**BIOLOGY MSc 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 |
| 501101546 | | [DESIGN AND ANALYSIS IN BIOLOGICAL RESEARCHES](#C99) | 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 | |
|  | | Elective Course-3 | 7.5 | 3+0 | 3 | E | Turkish | |
|  | | Elective Course-4 | 7.5 | 3+0 | 3 | E | Turkish | |
|  | | Elective Course-5 | 7.5 | 3+0 | 3 | E | Turkish | |
| 501102001 | | Seminar | 7.5 | 0+1 | - | **C** | Turkish | |
|  | | Total of II. Semester | 30 |  | 12 |  |  | |
|  | | TOTAL OF FIRST YEAR | 60 |  | 21 |  |  | |

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| **Second Year** | | | | | | | | |
| **III. Semester** | | | | | | | | | |
| Code | Course Title | | ECTS | | T+P | Credit | C/E | Language |
| 501101702 | MSc THESIS STUDY | | 25 | | 0+1 | - | **C** | Turkish |
| 501101703 | SPECIALIZATION FIELD COURSE | | 5 | | 3+0 | - | **C** | Turkish |
|  | | Total of III. Semester | 30 |  | |  |  |  | |
| **IV. Semester** | | | | | | | | | |
| Code | | Course Title | ECTS | T+P | | Credit | C/E | Language | |
| 501101702 | | MSc THESIS STUDY | 25 | 0+1 | | - | **C** | Turkish | |
| 501101703 | | SPECIALIZATION FIELD COURSE | 5 | 3+0 | | - | **C** | Turkish | |
|  | | Total of IV. Semester | 30 |  | |  |  |  | |
|  | | TOTAL OF SECOND YEAR | 60 |  | |  |  |  | |

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| **Elective Courses** | | | | | | |
| Code | Course Title | ECTS | T+P | Credit | C/E | Language |
| 501102519 | [ADVANCE CELL BIOLOGY](#C80) | 7.5 | 3+0 | 3 | E | Turkish |
| 501101537 | [ADVANCE CELL PHYSIOLOGY](#C42) | 7.5 | 3+0 | 3 | E | Turkish |
| 501101533 | [ADVANCE MICROBIAL TECHNOLOGY](#C75) | 7.5 | 3+0 | 3 | E | Turkish |
| 501101526 | [ADVANCE PALINOLOGY](#C57) | 7.5 | 3+0 | 3 | E | Turkish |
| 501101525 | [ADVANCED BIOCHEMISTRY](#C14) | 7.5 | 3+0 | 3 | E | Turkish |
| 501101516 | [ADVANCED ENTOMOLOGY](#C6) | 7.5 | 3+0 | 3 | E | Turkish |
| 501102526 | [ANAEROBIC TREATMENT TECHNIQUES](#C13) | 7.5 | 3+0 | 3 | E | Turkish |
| 501102525 | [ANIMAL CELL CULTURE TECHNOLOGY](#C40) | 7.5 | 3+0 | 3 | E | Turkish |
| 501102615 | [BIOLOGICAL LIFE CYCLES](#C116) | 7.5 | 3+0 | 3 | E | Turkish |
| 501101541 | [BIOLOGICAL QUALITY IN LIMNOLOGY AND INDEX](#C19) | 7.5 | 3+0 | 3 | E | Turkish |
| 501101515 | [BIOLOGICAL RESEARCH METHODS IN NATURE](#C78) | 7.5 | 3+0 | 3 | E | Turkish |
| 501101521 | [BIOLOGICAL TERMINOLOGY](#C20) | 7.5 | 3+0 | 3 | E | Turkish |
| 501101513 | [BIOLOGY OF ACTINOMYCETES](#C4) | 7.5 | 3+0 | 3 | E | Turkish |
| 501101524 | [BIOLOGY OF MOSSES](#C21) | 7.5 | 3+0 | 3 | E | Turkish |
| 501102545 | [Cell Death and Cancer](#C113) | 7.5 | 3+0 | 3 | E | Turkish |
| 501101529 | [CURRENT RESEARCH TOPICS IN BIOCHEMISTRY](#C79) | 7.5 | 3+0 | 3 | E | Turkish |
| 501102522 | [DIGESTION SYSTEM PHYSIOLOGY](#C86) | 7.5 | 3+0 | 3 | E | Turkish |
| 501102518 | [DIVERSITY OF BACTERIA](#C15) | 7.5 | 3+0 | 3 | E | Turkish |
| 501102507 | [ECOLOGY OF VEGETATION AND APPLICATION METHODS](#C73) | 7.5 | 3+0 | 3 | E | Turkish |
| 501101551 | [Effects of Pollution on the Aquatic Ecosystems](#C117) | 7.5 | 3+0 | 3 | E | Turkish |
| 501101530 | [ETHNOBOTANY](#C76) | 7.5 | 3+0 | 3 | E | Turkish |
| 501102539 | [EXPERIMENTAL ANIMAL ETHICS](#C26) | 7.5 | 3+0 | 3 | E | Turkish |
| 501102536 | [FISHERY AND POPULATION DYNAMICS](#C47) | 7.5 | 3+0 | 3 | E | Turkish |
| 501101510 | [FLORA OF TURKEY](#C71) | 7.5 | 3+0 | 3 | E | Turkish |
| 501102546 | [Production and Consumption of Insects as Food and Feed](#C118) | 7.5 | 3+0 | 3 | E | Turkish |
| 501102547 | [MOLECULAR TECNIQUES ON INSECT TAXONOMY](#C119) | 7.5 | 3+0 | 3 | E | Turkish |
| 501101540 | [FRESHWATER ECOSYSTEM MANAGEMENT AND THEIR SERVİCES](#C38) | 7.5 | 3+0 | 3 | E | Turkish |
| 501101528 | [FUNGAL BIODIVERSITY](#C8) | 7.5 | 3+0 | 3 | E | Turkish |
| 501102620 | [Genetic Diversity](#C115) | 7.5 | 3+0 | 3 | E | Turkish |
| 501101550 | [HARMFUL INSECTS](#C112) | 7.5 | 3+0 | 3 | E | Turkish |
| 501102515 | [HARMFUL INSECTS](#C74) | 7.5 | 3+0 | 3 | E | Turkish |
| 501102514 | [HERBARIUM TECHNIQUES](#C56) | 7.5 | 3+0 | 3 | E | Turkish |
| 501101509 | [HISTOLOGICAL PREPARATION TECHNIQUES](#C77) | 7.5 | 3+0 | 3 | E | Turkish |
| 501101532 | [IMMOBILIZED MICROBIAL CELLS](#C43) | 7.5 | 3+0 | 3 | E | Turkish |
| 501102534 | [INSECT ECOLOGY](#C10) | 7.5 | 3+0 | 3 | E | Turkish |
| 501101544 | [MICROBIAL DETERIORATION](#C82) | 7.5 | 3+0 | 3 | E | Turkish |
| 501101527 | [MICROBIAL FERMENTATION TECHNIQUES](#C7) | 7.5 | 3+0 | 3 | E | Turkish |
| 501101511 | [MICROBIAL PHYSIOLOGY](#C55) | 7.5 | 3+0 | 3 | E | Turkish |
| 501101518 | [MICROBIOLOGICAL QUALITY CONTROLS OF FOODS](#C25) | 7.5 | 3+0 | 3 | E | Turkish |
| 501102542 | [Microbial Fertilizers](#C110) | 7.5 | 3+0 | 3 | E | Turkish |
| 501102612 | [Molecular Phylogenetics](#C114) | 7.5 | 3+0 | 3 | E | Turkish |
| 501102521 | [NERVOUS SYSTEM PHYSIOLOGY](#C87) | 7.5 | 3+0 | 3 | E | Turkish |
| 501102540 | [OXDATIVE STRESS AND ANTIOXIDANT METABOLISM IN PLANTS](#C102) | 7.5 | 3+0 | 3 | E | Turkish |
| 501102517 | [PARK AND GARDEN ORNAMENTAL PLANTS](#C69) | 7.5 | 3+0 | 3 | E | Turkish |
| 501101506 | [PESTICIDES AND EFFECT MECHANISMS](#C83) | 7.5 | 3+0 | 3 | E | Turkish |
| 501102541 | [PHOTOSYSTEMS AND PIGMENT SYSTEMS IN PLANTS](#C103) | 7.5 | 3+0 | 3 | E | Turkish |
| 501101543 | [PHYTOTHERAPY, FREE RADICALS AND ANTIOXIDANT SYSTEMS](#C37) | 7.5 | 3+0 | 3 | E | Turkish |
| 501101547 | [PLANT ECOPHYSIOLOGY](#C105) | 7.5 | 3+0 | 3 | E | Turkish |
| 501101514 | [PLANT MICROBIOLOGY](#C5) | 7.5 | 3+0 | 3 | E | Turkish |
| 501102543 | [Plant Photography](#C111) | 7.5 | 3+0 | 3 | E | Turkish |
| 501102516 | [POTAMOBENTOLOGY](#C9) | 7.5 | 3+0 | 3 | E | Turkish |
| 501101542 | [PRACTICE AND ANALYSIS METHODS IN LABORATORY ANIMALS I](#C27) | 7.5 | 3+0 | 3 | E | Turkish |
| 501102532 | [PRACTICE AND ANALYSIS METHODS IN LABORATORY ANIMALS II](#C28) | 7.5 | 3+0 | 3 | E | Turkish |
| 501102544 | [Preparation Techniques in Systematic Botany](#C109) | 7.5 | 3+0 | 3 | E | Turkish |
| 501102527 | [PRINCIPLES OF LIQUID CHROMATOGRAPHY (HPLC)](#C81) | 7.5 | 3+0 | 3 | E | Turkish |
| 501102506 | [RELATIONSHIP BETWEEN SOIL AND PLANT](#C70) | 7.5 | 3+0 | 3 | E | Turkish |
| 501102537 | [SOIL ECOLOGY](#C88) | 7.5 | 3+0 | 3 | E | Turkish |
| 501102510 | [SOIL MICROBIOLOGY](#C24) | 7.5 | 3+0 | 3 | E | Turkish |
| 501101539 | [STAGNANT WATER FISHING](#C48) | 7.5 | 3+0 | 3 | E | Turkish |
| 501101538 | [STEM CELLS](#C51) | 7.5 | 3+0 | 3 | E | Turkish |
| 501102535 | [THE TERMINOLOGY OF BRYOPHYTES](#C92) | 7.5 | 3+0 | 3 | E | Turkish |
| 501101549 | [TOXICOLOGY](#C106) | 7.5 | 3+0 | 3 | E | Turkish |
| 501101548 | [USE OF PLANTS IN ENVIRONMENTAL POLLUTION](#C104) | 7.5 | 3+0 | 3 | E | Turkish |
| 501102538 | [WATER DIRECTIVES](#C95) | 7.5 | 3+0 | 3 | E | Turkish |
| 501102503 | [WILDLIFE ECOLOGY](#C94) | 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 (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**:

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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** | 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 (√)]** | | | | | | |
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| **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**:

**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** | 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 (√)]** | | | | | | |
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| **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 (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 (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 (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 (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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| **EPARTMENT** | **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 (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 (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 (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 (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 (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 (√)]** | | | | | | |
|  | |  | | | |  | | | | | | |
| **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 (√)]** | | | | | | |
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| **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 (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 (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 (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 (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 (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 (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 (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** |  | **TITLE** | Plant Photography |

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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 | |  | | | | X | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 30 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 20 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | | 1 | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | In this course, introduction to photography, cameras and lenses, shutter speed, aperture, exposure principles, light and color in photography, composition, photography techniques, digital photo editing techniques, photography techniques in different plant families will be covered. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aim of this course is to provide the students with the opportunity to photograph plant specimens belonging to different plant families in field studies. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Learning photography techniques and using in professional life. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Learning basic photography knowledge  2. Learning the principles of cameras, lenses, shutter speed, aperture and exposure  3. To learn depth of field, light and color and composition  4. Learning photo shooting techniques  5. Learning the techniques of editing digital photos  6. Application of learned techniques in plant photography | | | | | | | |
| **TEXTBOOK** | | | | | Course notes of Assist. Prof. Dr. Ünal ÖZELMAS and Assist. Prof. Dr. Okan SEZER | | | | | | | |
| **OTHER REFERENCES** | | | | |  | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Introduction to photography |
| 2 | Machines, types and working principles |
| 3 | Lenses, types and working principles |
| 4 | Shutter speed, aperture and exposure principles |
| 5 | Depth of field, light and color in photography |
| 6 | Midterm Examination 1 |
| 7 | Composition |
| 8 | Photo shooting techniques |
| 9 | Digital photos |
| 10 | Digital photos |
| 11 | Midterm Examination 2 |
| 12 | Photograph of taxa belonging to different plant families and scientific evaluation of these photographs |
| 13 | Photograph of taxa belonging to different plant families and scientific evaluation of these photographs |
| 14 | Photograph of taxa belonging to different plant families and scientific evaluation of these photographs |
| 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 :** | Assist. Prof. Dr. Okan SEZER | **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** | Microbial Fertilizers |

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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 | | | | | 2 | | 20 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | | 2 | | 20 |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 30 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | In this course, Microbial fertilizers and their application methods, properties of microorganisms that can be used as microbial fertilizers and the effects of Rizobacteria that accelerate plant growth will be given. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | To give information about microbial fertilizers that promote vegetative growth, which increases the availability of mineral elements from organic and inorganic sources, from atmospheric nitrogen when applied to seed, plant surface or soil. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course will contribute to combine the knowledge in the field of biology with the new knowledge from different disciplines for the professional life and provide the ability to create and present these combined informations. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Students taking this course are able to understand;  What is microbial fertilizer? Use of microbial fertilizers in agriculture,  Properties of microorganisms that can be used as microbial fertilizers,  Use of microbial fertilizers against different stress conditions in soil,  Effect of Rhizobacterium, that accelerate plant growth, as microbial fertilizer,  Phytosanitary and Microbial Fertilizers,  Microbial fertilizers and application methods,  Soil and fertilizer microbiology,  Comprehend the use of microorganisms as microbial fertilizers and plant protection products. | | | | | | | |
| **TEXTBOOK** | | | | | Microbial Fertilizers Lecture Notes | | | | | | | |
| **OTHER REFERENCES** | | | | | Mengel K., Kirkby E.A., Kosegarten H., Appel T. Principles of plant Nutrition, Kluwer Academic Publishers, 2001. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | What is microbial fertilizer? Use of microbial fertilizers in agriculture |
| 2 | Properties of microorganisms that can be used as microbial fertilizer |
| 3 | Use of microbial fertilizers against different stress conditions in soil |
| 4 | Effect of Rhizobacteria, that accelerate plant growth, as Microbial Fertilizer |
| 5 | Effect of Rhizobacteria, that accelerate plant growth, as Microbial Fertilizer |
| 6 | Midterm Examination 1 |
| 7 | Phytosanitary and Microbial Fertilizers |
| 8 | Phytosanitary and Microbial Fertilizers |
| 9 | Microbial fertilizers and application methods |
| 10 | Soil and fertilizer microbiology |
| 11 | Midterm Examination 2 |
| 12 | Soil and fertilizer microbiology |
| 13 | Soil properties and environmental conditions in microbial fertilization |
| 14 | Use of algae as fertilizer |
| 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 Sevil PİLATİN | **Date:** | 08.11.2019 |

**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** | Preparation Techniques in Systematic Botany |

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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 | |  | | | | 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** | | | | | Introduction and use of microscope, Microscope selection. Acquisition of Herbal Extracts, Pretreatments, Stabilization, Rules for the preparation of killing and stagnation liquids, Stabilization Rules, Lethal and Stabilizing Substances, Lethal and Stabilizing Liquids. Softening. Dyes and Dyeing, Preparation of some melts and dyes, Dyeing methods, Selection of dyeing and dyeing methods. Methods and Applications in Making Preparations, Preparing with hand cross-sections, Thin-section method in making preparations, Preparing with crushing and spreading method | | | | | | | |
| **COURSE OBJECTIVES** | | | | | To give information about various preparation techniques in plants. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Students will have knowledge about the preparation techniques in the experimental studies. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Defines the basic concepts of plant preparation techniques.  2. Discuss the fixation and classification of fixatives.  3. Explain dyeing, dyes, classification of dyes, dyeing mechanisms, chemical properties of dyes, dye production from plant tissues.  4. Transfer the methods of showing macromolecules in the cell.  5. Evaluate techniques of sectioning, staining, fixation and preparation of permanent preparations.  6. Describe special staining techniques in some tissues. | | | | | | | |
| **TEXTBOOK** | | | | | Course notes of Assist Prof. Dr. Okan SEZER | | | | | | | |
| **OTHER REFERENCES** | | | | |  | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Microscope Types |
| 2 | Microscope Types |
| 3 | Plant material obtaining methodes |
| 4 | Plant material obtaining methodes |
| 5 | Plant material obtaining methodes |
| 6 | Midterm Examination 1 |
| 7 | Sectioning techniques |
| 8 | Fixation techniques |
| 9 | Fixation techniques |
| 10 | Painting techniques |
| 11 | Midterm Examination 2 |
| 12 | Preparation applications |
| 13 | Preparation applications |
| 14 | Preparation applications |
| 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 :** | Assist. Prof. Dr. Okan SEZER | **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** | HARMFUL INSECTS |

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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 | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 10 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Description of harm and harmful insects, the style of causing harm, nourishment characteristic , reproduction and development , environment connection, harmful creatures and their natural enemies , harmful creatures which are come across in vegetable production and struggle methods. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The purpose of lecture is describing harm and the harmful one in relation between human and insect , learning kinds of harms and basic harmful and general fighting techniques . | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | |  | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1-Determining the forms of harm by insects  2- Collecting harmful insects and basic examination methods  3- Diagnosis of harmful insects  4- Recognizing general harmful insects which are come across in Eskişehir province and Turkey  5- To know the applied general methods of fighting  6- Learning the Natural Enemies | | | | | | | |
| **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 | Designating insects kinds of harm |
| 2 | Collecting harmful insects and basic examination methods |
| 3 | Diagnosis of harmful insects |
| 4 | Recognizing general harmful insects which are come across in Eskişehir province and Turkey |
| 5 | General Methods that are applied to fight |
| 6 | Midterm Examination 1 |
| 7 | Learning natural enemies |
| 8 | Recognising animals which are used in biological fight in Turkey |
| 9 | Harmfull insects' weak feature and benefiting from these and criterion of succes in fight |
| 10 | Some Harmful insects orders : Hemiptera- Homoptera |
| 11 | Midterm Examination 2 |
| 12 | 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 :** | Dr.Öğr. Üyesi Hakan ÇALIŞKAN | **Date:** | 29.04.2020 |

**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** | Cell Death and Cancer |

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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 | |  | | | | X | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 30 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 20 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | | 1 | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | In this course, the factors causing cell death, cell death types and relationships between cancer will be covered. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aim of this course is to provide the students with up-to-date information about how and by what mechanisms cancer cells escape from cell death. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | The types and mechanisms of cell death and how a cancerous cell can escape from these mechanisms will be learned. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Learning the cell death  2. Learning the factors that cause cell death  3. Learning the types and mechanisms of cell death  4. Learning about cancer development  5. Learning the mechanisms of cancer cells to escape cell death  6. Learning the studies about preventing these escape mechanisms in cancer cells Learning the basic photography knowledge | | | | | | | |
| **TEXTBOOK** | | | | | Gabriel JA, The Biology of Cancer, Second Edition, John Wiley&Sons, Frank SA, 2007.Dynamics of Cancer, Princeton University Pres.-Bruce Alberts, Alexander Johnson, Julian Lewis, David Morgan, Martin Raff, Keith Roberts, Peter Walter. Molecular Biology of the Cell. Sixth Edition. Chapter 18 – Cell Death. Garland Science, 2014: New York and Abingdon, UK. | | | | | | | |
| **OTHER REFERENCES** | | | | | Douglas R Green. Means to an End: Apoptosis and Other Cell Death Mechanisms. Cold Spring Harbor Laboratory Press. 2017.-Macdonalds F, Ford CHJ, Casson AG. 2004, Molecular Biology of Cancer, Second Edition, BIOS Scientific Publishers. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | What is Cell Death? |
| 2 | Factors Causing Cell Death and Mechanisms |
| 3 | Necrosis and Its Mechanism |
| 4 | Necroptosis, Anoikis, Ferroptosis and Pyroptosis Mechanisms |
| 5 | Apoptosis, a Form of Cell Death |
| 6 | Midterm Examination 1 |
| 7 | Inner apoptotic pathway |
| 8 | External apoptotic pathway |
| 9 | Lysosome-mediated cell death |
| 10 | Mitototic cell death |
| 11 | Midterm Examination 2 |
| 12 | Autophagy-mediated cell death |
| 13 | Apoptosis- Autophagyand Cancer Relationship |
| 14 | Current Approaches to Cell Death in Cancer 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. |  |  |  |

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| **Prepared by :** | Prof. Dr. Ayşe Pınar ÖZTOPCU VATAN | **Date:** | 12.11.2020 |

**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** | BIOLOGICAL LIFE CYCLES |

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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 | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 20 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 40 |
| **PREREQUISITE(S)** | | | | | none | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | In this course, a different organizational level Domain System based on the life cycles of living things, so the existence of nature and the wide range of topics will be included for spreading. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aim of this course, from Angiosperms to Algae, life cycles of organisms that make up a significant portion of the earth understanding of biological diversity, nature, provide an understanding of a wide spreading. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | In this course, students compare with each cycle of life on earth that form the basis of biological diversity, to analyze the relationship between organizational levels, and thus showed the earth spread over a broad description of the living things will contribute to this cause. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Able to knowledge about the diversity of life on Earth and living areas.  2. Able to knowledge about the factors of life.  3. Able to monitor the exchange of habitats and living conditions.  4. Able to know the importance of climate change and global warming, and know the effects of life.  5. Able to recognize the loss of biodiversity as a global issue.  6. Able to knowledge about nature and life in nature.  7. Able to explain the spreading of species and the affecting factors. | | | | | | | |
| **TEXTBOOK** | | | | | Biological Life Cycles Textbook, Associate Prof. Ebru Ataşlar Göymen, PhD, ESOGÜ Biology Department, Eskişehir, 2021 | | | | | | | |
| **OTHER REFERENCES** | | | | | -Plant Systematics, Michael G. Simpson, Elsevier, 2012.-Bitki Biyolojisi, Y. Akman ve K. Güney, Palme Yayıncılık, 2011.-Bitki Sistematiği, B. Yıdız ve E. Aktoklu, Palme Yayıncılık, 2010.-Plant, J. Marinelli, Royal Botanic Gardens Kew, 2004-Plant Biology, A.J. Lack and D.E. Evans, Oxford Brookes University, UK, 2002.-Reproductive Biology of Plants, B.M. Johri and P.S. Srivastava, Narosa Publishing, 2001.-Plant Types I & II, R.N. Miller, Hutchinson Education, 1986. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Life cycles of different organism groups: Haplont, Haplo-diplont ve Diplont. Types of cycles that form the basis of this division: Mitosis and Meiosis |
| 2 | Relationship between the level of organization and life cycle. The life cycle of plant pathogenic viruses. |
| 3 | Introduction to life cycle for Domain system: Bacteria and Archaea Domain. Life cycle of Cyanobacteria |
| 4 | General life cycle of Domain Eukarya: Euglenophyta, Pyrrophyta and Bacillariophyta |
| 5 | Life cycle of Chrysophyta and Phaeophyta  Life cycle of Rhodophyta and Chlorophyta |
| 6 | Midterm Examination 1 |
| 7 | Life cycle of Haplo-diplont organism |
| 8 | Life cycle of Bryophyta, Lycopodiophyta and Pteridophyta |
| 9 | Life cycle of Diplont organism: Kingdom Plantae, Classis Gymnospermae |
| 10 | Life cycle of Diplont organism: Kingdom Plantae, Classis Angiospermae |
| 11 | Midterm Examination 2 |
| 12 | Formation of hybrid species in the Kingdom Plantae |
| 13 | Life cycle of Kingdom Lichen |
| 14 | Examples of life cycle in Kingdom Fungi. Life cycles in fungi with host plants: P. graminis and U. tritici |
| 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 :** | Assoc. Prof. Dr. Ebru ATAŞLAR GÖYMEN | **Date:** | 15.11.2021 |

**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** | Genetic Diversity |

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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 | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 20 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 40 |
| **PREREQUISITE(S)** | | | | | none | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Within the scope of this course, natural evolutionary processes that cause genetic differentiation of living things and speciation steps in population groups formed as a result of these processes will be covered. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aim of this course is to enable students to learn and understand the genetic changes that cause differentiation between living things and the methods used to detect these changes. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course will give students a perspective in terms of genetic diversity and will teach them about conservation genetics, systematic botany etc. fields will be useful. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Has knowledge about the diversity of life on earth and their habitats.  2. To understand the genetic structures of living things and the reasons that change them.  3. To investigate the kinship relations of living things.  4. To have information about the demographic structures of living things.  5. To understand the impact of environmental factors on biodiversity. | | | | | | | |
| **TEXTBOOK** | | | | | Murray, J. (1972). Genetic diversity and natural selection. Genetic diversity and natural selection. | | | | | | | |
| **OTHER REFERENCES** | | | | |  | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Concepts used in genetics |
| 2 | Genetic Migrations and Effective Population Size |
| 3 | Genetic Migrations and Effective Population Size |
| 4 | Genetic Migrations and Effective Population Size |
| 5 | Population Structure and Gene Movements |
| 6 | Midterm Examination 1 |
| 7 | Population Structure and Gene Movements |
| 8 | Population Structure and Gene Movements |
| 9 | Natural selection |
| 10 | Natural Selection Models |
| 11 | Midterm Examination 2 |
| 12 | Markers used to determine genetic diversity. |
| 13 | Haplotype Network Generation Methods. |
| 14 | Haplotype Network Generation Methods. |
| 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 :** | Assoc. Prof. Dr. Kurtuluş ÖZGİŞİ | **Date:** | 15.11.2021 |

**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** | Molecular Phylogenetics |

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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 | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 20 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 40 |
| **PREREQUISITE(S)** | | | | | none | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | In this course, basic information such as changes in amino acid sequences and DNA sequences and nucleotide substitution patterns will be given for accurate phylogenetic inferences. Then, phylogenetic trees will be explained in detail with all their features and models, and different methods used to perform phylogenetic inference will be explained in detail. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aim of this course is to provide the ability to analyze the important points in determining the appropriate markers, traits and tree formation methods necessary to reach phylogenetic results. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | With this course, students will understand the evolutionary relationships between species, the mechanisms of speciation, and will gain the ability to construct phylogeny and character analysis using molecular markers. In addition, the students will be taught theoretical and practical methods of phylogeny formation, and they will gain the knowledge and skills to apply phylogenetic analysis. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Has knowledge about the diversity of life on earth and their habitats.  2. Has knowledge about the factors that affect life.  3. Can determine the kinship relations between living things  4. Recognize appropriate markers in molecular phylogenetic analyses.  5. Can make comparisons by applying different tree building methods. | | | | | | | |
| **TEXTBOOK** | | | | | Hall, B. G. (2007). Phylogenetic trees made easy. WH Freeman.Dress, A., Huber, K. T., Koolen, J., Moulton, V., & Spillner, A. (2012). Basic phylogenetic combinatorics. Cambridge University Press. | | | | | | | |
| **OTHER REFERENCES** | | | | |  | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Basic Phylogenetics |
| 2 | Molecular character analysis |
| 3 | Molecular character analysis |
| 4 | Molecular approaches |
| 5 | Molecular approaches |
| 6 | Midterm Examination 1 |
| 7 | Molecular markers |
| 8 | Molecular markers |
| 9 | Molecular markers |
| 10 | Molecular phylogenetic tree methods |
| 11 | Midterm Examination 2 |
| 12 | Molecular phylogenetic tree methods |
| 13 | Basic Phylogenetic analyzes |
| 14 | Evaluation of phylogenetic data |
| 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 :** | Assoc. Prof. Dr. Kurtuluş ÖZGİŞİ | **Date:** | 15.11.2021 |

**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** | Effects of Pollution on the Aquatic Ecosystems |

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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 (√)]** | | | | | | |
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| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 25 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 25 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | The structure of of water, the change of natural statement by the environmental impacts, the sources of pollutants and their impacts to the aquatic life; plants and animals, the biological assessment programs for the monitoring and determination of water pollution samples on this feed. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | It is aimed to teach the effect of water pollution on aquatic organisms in the theoretical dimension. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | It will contribute to the students who will work in this field to learn about aquatic systems, to be informed about pollutants, and to have knowledge about the protection of aquatic systems. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1-Learning the classification of aquatic systems  2-Understanding the pollutants in aquatic systems  3-Learning the effects of pollution on aquatic organisms  4-Understanding the parameters used in water pollution | | | | | | | |
| **TEXTBOOK** | | | | | Jeffries M, Mills D, Freshwater ecology principles and applications, J Wiley&Sons 1990 | | | | | | | |
| **OTHER REFERENCES** | | | | | Heath A G, Water pollution and fish physiology, CRC Press, 1987Landis W, Yu M-Ho, Introduction to environmental toxicology, impacts of chemicals upon ecological systems, Lewis Pub. NY, 1999Nriagu J O, Lakshminarayana, aquatic toxicology and water quality management, John Wiley and Sons, 1989Watts S, Halliwell L, Essential environmental sciences, methods and techniqoues, Routledge, 1996WMO, Manual on water quality monitoring, WMO, OHR 27, 680, 1998-Actual articles concerning to students' subjects | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Structure of aquatic systems |
| 2 | Structure of aquatic systems (continued) |
| 3 | Environmental effects |
| 4 | Changes in natural structure with environmental effects |
| 5 | Changes in natural structure with environmental effects (continued) |
| 6 | Midterm Examination 1 |
| 7 | Effects of pollutants on aquatic life |
| 8 | Effects of pollutants on aquatic life (continued) |
| 9 | Effects of pollution on aquatic plants and animals |
| 10 | Effects of pollution on aquatic plants and animals (continued) |
| 11 | Midterm Examination 2 |
| 12 | Biological programs for the determination and detection of water pollution, examples |
| 13 | Biological programs for the determination and detection of water pollution, examples (continued) |
| 14 | Accumulation of heavy metals |
| 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 :** | Res. Ass. Dr. Deniz MERCAN | **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 (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501102547 | **TITLE** | MOLECULAR TECNIQUES ON INSECT TAXONOMY |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 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 | | | | |  | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | | - | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | In this course, the historical development of molecular techniques used in the taxonomy of insects, the place and effect of molecular taxonomy in taxonomic studies, the preferred insect groups in molecular studies, the techniques and devices used, analysis methods and bioinformatics programs, current developments in molecular taxonomy will be included. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aim of this course; To provide students with scientific knowledge about the purpose, application areas and methods of molecular techniques used in insect taxonomy. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course will contribute to the students who will specialize in Entomology, to improve their undergraduate and graduate knowledge about advanced molecular methods used in insect taxonomy. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | - To learn basic molecular terms and concepts used in insect taxonomy  - To obtaining information about insect groups used in molecular taxonomy studies  - To gain information about devices, analysis and bioinformatics programs used in molecular taxonomy studies  - To have information about the fields where molecular taxonomy methods are used and current developments | | | | | | | |
| **TEXTBOOK** | | | | | Marjorie A. 2019. Insect Molecular Genetics An Introduction to Principles and Applications. 4th edition. Academic press. Elsevier. | | | | | | | |
| **OTHER REFERENCES** | | | | | Gilbert, L. 2011. Insect Molecular Biology and Biochemistry. academic press. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | DNA, gene structure and gene organization |
| 2 | Transcription, Translation and Regulation of Eukaryotic DNA |
| 3 | Nuclear and Extranuclear DNA structure in insects |
| 4 | Description of basic molecular genetics methods |
| 5 | Basic DNA isolation methods in insects |
| 6 | Midterm Examination 1 |
| 7 | DNA amplifications and Polymerase chain reactions |
| 8 | Model organisms in molecular taxonomy |
| 9 | Molecular genetics concept in insect behavior |
| 10 | Molecular systematics and evolution concept in insects |
| 11 | Midterm Examination 2 |
| 12 | Population ecology and molecular systematics in insects |
| 13 | Molecular techniques used in insect taxonomy-Bioinformatics programs-1 |
| 14 | Molecular techniques used in insect taxonomy-Bioinformatics programs-2 |
| 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 :** | Res. As. Dr. Ebru Ceren FİDAN | **Date:** | 4.11.2022 |

**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** | 501102546 | **TITLE** | Production and Consumption of Insects as Food and Feed |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 2 | | 2 |  | | | 3 | 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 | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | The course covers the production and Consumption of Insects as Food and Feed exemplary insect breeding practices, areas and materials used for feeding, reproduction, and cultivation, and storage methods suitable for post-harvest use. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | It is aimed to provide students with knowledge and experience in providing appropriate maintenance and production conditions for research and commercial use and exploitation of insect species. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Students will gain knowledge and experience about insect feeding and production, which they need for their academic studies. It will develop a vision for academic and commercial studies in the field of entomology. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | The student will gain basic information about the maintenance, production and use of an insect species that may be required, and will be able to make an analysis and synthesis with the information they have obtained for their own studies by making use of the methods and sample applications used. Practices with case studies will improve their skills. | | | | | | | |
| **TEXTBOOK** | | | | | İpek Böceği Besleme Evi ve Dut Bahçesi Tesisi Yatırımcı rehberi. Tarım ve Orman Bakanlığı Hayvancılık Genel Müdürlüğü Eğitim ve Yayın Daire Başkanlığı ANKARA 2020Uğur SEVİLMİŞ, Seyithan SEYDOŞOĞLU, Tugay AYAŞAN, Emin BİLGİLİ, Deniz SEVİLMİŞ. Siyah Asker Sineğinin (Hermetia illucens L.) Yem Kaynağı Olarak Değerlendirilmesi . Iğdır Üniversitesi Fen Bilimleri Enstitüsü Dergisi, 9(4): 2379-2389, 2019Seyithan Seydaşoğlu, Siyah Asker Sineğinin Kanatlılar ve balıklar için innovatf bir yem kaynağı olarak değerlendirilmesi. ISPEC ULuslararası Tarım ve Kırsal Kalkınma Kongresi Haziran 2019 SiirtSırrı KAR, Hasan Ersin ŞAMLI , Levent ARIN Kara Asker Sineği Hermetia illucens (Linnaeus, 1758): Biyoloji, Üretim ve Hayvan Beslemede Kullanımı KSÜ Tarim ve Doğa Derg 21(2):246-263, 2018Süleyman Çalışlar Un Kurdu Böceğinin Besin İçeriği ve Kanatlı Hayvan Beslemede Kullanım İmkânlarıNevşehir Bilim ve Teknoloji Dergisi Cilt 6(ICAFOF 2017 Özel Sayı) 226-232 2017 | | | | | | | |
| **OTHER REFERENCES** | | | | | İrem Gelinçek, Un Kurdu ile beslenen karadeniz alabalığı anaçlarında gamet kalitesi üzerine bir araştırma. İstanbul Üniversitesi Fen Bilimleri Enstitüsü Su ürünleri yetiştiriciliği ve Hastalıkları anabilim dalı Yüksek Lisans Tezi 2019 | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Insect biology |
| 2 | Development in insects (Metamorfose) |
| 3 | Silkworm: Biology |
| 4 | Silkworm: Breeding (Production) |
| 5 | Silkworm: Production and facility features used in breeding |
| 6 | Midterm Examination 1 |
| 7 | Black Soldier Fly: Biology, Breeding |
| 8 | Black Soldier Fly: Production and facility features used in breeding |
| 9 | Flour Worm: Biology, Breeding |
| 10 | Flour Worm: Production |
| 11 | Midterm Examination 2 |
| 12 | Species selection for insect production |
| 13 | World insect market and economy |
| 14 | Legislation in the international insect trade |
| 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 Hakan Çalışkan | **Date:** | 04.11.2022 |

**Signature**: