poisons  4-To be able to informe about the contents of toxicology subdiversity | | | | | | | |
| **TEXTBOOK** | | | | | Toksikoloji, 2005, Nevin Vural, Ank Ünv. Basımevi. | | | | | | | |
| **OTHER REFERENCES** | | | | | Papers related to subjects. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Definition of toxicology and poison, classification and history |
| 2 | Toxins of Herbal and Animal, Mycotoxins |
| 3 | Entry Paths, Absorption, Distribution and Excretion of Poisons |
| 4 | Biotransformation of xenobiotics |
| 5 | Mechanisms of toxic effects in living systems |
| 6 | Midterm Examination 1 |
| 7 | Systemic Toxicology |
| 8 | Genetic toxicology and toxicity due to genetic reasons |
| 9 | Pharmacogenomics and Toxicogenomics |
| 10 | Industrial and Environmental Toxicology |
| 11 | Midterm Examination 2 |
| 12 | Forensic Toxicology |
| 13 | Radiation and radioactivity toxicology |
| 14 | Economic toxicology |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improves their information at the level of expertise in their respective disciplines based on the biology degree level qualifications. |  |  |  |
| **LO 2** | Apply to knowledge and technologies in the field of education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 3** | Can create original solutions to problems related to the field by using research methods. |  |  |  |
| **LO 4** | Is an individual with high ethical standards in issues in the work area / applications, universal and sensitive to social values, interests of the country, researching, producing,. |  |  |  |
| **LO 5** | Capable of use the achievements in the field of biology is utilizing in interdisciplinary studies. |  |  |  |
| **LO 6** | Has the ability to access to scientific publications, reading comprehension, and make comments. |  |  |  |
| **LO 7** | Develops attitude towards project-based work. |  |  |  |
| **LO 8** | Transfers in a systematic way the current developments in the field and / or their work, both quantitative and qualitative data in the field or outside groups supporting them with written, oral, visual and applied. |  |  |  |
| **LO 9** | Can use advanced computer and information technology for the purposes of the field. |  |  |  |
| **LO 10** | Can communicate orally and in writing with with using a foreign language in the European Language Portfolio. |  |  |  |
| **LO 11** | Contributes to the development of the information society with academic and cultural heritage |  |  |  |
| **LO 12** | Develops a positive attitude towards lifelong learning. |  |  |  |

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| **Prepared by :** | Dr. Öğr. Üyesi Ferhan KORKMAZ | **Date:** | 03.04.2018 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** |  | **TITLE** | Entomological Preparation Technics |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 0 | | 3 | 0 | | |  |  | COMPULSORY  (   ) | | ELECTIVE  ( x ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (seminar) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | | -None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Introduction and use of tools and materials used in taxonomic studies on insects; Laboratory preparations for taxonomic research; Collection, transport and storage of insect materials from land; Preparation techniques of insect taxonomic structures; Viewing and recording morphological and taxonomic features of insects. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | to collect the methods, to bring them to the laboratory, the storage of these specimens by making general or partial body preparations and taking advantage of these preparations to understand the drawing and measurement methods of the relevant diagnostic characters of inland terrestrial and aquatic insect samples (both adult and larvae) | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Students will be able to determine the taxonomic method according to the insect group he/she works and use these methods in his / her studies. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Be able to apply the appropriate methods for collecting, transporting and storing insects from the land;  Understanding the importance and necessity of making preparations in insects;  To determine and apply the preparation method according to diagnostic characters;  Entomological collection and inventory preparation;  To be able to develop and use different preparation techniques | | | | | | | |
| **TEXTBOOK** | | | | | Prepared as a course note. | | | | | | | |
| **OTHER REFERENCES** | | | | | Beirne, Bryan P., 1963: Collecting, preparing and preserving insects.  Yaşamın Temel Kuralları Cilt 2 / Kısım 2/ Omurgasızlar / Böcekler - Entomoloji/ Prof. Dr. Ali Demirsoy. Meteksan A. Ş. Ankara.  Düzgüneş, Z., 1980. Küçük Arthropodların toplanması, saklanması ve mikroskobik preparatlarının hazırlanması. T.C. Gıda-Tarım ve Hayvancılık Bakanlığı, Zirai Mücadele ve Zirai Karantina Genel Müdürlüğü, Ankara, 77 s.Entomolojik Müze Metotları , S. KIYAK, Öğün Matbaacılık, 2000 | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | The importance and necessity of collection and preparation in entomological researches |
| 2 | Basic body parts and taxonomic characters used in insect morphology |
| 3 | Taxonomic collection and preparation methods in different insect groups |
| 4 | Purpose of Temporary and Permanent Preparations, Differences by Insect Groups and Tools Used in Preparation |
| 5 | Entomological sampling, transport and storage methods |
| 6 | Midterm Examination 1 |
| 7 | Collecting, transport and storage methods of terrestrial samples |
| 8 | Preparation of Adult and Larval Species of Terrestrial Specimens |
| 9 | Genital Organ Preparation Technique and Its Importance (Using KOH Method) |
| 10 | Methods for the extraction and preparation of male and female genital organs from dry and wet material |
| 11 | Midterm Examination 2 |
| 12 | Collection of Adult and Larvae of Aquatic Specimens and Delivery to Laboratory |
| 13 | Preparations of Adult and Larvae of Aquatic Specimens |
| 14 | Basic methods used in imaging and recording of the entomological collection and preparation |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | **☒** | **☐** | **☐** |
| **LO 2** | They have the ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesizing and solve hypothesis by using various observational and experimental methods. | **☒** | **☐** | **☐** |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | **☐** | **☒** | **☐** |
| **LO 4** | The student would be sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | **☒** | **☐** | **☐** |
| **LO 5** | They have the ability to work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | **☒** | **☐** | **☐** |
| **LO 6** | They can make and/or manage an original study which innovates to science in their field, improve a new scientific method or a known method is applied a field. | **☒** | **☐** | **☐** |
| **LO 7** | They have the ability to watch, read, understand, write and comment by using high-level scientific improvements and informatics technologies related to their fields. | **☒** | **☐** | **☐** |
| **LO 8** | They can examine the social relationship and standards of direct these relationships with a critical perspective and if necessary can take the lead to develop these standards. | **☒** | **☐** | **☐** |
| **LO 9** | They have the ability to depend on their original opinions at activities related to their fields and ability of effectively communicate. | **☒** | **☐** | **☐** |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | **☐** | **☒** | **☐** |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | **☒** | **☐** | **☐** |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | **☒** | **☐** | **☐** |
| **LO 13** | Develop a positive attitude towards life-long learning. | **☒** | **☐** | **☐** |

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| **Prepared by :** | Dr.Hakan CALISKAN | **Date:** | 06.11.2018 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** |  | **TITLE** | Hygiene and Sanitation in Food Production |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( x ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 30 |
| Quiz | | | | |  | |  |
| Homework | | | | | 2 | | 20 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (Seminar) | | | | | 2 | | 20 |
| **Final Examination** | | | | | | | 30 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | In this course, potential biological, chemical and physical hazards in food production facilities, hygiene and sanitation practices in food producers and structure and design of food production facilities subjects will be given. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | To teach the importance of food safety from farm to table, hygiene and sanitation principles, potential biological, chemical and physical hazards in food production facilities and methods of protection from them. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | The course provides designing a scientific research with basic biological knowledge having students in their fields, implementation and able to presenting by finishing, preparing to professional life. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Students taking this course, will be able to comprehend issues such as below;  - The advantages of an effective food safety and sanitation program and its importance in terms of brand reliability.  - The importance of food safety from farm to table  - Potential biological, chemical and physical hazards in food production facilities  - Foodborne disease agents (pathogens) and microorganisms causing food spoilage  - Methods of inhibition and destruction of microorganism and its scientific principles  -Pest and pest control methods  - Personnel hygiene practices that minimize food contamination  - Latest methods and technologies for cleaning and disinfection of food contact surfaces  - Potential food safety hazards and their protection methods  - Structure and design design of food production facilities  - systems such as Risk Risk Analysis at Critical Control Points (HACCP)garant which ensure food safety, | | | | | | | |
| **TEXTBOOK** | | | | | Gıda Hijyeni ve Sanitasyon. Prof. Dr. Semra Kayaardı. | | | | | | | |
| **OTHER REFERENCES** | | | | | Gıda Endüstrisinde Hijyen ve Sanitasyon. Mustafa Tayar , Velaaddin Kılıç.Gıda İşletmelerinde Hijyen. Prof. Dr. Deniz GÖKTAN - Prof. Dr. Günnur TUNÇEL | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Advantages of an effective food safety and sanitation program in terms of brand reliability |
| 2 | Food safety from farm to table |
| 3 | Potential biological, chemical and physical hazards in food production facilities |
| 4 | Foodborne pathogens and microorganisms causing food spoilage |
| 5 | Structure and Design of food production facilities |
| 6 | Midterm Examination 1 |
| 7 | Control of microorganism growth |
| 8 | Principles of Food, Building, Air, Water and Personnel Hygiene |
| 9 | Pests and pest control methods |
| 10 | Personnel hygiene practices that minimize food contamination |
| 11 | Midterm Examination 2 |
| 12 | Methods for cleaning and disinfection of food contact surfaces |
| 13 | Potential food safety hazards and prevention methods |
| 14 | Food Safety Systems and Risk Analysis at Critical Control Points (HACCP) |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. |  |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. |  |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. |  |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. |  |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. |  |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. |  |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. |  |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. |  |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. |  |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. |  |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. |  |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. |  |  |  |

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| **Prepared by :** | Assoc. Prof. Dr. Buket KUNDUHOĞLU | **Date:** | 01.11.2019 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** |  | **TITLE** | Aquaponic Systems |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | |  |  | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( x ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 25 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 25 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | This course will cover topics related to plant breeding techniques through the nitrification cycle with freshwater and marine fish. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aim of this course is for students to; To enable them to understand alternative agricultural techniques by comprehending sustainable, environmentally friendly and technological production models compared to traditional agriculture. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course; It will contribute to students' understanding and interpretation of the basis of soilless agriculture, soilless farming techniques, and newly developing soilless farming models. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Has basic knowledge of marine fish.  2. Has basic knowledge of freshwater fish.  3. Has an idea about the nitrification return in basic aquaponic systems.  4. Explains marine and freshwater fish and plant cultivation in soilless agriculture.  5. Perceives the food crisis and climate change as a problem.  6. Can synthesize acoaponic systems. | | | | | | | |
| **TEXTBOOK** | | | | | Fish Breeding Anadolu University 2017, FACULTY OF OPEN EDUCATION PUBLICATION NO: 2447, ISBN: 978-975-06-2226-7 | | | | | | | |
| **OTHER REFERENCES** | | | | | A. Southern, W. King. 2017.The Aquaponic Farmer: A Complete Guide to Building and Operating a Commercial Aquaponic System Paperback – October 9, 2017 | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Aquaculture cultivation |
| 2 | Freshwater fish farming |
| 3 | Nitrogen cycle and nitrification |
| 4 | Soilless farming techniques |
| 5 | Hydroponic systems |
| 6 | Midterm Examination 1 |
| 7 | Aquaponic system and its components |
| 8 | Water quality characteristics in aquaponic systems |
| 9 | Importance of bacteria in aquaponic systems |
| 10 | Plants grown in aquaponic systems |
| 11 | Midterm Examination 2 |
| 12 | Commercial aquaponic systems |
| 13 | Advantages of aquaponic systems |
| 14 | Disadvantages of aquaponic systems |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. |  |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. |  |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. |  |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. |  |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. |  |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. |  |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. |  |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. |  |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. |  |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. |  |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. |  |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. |  |  |  |

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| **Prepared by :** | Prof. Dr. Özgür Emiroğlu | **Date:** | 21.04.2022 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** |  | **TITLE** | Fishing methodology in freshwater |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | |  |  | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 25 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 25 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Within the scope of this course, there will be topics on fishing fish species living in fresh waters. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aim of this course is for students to; To comprehend the fishing methodology in all freshwater basins and to enable them to understand the fishing methodology. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course; It will contribute to the students' recognition of water basins, their understanding of lake and river systems and their ability to explain the methodology accordingly. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Has knowledge about the diversity of life on earth and their habitats.  2. Has knowledge about lake and river ecosystems.  3. Will be able to determine the appropriate methodology in lake ecosystems.  4. Will be able to determine the appropriate methodology in river ecosystems.  5. Perceives loss of biodiversity as a global problem.  6. Can synthesize nature and life.  7. Comprehends the distribution of living species and the factors affecting them. | | | | | | | |
| **TEXTBOOK** | | | | | Fish Breeding Anadolu University 2017, FACULTY OF OPEN EDUCATION PUBLICATION NO: 2447, ISBN: 978-975-06-2226-7 | | | | | | | |
| **OTHER REFERENCES** | | | | | None | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Freshwater ecosystems |
| 2 | Freshwater fish |
| 3 | Lake ecosystems |
| 4 | Fishing methodology in lake ecosystem |
| 5 | Net used in hunting methodology in lake ecosystems |
| 6 | Midterm Examination 1 |
| 7 | Use of electroshockers in river ecosystems |
| 8 | Things to consider when using electroshockers |
| 9 | Use of electroshockers in lake ecosystems |
| 10 | Calculation of CPUE and BPUE in river ecosystems |
| 11 | Midterm Examination 2 |
| 12 | Control and eradication |
| 13 | Control and Eradication methods |
| 14 | Control and Eradication legislation |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | | **CONTRIBUTION LEVEL** | | |
| **NO** | | **LEARNING OUTCOMES (PhD)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. | |  |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. | |  |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. | |  |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. | |  |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. | |  |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. | |  |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. | |  |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. | |  |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. | |  |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. | |  |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. | |  |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. | |  |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. | |  |  |  |

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| **Prepared by :** | Prof. Dr. Özgür Emiroğlu | **Date:** | 21.04.2022 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** |  | **TITLE** | Systematic Benthology |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | |  |  | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 25 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 25 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | General Characteristics of Extreme Habitats,  Physical and Chemical Properties of Benthic Habitats,  Bentos Diagnosis,  Freshwater and Sea Bento,  Hyporheic Bentos,  Use of Benthos in Habitat Quality Assessment and Biological Monitoring,  European Union Water Framework Directive applications,  Bentos Life Cycle and Ecology,  Bentos Behavior,  Invasive Species,  Human Impact and Conservation of Benthic Biodiversity. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | Bu ders ile hidrobiyoloji çalışmalarında önemli bir yere sahip olan bentik canlıların teşhis edilmesi, ekolojik olarak öneminin öğrenilmesi, Avrupa Birliği Su Çerçeve Direktifi kapsamında bentik canlıların önemi hakkında gerekli bilgi ve becereler kazandırılacaktır. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course covers the recognition of the main taxa of benthic organisms, their life cycles, habitats, behaviors and ecology. It also covers the use of benthic organisms in biological monitoring and invasive species. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1.The student learns about the structure, diagnosis and ecology of benthic organisms.  2. Regulation of aquatic habitats, conservation of biological diversity and biological monitoring.  3. Have information about the applications of the European Union Water Framework Directive.  4.Understands the ecological importance of identification of benthic organisms. | | | | | | | |
| **TEXTBOOK** | | | | | Wetzel, R. G., 2001. Limnology, Lake and River Ecosystems. Elsevier Academic Press, 1005p | | | | | | | |
| **OTHER REFERENCES** | | | | | rdem, Ü., Başusta, M., Türeli, C. ve Duysak, Ö., 2010. Su Omurgasızları. Nobel basımevi, 273s.Welch, E. B. and Jacoby, J. M., 2008. Pollutant Effects in Freshwater, Applied Limnology. Taylor & Francis Group, 504p.Erdem, Ü., Başusta, M., Türeli, C. ve Duysak, Ö., 2010. Su Omurgasızları. Nobel basımevi, 273s. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | General characteristics of aquatic habitats and benthic zone, streams and estuaries |
| 2 | General characteristics of aquatic habitats and benthic zone, lakes, study of river benthos |
| 3 | General characteristics of aquatic habitats and benthic zone, wetlands, study of river benthos (continued) |
| 4 | General characteristics of aquatic habitats and benthic zone, seas, examination of Lake benthos |
| 5 | Benthic habitat and substrate relationship, examination of Wetland benthos |
| 6 | Midterm Exam 1 |
| 7 | Freshwater and marine benthos, examination of Sea benthos |
| 8 | Use of benthos in habitat quality assessment and biological monitoring, applications of the European Union Water Framework Directive |
| 9 | Life cycle and ecology of benthos, Determination of water quality by biological methods |
| 10 | Behavior and receptors of bentos |
| 11 | Midterm Exam 2 |
| 12 | Drift behavior, daily drift periods, colonization, evolution of drift behavior |
| 13 | Human impact on benthos, impact of global climate change on benthos and their habitats, invasive species |
| 14 | Human impact on benthos, impact of global climate change on benthos and their habitats, invasive species (continue) |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. |  |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. |  |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. |  |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. |  |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. |  |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. |  |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. |  |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. |  |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. |  |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. |  |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. |  |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. |  |  |  |

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| **Prepared by :** | Prof. Dr. Naime ARSLAN | **Date:** | 22.04.2022 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** |  | **TITLE** | FIELD STUDIES IN HYDROBIOLOGY |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | |  |  | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 25 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 25 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Plans and preparations made before the field in hydrobiology studies, introduction and application of the tools and methods used in the studies, protection of the samples collected in the field studies. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | This course provides the necessary skill and knowledge to conduct a field study on the aquatic life in both running and still waters. It is aimed to teach the processes and methods for planning and conducting and evaluating the data of an aquatic field study . | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | With this course, the field applications used in hydrobiology studies and the latest developments in this field will be transferred to the student, so that they will both give information about scientific study methods and gain the ability to produce solutions to the problems that occur during the field. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. To be able to make a sampling plan according to the work to be done  2. To be able to determine the tools and chemicals to be taken to the field according to the purpose of the study  3. Use of appropriate sampling techniques  4. Ensuring the protection of the collected samples  5. Obtaining information about health and safety in field studies | | | | | | | |
| **TEXTBOOK** | | | | | Kottelat, M.; Freyhof, J., Handbook of European Freshwater Fishes, Kottelat, Cornol, Switzerland and Freyhof, Berlin, Germany. 2007, 646 p. | | | | | | | |
| **OTHER REFERENCES** | | | | | 1-Bain MB and N.J.Stevenson,1999 , Aquatic habitat assesmnet: common methods.216p.2-Tachet H., Bournaud M and Richoux P.,1980: Introduction a l?etude des macroinvertebres des eaux douces, assıc. Francaise de limnologie.3- Chapman, D., Water Quality Assessment (A guide to the use of biota, sediments and water in environmental monitoring). E and FN SPON An imprint of Routledge, London and New York, 2003.626p4- Hauer, F. R.; Lamberti, A. G., Methods in Stream Ecology, Academic Press, 2007, 878 p.5- Cowx, I. G., Management and Ecology of Lake and Reservoir Fisheries. Blackwell Science, University of Hull, UK. 2002, 402 p.6- Lowell, D. S., Freshwater Mussel Ecology. University of California Press, 1955, 204 p.7-Edmondson, W. T., Fresh-water Biology, John Wiley and Sons, Inc. 1959, 1247 p. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Before Field Study: Study design in aquatic environments, Rules for practical works |
| 2 | Aquatic Systems, Determination Of study Area, Map Reading, Sampling Stations |
| 3 | Sampling Methods, Demonstration and use of field equipment |
| 4 | Field Equipment, Field study |
| 5 | Equipment Preparation And Maintanence |
| 6 | Midterm Exam 1 |
| 7 | Sampling Periods And Frequency |
| 8 | Safety Rules For Field Studies (T) Electric usage in field and electrofishing |
| 9 | Field Study: Sampling, Observation |
| 10 | After Field Work: Sample Preservation, Classification of samples, Practices for sample Preservation, Classification of samples in lab. |
| 11 | Midterm Exam 2 |
| 12 | Analyse, Evaluation And Process Methods for samples, Assignment |
| 13 | Analyse, Evaluation And Process Methods for samples, Assignment |
| 14 | Basic rules for Reporting |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. |  |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. |  |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. |  |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. |  |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. |  |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. |  |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. |  |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. |  |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. |  |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. |  |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. |  |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. |  |  |  |

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| **Prepared by :** | Prof. Dr. Naime ARSLAN | **Date:** | 22.04.2022 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501112634 | **TITLE** | LICHENOLOGY |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | The scope of this course will be included that symbiotic and mutualistic living, description of lichen, morphological andanatomical features of lichens, nutrition and growth in lichens, classification of lichens, useage areas of lichens, biomonitoring with lichens and niche of the lichens in ecosystem. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aim of this course is to provide comprehending the mutualistic relationships which we are frequently observe in nature, introducing the lichens and explaining the relationships between lichen forming partners, teaching the morphoanatomical features of lichens, comprehending main criteria in classification of lichens, teaching the economical and scientific usages of lichens to the students. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | The course provides to using biological knowledge in lichenology by the students. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | By the end of this course students will be able to;  1. Define the symbiotic and mutualistic living and comprehend it is importance.  2.Comprehend morphological and anatomical features of Lichens.  3.Explain nutrition mechanisms and development strategies il Lichens.  4. Comprehend the classification of Lichens.  5. Define the useage areas of Lichens.  6. Explain the importance of lichens in biomonitoring applications.  7. Comprehend niche of lichens in ecosystems. | | | | | | | |
| **TEXTBOOK** | | | | | Kershaw K.A. (1985). Physiological Ecology of Lichens (Cambridge Studies in Ecology). Cambridge University Pres. pp. 293. Ahmadjian V. (1993). The Lichen Symbiosis. Jonh Wiley & Sons, Inc., USA. pp. 250. Nash III T.H. (1996). Lichen Biology. Cambridge University Pres. pp. 303. | | | | | | | |
| **OTHER REFERENCES** | | | | |  | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Symbiotic and mutualistic live |
| 2 | Description of lichens, morphological and anatomical features of lichens |
| 3 | Description of lichens, morphological and anatomical features of lichens |
| 4 | Nutrition in lichens |
| 5 | Growth in lichens |
| 6 | Growth in lichens |
| 7 | Reproduction in lichens |
| 8 | Reproduction in lichens (Exam) |
| 9 | Classification of lichens |
| 10 | Importance of lichens in ecosystem |
| 11 | Lichen secondary metabolites |
| 12 | Useage areas of lichens and importance of lichen secondary metabolites |
| 13 | Biomonitoring applications in lichens |
| 14 | Biomonitoring applications in lichens |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. |  |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. |  |  |  |
| **LO 3** | Apply their knowledge and technology to education, industry, agriculture, health and environmental problems. |  |  |  |
| **LO 4** | Person who sensitive to universal and social values, interest benefits of the country, researching, producing, has ethical values on the working subjects/ aplications. |  |  |  |
| **LO 5** | They have ability of work with interdisciplinary teams and take the lead by taking responsbility at solving problems. |  |  |  |
| **LO 6** | They can make and/or manage an original study which innovate to science at their field, improve a new scientific method or a known method is applied a field. |  |  |  |
| **LO 7** | They have ability of watch, read, understand, writ and comment by using at high level scientific improvements and informatic technologies related to their fields. |  |  |  |
| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. |  |  |  |
| **LO 9** | They have ability of depend their original opinions at activities related to their fields and ability of effectively communicate. |  |  |  |
| **LO 10** | Advanced user of the computer and information technologies for the purposes of the branches. |  |  |  |
| **LO 11** | Able to communicate oral and written with a language on European Language Portfolio. |  |  |  |
| **LO 12** | Contributes to the process of becoming an information society with academic and cultural knowledge. |  |  |  |
| **LO 13** | Develop a positive attitude towards life-long learning. |  |  |  |

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| **Prepared by :** | Assoc. Prof. Dr. Okan SEZER | **Date:** | 10/11/2022 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **BIOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501112633 | **TITLE** | Using Digital Macrophotography to Study Entomology |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 2 | | 2 |  | | | 2 | 4 | COMPULSORY  (   ) | | ELECTIVE  ( x ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 30 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 20 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Taking macro photography and images of entomological material under microscope (bright field and stereo microscope), preparation for this, material direction, use and arrangement of image and working area, light selection and adjustment, software to be used, calibration, coding systems used for image acquisition and recording, measurement and processing of the image is the content of the course. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | Within the scope of the course, it is aimed for the student to examine the biological material by using software or imaging systems that will work with digital cameras and microscopes, to take the visuals and to gain knowledge and skills about the measurement of the material through software. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | The course will provide opportunities for students in the field of biology to meet the needs of human resources with knowledge and experience in businesses that perform operations such as material imaging, examination and measurement with software connected to optical devices in their field of activity in our country. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | The student will obtain information about the system and light usage in optical systems to display the material in its natural appearance in scale. They will understand that the imaging of the morphological properties of biological materials in a way that provides reliable data has to be performed with sensitive techniques, and will gain the ability to apply using optical systems and software that work together with the imaging system within the scope of the course. | | | | | | | |
| **TEXTBOOK** | | | | | Scot Kelby Dijital fotoğrafçının el kitabı (Cilt 1) Alfa Yayınları 2012Deniz Seyran Makro ve Yakın Plan Fotoğrafçılığı Phoenix Yayınevi 2013Özer Kamburoğlu, Dijital Fotoğraf Akademisi 3- Makro Fotoğraflar nasıl çekilir? 2018Mark Disbury,Rachel P Cane,Richard C Russell, Remote identification of exotic mosquito specimens using digital photography. Australian Journal of Entomology Volume47, Issue2 May 2008 Pages 128-130Yves Basset, Vojtech Novotny, Scott E. Miller, Richard Pyle Quantifying Biodiversity: Experience with Parataxonomists and Digital Photography in Papua New Guinea and Guyana. October 2000 / Vol. 50 No. 10 • BioScience 899 | | | | | | | |
| **OTHER REFERENCES** | | | | | Zelal KARAKOÇ, M. Aydın KETANİ, Şennur KETANİ,Mikroskopların Çalışma Mekanizması ve Çeşitleri …Dicle Üniv Vet Fak Derg 2016: :1(1):1-6Donald R.BourneaChristopher J.KyleabHelene N.LeBlancacDavidBeresfordad Technical note: A rapid, non-invasive method for measuring live or preserved insect specimens using digital image analysis.Forensic Science International: Synergy Volume 1, 2019, Pages 140-145 | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | light in photography |
| 2 | Photographing time |
| 3 | Diaphragm and shutter speed |
| 4 | Depth of field |
| 5 | DSLR camera use and white balance |
| 6 | Griding/Framing, material and background |
| 7 | Macro photography, scale and calibration |
| 8 | Use of brightfield and stereo microscope features, |
| 9 | Light aperture and white balance in microscopy |
| 10 | Placement of the material in the work area, material direction |
| 11 | Digital imaging system and its use |
| 12 | Calibration and scale |
| 13 | Measurement and marking on the image |
| 14 | Registry of digital images |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE BIOLOGY PhD PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Improve their knowledge level of speciality with scientific methods and research on the basis of master degree compotences. |  |  |  |
| **LO 2** | They have ability of determination of problems related to their fields, hypothesize towards solving the problems by synthesize and solve hypothesis by using various observational and experimential methods. |  |  |  |
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| **LO 8** | They can examine social relationship and standards of direct these relationship with a critical perspective and if necessary can take the lead to develop these standards. |  |  |  |
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| **LO 13** | Develop a positive attitude towards life-long learning. |  |  |  |

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| **Prepared by :** | Dr. Öğr. Üyesi Hakan ÇALIŞKAN | **Date:** | 04.11.2023 |

**Signature**: