**HORTICULTURE PhD PROGRAMME**

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| **First Year** |
| **I. Semester** |
| Code | Course Title | ECTS | T+P | Credit | C/E | Language |
| 501111101 | [THE SCIENTIFIC RESEARCH METHODS AND ITS ETHICS](#C1) | 7.5 | 3+0+0 | 3 | **C** | Turkish |
| 505012501 | [ROOTSTOCK USE AND BREEDING IN HORTICULTURE](#C7) | 7.5 | 3+0+0 | 3 | **C** | Turkish |
|  | Elective Course-1 | 7.5 | 3+0+0 | 3 | E | Turkish |
|  | Elective Course-2 | 7.5 | 3+0+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+0 | 3 | E | Turkish |
|  | Elective Course-4 | 7.5 | 3+0+0 | 3 | E | Turkish |
|  | Elective Course-5 | 7.5 | 3+0+0 | 3 | E | Turkish |
| 505012001 | PhD Seminar | 7.5 | 0+1+0 | - | **C** | Turkish |
|  | Total of II. Semester  | 30 |  | 9 |  |  |
|  | TOTAL OF FIRST YEAR | 60 |  | 21 |  |  |

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| **Second Year** |
| **III. Semester** |
| Code | Course Title | ECTS | T+P | Credit | C/E | Language |
| 505011801 | PhD PROFICIENCY | 30 | 0+1+0 | **-** | **C** | Turkish |
|  | Total of III. Semester | 30 |  |  |  |  |
| **IV. Semester** |
| Code | Course Title | ECTS | T+P | Credit | C/E | Language |
| 501011102 | THESIS PROPOSAL | 30 | 0+1+0 | **-** | **C** | Turkish |
|  | Total of IV. Semester | 30 |  |  |  |  |
|  | TOTAL OF SECOND YEAR  | 60 |  |  |  |  |

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| **Third Year** |
| **V. Semester** |
| Code | Course Title | ECTS | T+P | Credit | C/E | Language |
| 505011802 | PhD THESIS STUDY | 25 | 0+1+0 | **-** | **C** | Turkish |
| 505011803 | SPECIALIZATION FIELD COURSE | 5 | 3+0+0 | **-** | **C** | Turkish |
|  | Total of V. Semester | 30 |  |  |  |  |
| **VI. Semester** |
| Code | Course Title | ECTS | T+P | Credit | C/E | Language |
| 505011802 | PhD THESIS STUDY | 25 | 0+1+0 | **-** | **C** | Turkish |
| 505011803 | SPECIALIZATION FIELD COURSE | 5 | 3+0+0 | - | **C** | Turkish |
|  | Total of VI. Semester | 30 |  |  |  |  |
|  | TOTAL OF THIRD YEAR | 60 |  |  |  |  |

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| **Fourth Year** |
| **VII. Semester** |
| Code | Course Title | ECTS | T+P | Credit | C/E | Language |
| 505011802 | PhD THESIS STUDY | 25 | 0+1+0 | **-** | **C** | Turkish |
| 505011803 | SPECIALIZATION FIELD COURSE | 5 | 3+0+0 | **-** | **C** | Turkish |
|  | Total of VII. Semester | 30 |  |  |  |  |
| **VIII. Semester** |
| Code | Course Title | ECTS | T+P | Credit | C/E | Language |
| 505011802 | PhD THESIS STUDY | 25 | 0+1+0 | **-** | **C** | Turkish |
| 505011803 | SPECIALIZATION FIELD COURSE | 5 | 3+0+0 | - | **C** | Turkish |
|  | Total of VIII. Semester | 30 |  |  |  |  |
|  | TOTAL OF FOURTH YEAR | 60 |  |  |  |  |

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| **Elective Courses** |
| Code | Course Title | ECTS | T+P | Credit | C/E | Language |
| 505011601 | [The Propagation of Clone Rootstocks in Pomology](#C10) | 7.5 | 3+0+0 | 3 | E | TurkIsh |
| 505012502 | [HORTI. GENETIC RESOURCES CONSERVATION METHODS](#C9) | 7.5 | 3+0+0 | 3 | E | TurkIsh |
| 505012503 | [BERRIES BREEDING](#C8) | 7.5 | 3+0+0 | 3 | E | TurkIsh |
| 505012504 | [ABIOTIC STRESS PHYSIOLOGY IN HORTICULTURAL CROPS](#C2) | 7.5 | 3+0+0 | 3 | E | TurkIsh |
| 505012505 | [INTENSIVE POMOLOGY](#C6) | 7.5 | 3+0+0 | 3 | E | TurkIsh |
| 505012506 | [POSTHARVEST PHYSIOLOGY OF HORTICULTURAL CROPS](#C5) | 7.5 | 3+0+0 | 3 | E | TurkIsh |
| 505012507 | [HAPLOIDIZATION IN HORTICULTURE](#C3) | 7.5 | 3+0+0 | 3 | E | TurkIsh |
| 505012508 | [DORMANCY IN HORTICULTURAL PLANTS](#C4) | 7.5 | 3+0+0 | 3 | E | TurkIsh |
| 505002525 | [Variety differentiation and morphological characterization in vegetables](#C11) | 7.5 | 3+0+0 | 3 | E | TurkIsh |

**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** |        | **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. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 2** | Being able to have researcher qualification with occupational sense of responsibility.  | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 3** | Becoming skillful at analyzing and reporting the data obtained in scientific researches. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 4** | Gaining awareness on ethical principles at basic research methods. | **[x]**  | **[ ]**  | **[ ]**  |
| **Prepared by :**  |   | **Date:** |  |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** |  **HORTICULTURE (PhD)** | **SEMESTER** |   |

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| **COURSE** |
| **CODE** |  505012504 | **TITLE** |  Abiotic Stress Physiology in Horticultural Crops  |

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| **LEVEL** | **HOUR/WEEK** | **Credit** | **ECTS** | **TYPE** | **LANGUAGE** |
| **Theory** | **Practice** | **Laboratory** |
|  **PhD** | 3  | -0  | -0  | 3  | 7,5 | COMPULSORY(   ) | ELECTIVE( x ) | Turkish |
| **CREDIT DISTRIBUTION** |
| **Basic Science** | **Basic Engineering** | **Knowledge in the discipline****[if it contains considerable design content, mark with (√)]** |
|   |   |      |
| **ASSESSMENT CRITERIA** |
| **SEMESTER ACTIVITIES** | **Evaluation Type** | **Number** | **Contribution** **( % )** |
| Midterm | 1 | 25 |
| Quiz |   |    |
| Homework | 1 | 25 |
| Project |   |    |
| Report |   |    |
| Seminar |   |    |
| Other (………) |   |    |
| **Final Examination** | 50 |
| **PREREQUISITE(S)** |        |
| **SHORT COURSE CONTENT** |  Types of stress, stress resistance and tolerance issues with their effects. |
| **COURSE OBJECTIVES** |  Definition of stress, abiotic factors (water, salt, cold, frost, high temperature, ion, light, oxygen, air pollution, diseases and harmful stress with heavy metal) stress resistance and tolerance subjects are studied in plants. |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** |  Students learn the concepts of stress in fruits and their mechanisms of action. |
| **LEARNING OUTCOMES OF THE COURSE** |  Learns stress terminology.Learns stress factors and their effects.Learns stress resistance and tolerance mechanisms.Learns the goals of rehabilitation against stress.Learns the precautions to be taken against stress. |
| **TEXTBOOK** |  Books on stress in plants Related articles PPT presentations on the subject      |
| **OTHER REFERENCES** |  Lecture notes. |

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| **COURSE SCHEDULE (Weekly)** |
| **WEEK** | **TOPICS** |
| 1 | Stress terminology |
| 2 | Stress types |
| 3 | Drought stress |
| 4 | Drought stress |
| 5 | Salt stress |
| 6 | Salt stress |
| 7 | Midterm |
| 8 | High temperature stress |
| 9 | Low temperature stress |
| 10 | Light stress |
| 11 | Flood and oxidative stress |
| 12 | Air pollution stress |
| 13 | Stress resistance breeding and applications |
| 14 | Stress resistance breeding and applications |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE HORTICULTURE PhD PROGRAM LEARNING OUTCOMES** | **CONTRIBUTION LEVEL** |
| **NO** | **LEARNING OUTCOMES (PhD)**  | **3**High | **2**Mid | **1**Low |
| **LO 1** | The ability to develop, expand and deepen the competencies gained at undergraduate and graduate levels in the cultivation and breeding of fruit, vegetables, vineyards and ornamental plants at the level of expertise. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 2** | The ability to define, analyze and solve complex problems that arise in the fields of study of the Department of Horticulture | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 3** | Ability to develop new ideas and thoughts by using modern techniques and tools in the field of Horticulture | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 4** | Ability to access information used in different fields, evaluate and interpret information and apply it to one's own field | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 5** | Ability to obtain data through research in the field of Horticulture, evaluate, record, write and implement projects | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 6** | Ability to work effectively in individual, multidisciplinary and multidisciplinary teams, to lead, to gain creativity and to take responsibility in this regard  | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 7** | Oral and written communication skills in at least one foreign language  | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 8** | Transferring the acquired knowledge to the academic environment and practice, raising awareness of the society and putting it into practice | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 9** | Awareness of the necessity of lifelong learning; ability to access information, follow developments in science and technology, and constantly renew oneself | **[ ]**  | **[x]**  | **[ ]**  |

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

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** |  **HORTICULTURE (PhD)** | **SEMESTER** |   |

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| **COURSE** |
| **CODE** |  505012507 | **TITLE** |  Haploidization in Horticulture |

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| **LEVEL** | **HOUR/WEEK** | **Credit** | **ECTS** | **TYPE** | **LANGUAGE** |
| **Theory** | **Practice** | **Laboratory** |
|  **PhD** | 3  | 0  | 0  | 3  | 7,5 | COMPULSORY(   ) | ELECTIVE( X ) | Turkish |
| **CREDIT DISTRIBUTION** |
| **Basic Science** | **Basic Engineering** | **Knowledge in the discipline****[if it contains considerable design content, mark with (√)]** |
| X |   |      |
| **ASSESSMENT CRITERIA** |
| **SEMESTER ACTIVITIES** | **Evaluation Type** | **Number** | **Contribution** **( % )** |
| Midterm | 1 | 25 |
| Quiz |   |    |
| Homework | 1 | 25 |
| Project |   |    |
| Report |   |    |
| Seminar |   |    |
| Other (………) |   |    |
| **Final Examination** | 50 |
| **PREREQUISITE(S)** |        |
| **SHORT COURSE CONTENT** |  The importance of haploidy technique, natural pathways of haploid plants, haploid obtaining by in vitro techniques (anther cultures, microspore culture, ovule - ovary cultures, pollen irradiation), dihaploidization by chromosome doubling, direct and indirect methods used in ploidy determination, use of dihaploid plants in plant breeding are explained. In addition, theoretical and practical information on the application these methods in important horticultural species are given. |
| **COURSE OBJECTIVES** |  The aims of this course are provide detailed information about haploidization and dihaploidization techniques in plant breeding and their usage in important species of horticulture and give information about recent scientific articles related to this topic. At the end of the course, it is aimed that the student can use the research methods in dihaploidization breeding studies |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** |  The scientific and technical aspects of utilization of biotechnological improvements in breeding and new variety development in horticultural species are taught |
| **LEARNING OUTCOMES OF THE COURSE** |  At the end of this course students -learn the techniques of haploidization in detail, -have theoretical and practical knowledge about the application of haploidization methods in important plant species, -learns how to obtain dihaploid plants,- He knows the current scientific researches on dihaploidisation, -learn ploidy determination methods. |
| **TEXTBOOK** |  1- Babaoğlu, M., Gürel. E. Özcan, S. Bitki Biyoteknolojisi, Doku Kültürü ve Uygulamaları, Selçuk Üniversitesi, ISBN:975-6652-04-7. 374s. 3 Taji, A., Kumar, P., Lakshmanan, P. In Vitro Plant Breeding. 167s.2- C. Neal Stewart. Bitki Biyoteknolojisi ve Genetik. Nobel akademik yayıncılık. ISBN: 9786051331829. S: 416  |
| **OTHER REFERENCES** |  1. Touraev, A., Forster, B.P., Jain, S.M. Advances in Haploid Productionin Higher Plants. Springer, ISBN 978-1-4020-8853-7. 341s.2. Recent scientific articles related to this topic. |

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| **COURSE SCHEDULE (Weekly)** |
| **WEEK** | **TOPICS** |
| 1 | Introduction of haploidy breeding |
| 2 | Haploid induction from male gamet (androgenesis)  |
| 3 | Anter culture |
| 4 | Microspor culture |
| 5 | Stress factors stimulating the formation of haploid embryos |
| 6 | Factors effecting androgenesis |
| 7 | Midterm Examination I |
| 8 | Haploid induction from female gamet (Gynogenesis, partenogenesis)- Ovul and avarium culture |
| 9 | Pollination with irradiated pollen and embryo rescue techniques |
| 10 | Chromosome elimination |
| 11 | Dihaploidization and advantages in plant breeding |
| 12 | Ploidy determination methods |
| 13 | Use of haploid plants in plant breeding |
| 14 | Use of haploid plants in plant breeding |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE HORTICULTURE PhD PROGRAM LEARNING OUTCOMES** | **CONTRIBUTION LEVEL** |
| **NO** | **LEARNING OUTCOMES (PhD)**  | **3**High | **2**Mid | **1**Low |
| **LO 1** | The ability to develop, expand and deepen the competencies gained at undergraduate and graduate levels in the cultivation and breeding of fruit, vegetables, vineyards and ornamental plants at the level of expertise. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 2** | The ability to define, analyze and solve complex problems that arise in the fields of study of the Department of Horticulture | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 3** | Ability to develop new ideas and thoughts by using modern techniques and tools in the field of Horticulture | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 4** | Ability to access information used in different fields, evaluate and interpret information and apply it to one's own field | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 5** | Ability to obtain data through research in the field of Horticulture, evaluate, record, write and implement projects | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 6** | Ability to work effectively in individual, multidisciplinary and multidisciplinary teams, to lead, to gain creativity and to take responsibility in this regard  | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 7** | Oral and written communication skills in at least one foreign language  | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 8** | Transferring the acquired knowledge to the academic environment and practice, raising awareness of the society and putting it into practice | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 9** | Awareness of the necessity of lifelong learning; ability to access information, follow developments in science and technology, and constantly renew oneself | **[x]**  | **[ ]**  | **[ ]**  |

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

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** |  **HORTICULTURE (PhD)** | **SEMESTER** |   |

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| **COURSE** |
| **CODE** |  505012508 | **TITLE** |  DORMANCY IN HORTICULTURAL PLANTS |

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| **LEVEL** | **HOUR/WEEK** | **Credit** | **ECTS** | **TYPE** | **LANGUAGE** |
| **Theory** | **Practice** | **Laboratory** |
|  **PhD** | 3  | 0  | 0  | 3  | 7,5 | COMPULSORY(   ) | ELECTIVE( X ) | TURKISH |
| **CREDIT DISTRIBUTION** |
| **Basic Science** | **Basic Engineering** | **Knowledge in the discipline****[if it contains considerable design content, mark with (√)]** |
|   |   |      |
| **ASSESSMENT CRITERIA** |
| **SEMESTER ACTIVITIES** | **Evaluation Type** | **Number** | **Contribution** **( % )** |
| Midterm | 1 | 50 |
| Quiz |   |    |
| Homework |   |    |
| Project |   |    |
| Report |   |    |
| Seminar |   |    |
| Other (………) |   |    |
| **Final Examination** | 50 |
| **PREREQUISITE(S)** |  - |
| **SHORT COURSE CONTENT** |  The contents of this course include dormancy terminology, dormancy stages, dormancy breaking, late flowering and dormancy in different organs like seed, buds, bulb, rhizome, the importance of chilling requirements in temperate zone fruits and total growing degree hours. |
| **COURSE OBJECTIVES** |  This course aims to give information about dormancy and dormancy mechanism besides the general physiological events in horticulture. |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** |  Students gain extensive knowledge about rest as professional knowledge. |
| **LEARNING OUTCOMES OF THE COURSE** |  Obtains conceptual and theoretical knowledge about dormancy physiology, dormancy stages, chilling requirement and total growing degree hours.Gains ability to do technical and cultural applications on issues of dormancy breaking and dormancy completion.Obtains information about lightening of dormancy event in different organs such as seed, buds, tuber, rhizome etc.Gains practical ability on how to transfer research findings and theoretical knowledge into practice.Develops methods to solve problems such as unmet dormancy and chilling requirements in fruit trees. |
| **TEXTBOOK** |        |
| **OTHER REFERENCES** |  Bitki fizyolojisi, Prof. Dr. Yıldırım AKMAN, Ankara, 2001, ISBN: 975-97436-0-4Dormancy in Plants, Jean Viemont, CABI, 2000, ISBN:9780851994475 |

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| **COURSE SCHEDULE (Weekly)** |
| **WEEK** | **TOPICS** |
| 1 | Description of dormancy and its mechanism. |
| 2 | Dormancy periods. |
| 3 | Chilling requirements and precautions to be taken to meet chilling requirements. |
| 4 | Seed dormancy and effects of dormancy over germination. |
| 5 | Internal factors affecting germination in seeds. |
| 6 | Environmental factors affecting germination in seeds. |
| 7 | Comparison of seed and bud dormancy from the physiological aspect. |
| 8 | Effects of apical dormancy over dormancy breaking in buds. |
| 9 | Dormancy in bulb and tuberous, effects of shoot tip culture on dormancy breaking. |
| 10 | Comparison of vernalization and chilling requirements from the physiological aspect. |
| 11 | Control of dormany by physiologically and chemically  |
| 12 | Dormancy in tropical climate |
| 13 | Stress factors effects on dormancy |
| 14 | Climate change and dormancy |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE HORTICULTURE PhD PROGRAM LEARNING OUTCOMES** | **CONTRIBUTION LEVEL** |
| **NO** | **LEARNING OUTCOMES (PhD)**  | **3**High | **2**Mid | **1**Low |
| **LO 1** | The ability to develop, expand and deepen the competencies gained at undergraduate and graduate levels in the cultivation and breeding of fruit, vegetables, vineyards and ornamental plants at the level of expertise. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 2** | The ability to define, analyze and solve complex problems that arise in the fields of study of the Department of Horticulture | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 3** | Ability to develop new ideas and thoughts by using modern techniques and tools in the field of Horticulture | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 4** | Ability to access information used in different fields, evaluate and interpret information and apply it to one's own field | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 5** | Ability to obtain data through research in the field of Horticulture, evaluate, record, write and implement projects | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 6** | Ability to work effectively in individual, multidisciplinary and multidisciplinary teams, to lead, to gain creativity and to take responsibility in this regard  | **[ ]**  | **[ ]**  | **[x]**  |
| **LO 7** | Oral and written communication skills in at least one foreign language  | **[ ]**  | **[ ]**  | **[x]**  |
| **LO 8** | Transferring the acquired knowledge to the academic environment and practice, raising awareness of the society and putting it into practice | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 9** | Awareness of the necessity of lifelong learning; ability to access information, follow developments in science and technology, and constantly renew oneself | **[ ]**  | **[ ]**  | **[x]**  |

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

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** |  **HORTICULTURE (PhD)** | **SEMESTER** |   |

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| **COURSE** |
| **CODE** |  505012506 | **TITLE** |   Postharvest Physiology of Horticultural Crops |

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| **LEVEL** | **HOUR/WEEK** | **Credit** | **ECTS** | **TYPE** | **LANGUAGE** |
| **Theory** | **Practice** | **Laboratory** |
|  **PhD** | 3  | 0  | 0  | 3  | 7.5 | COMPULSORY(   ) | ELECTIVE( X ) | ENGLISH |
| **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 | 25 |
| Quiz |   |    |
| Homework | 1 | 25 |
| Project |   |    |
| Report |   |    |
| Seminar |   |    |
| Other (………) |   |    |
| **Final Examination** | 50 |
| **PREREQUISITE(S)** |  - |
| **SHORT COURSE CONTENT** |  Consumption and maturity at the end of the biological process in horticultural crops, their physiological basis, physical and biochemical changes in the post-harvest period, quality criteria in horticultural products, factors affecting quality and ways of protection, the effects of different storage methods on the preservation quality of the product and scientific studies on this subject. |
| **COURSE OBJECTIVES** |  To raise awareness, to gain knowledge and skills within the scope of post-harvest physiology in horticultural products. |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** |  Students will understand the physiological causes of post-harvest losses, and will acquire information on proper consumption periods, shelf lives and prevention of post-harvest losses. |
| **LEARNING OUTCOMES OF THE COURSE** |  To be able to harvest horticultural crops in accordance with the purpose of cultivation,To learn about quality losses in horticultural crops and to take precautions,To learn modern preservation methods and to create projects on these issues. |
| **TEXTBOOK** |  Karaçalı, İ., 2011. Bahçe Ürünlerinin Muhafazası ve Pazara Hazırlanması. E.Ü. Ziraat Fak. Yayın No: 494, 410 s.de Freitas, S. T., & Pareek, S. (Eds.). (2019). Postharvest physiological disorders in fruits and vegetables (Vol. 824). CRC Press.Türk, R., Güneş, N.T., Erkan, M., Koyuncu, M.A. Bahçe Ürünlerinin Muhafazası ve Pazara Hazırlanması. SOMTAD Yayınları, Ders Kitabı No 1. |
| **OTHER REFERENCES** |  Cemeroğlu, B., Acar, J., 1986. Meyve ve Sebzelerde İşleme Teknolojisi. Gıda Derneği Yayın No: 6, Ankara Üniv. Ziraat Fak., Gıda Bölümü.Yahia, E. M., & Carrillo-Lopez, A. (Eds.). (2018). Postharvest Physiology and Biochemistry of Fruits and Vegetables. Woodhead publishing.Valero, D., & Serrano, M. (2010). Postharvest Biology and Technology for Preserving Fruit Quality. CRC press.Çelik, S., Bahçe Ürünlerinin Hasadı ve Muhafazası Namık Kemal Üniversitesi Yayın No: 20 (2006). |

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| **COURSE SCHEDULE (Weekly)** |
| **WEEK** | **TOPICS** |
| 1 | Definition and importance of postharvest physiology      |
| 2 | Biochemical structures and changes of horticultural crops |
| 3 | The effects of structural properties on postharvest physiology in horticultural crops. |
| 4 | Changes in the cell during storage and the role of enzymes |
| 5 | Inner atmosphere of storaged crops: role and importance in maturation and storage |
| 6 | Role of hormones and nutrients in postharvest physiology |
| 7 | Maturity physiology in horticultural crops (Midterm Exam) |
| 8 | Molecular basis of maturation in horticultural crops. |
| 9 | Aroma compounds, biosynthesis and post-harvest losses in horticultural products. |
| 10 | Stress and physiological responses in the postharvest period |
| 11 | Quality criteria in horticultural crops and ways to prevent quality losses |
| 12 | Control and prevention methods of microbial spoilage in storaged crops |
| 13 | Physiological and biochemical effects of storage of horticultural crops in controlled atmosphere and modified atmosphere |
| 14 | Current trends in the management of postharvest physiology |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE HORTICULTURE PhD PROGRAM LEARNING OUTCOMES** | **CONTRIBUTION LEVEL** |
| **NO** | **LEARNING OUTCOMES (PhD)**  | **3**High | **2**Mid | **1**Low |
| **LO 1** | The ability to develop, expand and deepen the competencies gained at undergraduate and graduate levels in the cultivation and breeding of fruit, vegetables, vineyards and ornamental plants at the level of expertise. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 2** | The ability to define, analyze and solve complex problems that arise in the fields of study of the Department of Horticulture | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 3** | Ability to develop new ideas and thoughts by using modern techniques and tools in the field of Horticulture | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 4** | Ability to access information used in different fields, evaluate and interpret information and apply it to one's own field | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 5** | Ability to obtain data through research in the field of Horticulture, evaluate, record, write and implement projects | **[ ]**  | **[ ]**  | **[x]**  |
| **LO 6** | Ability to work effectively in individual, multidisciplinary and multidisciplinary teams, to lead, to gain creativity and to take responsibility in this regard  | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 7** | Oral and written communication skills in at least one foreign language  | **[ ]**  | **[ ]**  | **[x]**  |
| **LO 8** | Transferring the acquired knowledge to the academic environment and practice, raising awareness of the society and putting it into practice | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 9** | Awareness of the necessity of lifelong learning; ability to access information, follow developments in science and technology, and constantly renew oneself | **[ ]**  | **[x]**  | **[ ]**  |

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

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** |  **HORTICULTURE (PhD)** | **SEMESTER** |   |

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| **COURSE** |
| **CODE** |  505012505 | **TITLE** |  İntensive Pomology |

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| **LEVEL** | **HOUR/WEEK** | **Credit** | **ECTS** | **TYPE** | **LANGUAGE** |
| **Theory** | **Practice** | **Laboratory** |
|  **PhD** | 3  | -0  | -0  | 3  | 7,5 | COMPULSORY( ) | ELECTIVE( X  ) | Turkish |
| **CREDIT DISTRIBUTION** |
| **Basic Science** | **Basic Engineering** | **Knowledge in the discipline****[if it contains considerable design content, mark with (√)]** |
|   |   |      |
| **ASSESSMENT CRITERIA** |
| **SEMESTER ACTIVITIES** | **Evaluation Type** | **Number** | **Contribution** **( % )** |
| Midterm | 1 | 25 |
| Quiz |   |    |
| Homework | 1 | 25 |
| Project |   |    |
| Report |   |    |
| Seminar |   |    |
| Other (………) |   |    |
| **Final Examination** | 50 |
| **PREREQUISITE(S)** |        |
| **SHORT COURSE CONTENT** |  This lesson consists of subjects as the aims of intensive pomology, the high density studies in pome fruits, stone fruits and nut fruits, the situtation of intensive pomology in world, the training and pruning systems in high density apple, pear and cherry orchards and the peach growing in meadow orchard.  |
| **COURSE OBJECTIVES** |  The aim of this course is to teach the basic principles of new techniques at intensive fruit growing.  |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** |  Students will learn about of new techniques at intensive fruit growing.  |
| **LEARNING OUTCOMES OF THE COURSE** |  1 Learns the critical and the advantage of intensive fruit growing to classic growing systems.2 Gains knowledge about the principles of intensive fruit growing.3 Learns the latest techniques used at intensive fruit growing in the world. |
| **TEXTBOOK** |  1.Kitap adı; Intensive Orchard Management, Yazar; Dr. Bruce H. Barritt, Basım Yılı; 1992, ISBN;0-9630659-1-2, Liste fiyatı; 30 $ 2. Fazio, G. 2003. Short Apple Trees, Faster and Healthier, Agricultural Research Magazine, November 2003 3. Heinicke, D.R. 1975, High density apple orchards, planting, training and pruning. USDA Agricultural Handbook No.4581. Bruce H. Barritt, 1992. Intensive Orchard Management, Washington, USA |
| **OTHER REFERENCES** |  Presentations and articles. |

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| **COURSE SCHEDULE (Weekly)** |
| **WEEK** | **TOPICS** |
| 1 | What is intensive pomology |
| 2 | The aims of intensive pomology |
| 3 | Fruit trees for intensive pomology |
| 4 | The high density studies in pome fruits |
| 5 | The high density studies in stone fruits  |
| 6 | The high density studies in nut fruits  |
| 7 | The situtation of intensive pomology in world |
| 8 | The irrigation and fertigation systems at intensive fruit orchards |
| 9 | The weed controlling in high density orchards  |
| 10 | The harmfull and disease controlling in high density orchards  |
| 11 | The training and pruning systems in high density apple orchards  |
| 12 | The training and pruning systems in high density pear orchards  |
| 13 | The training and pruning systems in high density cherry orchards |
| 14 | The training and pruning systems in high density peach orchards  |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE HORTICULTURE PhD PROGRAM LEARNING OUTCOMES** | **CONTRIBUTION LEVEL** |
| **NO** | **LEARNING OUTCOMES (PhD)**  | **3**High | **2**Mid | **1**Low |
| **LO 1** | The ability to develop, expand and deepen the competencies gained at undergraduate and graduate levels in the cultivation and breeding of fruit, vegetables, vineyards and ornamental plants at the level of expertise. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 2** | The ability to define, analyze and solve complex problems that arise in the fields of study of the Department of Horticulture | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 3** | Ability to develop new ideas and thoughts by using modern techniques and tools in the field of Horticulture | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 4** | Ability to access information used in different fields, evaluate and interpret information and apply it to one's own field | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 5** | Ability to obtain data through research in the field of Horticulture, evaluate, record, write and implement projects | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 6** | Ability to work effectively in individual, multidisciplinary and multidisciplinary teams, to lead, to gain creativity and to take responsibility in this regard  | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 7** | Oral and written communication skills in at least one foreign language  | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 8** | Transferring the acquired knowledge to the academic environment and practice, raising awareness of the society and putting it into practice | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 9** | Awareness of the necessity of lifelong learning; ability to access information, follow developments in science and technology, and constantly renew oneself | **[ ]**  | **[x]**  | **[ ]**  |

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

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** |  **HORTICULTURE (PhD)** | **SEMESTER** |   |

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| **COURSE** |
| **CODE** |  505012501 | **TITLE** |  Rootstock Use and Breeding in Horticulture |

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| **LEVEL** | **HOUR/WEEK** | **Credit** | **ECTS** | **TYPE** | **LANGUAGE** |
| **Theory** | **Practice** | **Laboratory** |
|  **PhD** | 3  | -0  | -0  | 3  | 7,5 | COMPULSORY( X ) | ELECTIVE(   ) | Turkish |
| **CREDIT DISTRIBUTION** |
| **Basic Science** | **Basic Engineering** | **Knowledge in the discipline****[if it contains considerable design content, mark with (√)]** |
|   |   |      |
| **ASSESSMENT CRITERIA** |
| **SEMESTER ACTIVITIES** | **Evaluation Type** | **Number** | **Contribution** **( % )** |
| Midterm | 1 | 25 |
| Quiz |   |    |
| Homework | 1 | 25 |
| Project |   |    |
| Report |   |    |
| Seminar |   |    |
| Other (………) |   |    |
| **Final Examination** | 50 |
| **PREREQUISITE(S)** |        |
| **SHORT COURSE CONTENT** |  Many applications are needed in terms of modern horticultural cultivation.In this context, it is important that it is fed from other sources, not on its own roots. As a result of today's changing conditions and necessity, rootstock use and breeding in fruit grovving, viticulture, vegetable grovving and ornamental plants are among the subjects of extraordinary importance. Rootstock use and importance, grafting processes, genetic limits in grafting, rootstocks used in the sector, rootstock breeding strategies and current literatüre on the subject will be evaluated with an analytical approach. |
| **COURSE OBJECTIVES** |  The aim of this course is to reveal the cultivation of the desired species and variety on the roots of other plants and the strategies related to the subject. |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** |  The importance of rootstock in horticulture, rootstocks used and their mechanisms of action, new rootstock breeding strategies. |
| **LEARNING OUTCOMES OF THE COURSE** |  .Learning the principles of rootstock use in horticultural cultivation,1. To have knovvledge about the rootstock and effect mechanisms used,
2. To have knovvledge about rootstock breeding strategies for changing conditions and new trends,
3. Obtaining information about sectoral approaches,
4. Basic topics such as acquiring analytical approaches with current

publications. |
| **TEXTBOOK** |  l.Rom, R.C. and R.F Carlson, Rootstocks for Fruit Crops. AVVilley- Interscience Publication. 2. Hartmann, H.T., D.E. Kester, Jr. F.T. Davies, R.L. Geneve, Hartmann and Kester's Plant Propagation Principles and Practices (7th edition) |
| **OTHER REFERENCES** | Aslantaş, R. Horticultural Cultivation Technigue lecture notes. |

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| **COURSE SCHEDULE (Weekly)** |
| **WEEK** | **TOPICS** |
| 1 | Rootstock use and importance in horticultural crops, |
| 2 | Principles and processes of grafting in horticultural crops, |
| 3 | Rootstock and done rootstocks, graft types and success, |
| 4 | Genetic limits, compatibility and use of intermediate rootstocks in grafting |
| 5 | Rootstocks and breeding of pome fruit |
| 6 | Rootstocks and breeding of stone fruits |
| 7 | Rootstocks and breeding of nuts |
| 8 | Citrus rootstocks and breeding |
| 9 | Grape rootstocks and breeding |
| 10 | Rootstock use in ornamental plants |
| 11 | Rootstock use in vegetable growing |
| 12 | Rootstock breeding strategies in horticultural crops |
| 13 | Rootstock breeding studies with current publications |
| 14 | Rootstock breeding studies and general evaluation with current publications |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE HORTICULTURE PhD PROGRAM LEARNING OUTCOMES** | **CONTRIBUTION LEVEL** |
| **NO** | **LEARNING OUTCOMES (PhD)**  | **3**High | **2**Mid | **1**Low |
| **LO 1** | The ability to develop, expand and deepen the competencies gained at undergraduate and graduate levels in the cultivation and breeding of fruit, vegetables, vineyards and ornamental plants at the level of expertise. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 2** | The ability to define, analyze and solve complex problems that arise in the fields of study of the Department of Horticulture | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 3** | Ability to develop new ideas and thoughts by using modern techniques and tools in the field of Horticulture | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 4** | Ability to access information used in different fields, evaluate and interpret information and apply it to one's own field | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 5** | Ability to obtain data through research in the field of Horticulture, evaluate, record, write and implement projects | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 6** | Ability to work effectively in individual, multidisciplinary and multidisciplinary teams, to lead, to gain creativity and to take responsibility in this regard  | **[ ]**  | **[ ]**  | **[x]**  |
| **LO 7** | Oral and written communication skills in at least one foreign language  | **[ ]**  | **[ ]**  | **[x]**  |
| **LO 8** | Transferring the acquired knowledge to the academic environment and practice, raising awareness of the society and putting it into practice | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 9** | Awareness of the necessity of lifelong learning; ability to access information, follow developments in science and technology, and constantly renew oneself | **[x]**  | **[ ]**  | **[ ]**  |

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

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** |  **HORTICULTURE (PhD)** | **SEMESTER** |   |

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| **COURSE** |
| **CODE** |  505012502 | **TITLE** |  Horticuitural Genetic Resources Conservation Methods |

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| **LEVEL** | **HOUR/WEEK** | **Credit** | **ECTS** | **TYPE** | **LANGUAGE** |
| **Theory** | **Practice** | **Laboratory** |
|  **PhD** | 3  | 0  | 0  | 3  | 7.5 | COMPULSORY(   ) | ELECTIVE( X ) | ENGLISH |
| **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 | 25 |
| Quiz |   |    |
| Homework | 1 | 25 |
| Project |   |    |
| Report |   |    |
| Seminar |   |    |
| Other (………) |   |    |
| **Final Examination** | 50 |
| **PREREQUISITE(S)** |  - |
| **SHORT COURSE CONTENT** |  The place of plant gene sources in breeding programs. Collection, characterization and evaluation of genetic resources. In situ and ex situ preservation. New technologies (artificial seed storage, DNA storage, cryopreservation) and their use in the conservation of genetic resources |
| **COURSE OBJECTIVES** |  The aim of this course is to teach the basic principles of new technologies in the conservation of genetic resources. |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** |  Students will learn about the potential of our country in terms of fruit grovving by learning the gene resources in our country about horticuitural plants |
| **LEARNING OUTCOMES OF THE COURSE** |  1 Learns the current situation of genetic resources in our country.1. Gains knovvledge about the principles of collecting genetic resources.
2. Learns the working system of seed gene banks.
3. Learns the latest technigues in the conservation of genetic resources.
 |
| **TEXTBOOK** | VVilkes, G. 1993. Germplasm collections: Their use, potential, social responsibility, and genetic vulnerability. in Proc. of the Int. Crop Sci. Cong. Ames, USA. Crop Sci. Soc. of America, Özgen, M., Adak, S., Karagöz, A. ve Ulukan, H. 1995. Bitkisel gen kaynaklarının korunma ve kullanımı. Türkiye Ziraat Mühendisliği 4. Teknik Kongresi, 9-13 Ocak 1995, Ankara, Ziraat Bankası Kültür Yayınları, 26: 309-343. Özgen, M. ve Türet, M. 1995. Bitki ıslahı ve gen aktarma teknolojisi. VVorkshop "Biyoteknoloji ve Bitki Islahı", 17-19 Nisan 1995, Gebze / Kocaeli, Bildiriler, Can Ofset, İzmir, 227-236. |
| **OTHER REFERENCES** | Presentations and articles. |

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| **COURSE SCHEDULE (Weekly)** |
| **WEEK** | **TOPICS** |
| 1 | The place of plant gene sources in breeding programs. |
| 2 | Current status of vegetable genetic resources in Turkey |
| 3 | Current status of fruit and vineyard genetic resources in Turkey |
| 4 | Current status of fruit and vineyard genetic resources in Turkey |
| 5 | Current status of Turkey's endemic genetic resources |
| 6 | Characterization of genetic resources |
| 7 | In situ preservative |
| 8 | Ex situ preservative |
| 9 | New technologies in the conservation of genetic resources (artificial seed storage) |
| 10 | New technologies in the conservation of genetic resources (DNA storage) |
| 11 | New technologies in the conservation of genetic resources (Cryogenic storage) |
| 12 | New technologies in the conservation of genetic resources (Cryogenic storage) |
| 13 | New technologies (other techniques) in the conservation of genetic resources |
| 14 | New technologies (other techniques) in the conservation of genetic resources |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE HORTICULTURE PhD PROGRAM LEARNING OUTCOMES** | **CONTRIBUTION LEVEL** |
| **NO** | **LEARNING OUTCOMES (PhD)**  | **3**High | **2**Mid | **1**Low |
| **LO 1** | The ability to develop, expand and deepen the competencies gained at undergraduate and graduate levels in the cultivation and breeding of fruit, vegetables, vineyards and ornamental plants at the level of expertise. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 2** | The ability to define, analyze and solve complex problems that arise in the fields of study of the Department of Horticulture | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 3** | Ability to develop new ideas and thoughts by using modern techniques and tools in the field of Horticulture | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 4** | Ability to access information used in different fields, evaluate and interpret information and apply it to one's own field | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 5** | Ability to obtain data through research in the field of Horticulture, evaluate, record, write and implement projects | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 6** | Ability to work effectively in individual, multidisciplinary and multidisciplinary teams, to lead, to gain creativity and to take responsibility in this regard  | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 7** | Oral and written communication skills in at least one foreign language  | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 8** | Transferring the acquired knowledge to the academic environment and practice, raising awareness of the society and putting it into practice | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 9** | Awareness of the necessity of lifelong learning; ability to access information, follow developments in science and technology, and constantly renew oneself | **[ ]**  | **[x]**  | **[ ]**  |

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

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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

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| **COURSE** |
| **CODE** |  505012503 | **TITLE** | Berries Breeding |

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| **LEVEL** | **HOUR/WEEK** | **Credit** | **ECTS** | **TYPE** | **LANGUAGE** |
| **Theory** | **Practice** | **Laboratory** |
|  **PhD** | 3  | 0  | 0  | 3  | 7.5 | COMPULSORY(   ) | ELECTIVE( X ) | ENGLISH |
| **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 | 25 |
| Quiz |   |    |
| Homework | 1 | 25 |
| Project |   |    |
| Report |   |    |
| Seminar |   |    |
| Other (………) |   |    |
| **Final Examination** | 50 |
| **PREREQUISITE(S)** |  - |
| **SHORT COURSE CONTENT** |  Taxonomy, basic botanical features, centers of origin and history of their cultivation and gene sources of Berry fruit species such as stravvberries, raspberries, blackberries vvhich breeding programs carried out in these species, breeding targets, economically important characters and their genetics (resistance to diseases and pests, morphological and physiological characters, fruit quality), breeding methods and techniques, biotechnological approaches to the breeding of berry species. |
| **COURSE OBJECTIVES** | Evolutionary development of main berry fruit species (stravvberry, raspberry, blackberry), history of their cultivation, breeding purposes and breeding methods used to develop these species. |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | Students will recognize different berry types and varieties. They will have information about how these fruit species are bred and what can be done to obtain new varieties. |
| **LEARNING OUTCOMES OF THE COURSE** | . Comprehend the basic components of berry breeding through taxonomy, origin centers, genetic resources and cultivation of berry fruit species such as strawberry, raspberry and blackberry.1. Evaluates the development of berry fruit breeding in the world by examining the current breeding programs carried out on these species.
2. Defines the economically important characteristics of berries and understands that breeding methods are used as a tool to improve these characters.
3. Learns the methods applied in the breeding of berry species

theoretically |
| **TEXTBOOK** | Badenes, M. L., & Byrne, D. H. (Eds. Springer Science & Business Media.(2012). Fruit breeding (Vol. 8). |
| **OTHER REFERENCES** | Lecture notes.Lecture notes |

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| **COURSE SCHEDULE (Weekly)** |
| **WEEK** | **TOPICS** |
| 1 | Taxonomy, basic botanical features and gene sources of stravvberry |
| 2 | Centers of origin and the history of their enculturation of stravvberry |
| 3 | Breeding programs and breeding goals of stravvberry |
| 4 | Economically important characters and their genetics in stravvberry |
| 5 | Stravvberry breeding methods |
| 6 | Taxonomy, basic botanical features and gene sources, centers of origin and history of cultivation of currant |
| 7 | Breeding programs and breeding goals in blackcurrant |
| 8 | Taxonomy, basic botanical features and gene sources, centers of origin and history of raspberry cultivation. |
| 9 | Breeding programs and breeding goals in raspberry |
| 10 | Economically important characters and their genetics in raspberry |
| 11 | Raspberry breeding methods |
| 12 | Taxonomy, basic botanical features and gene sources, centers of origin and history of blackberry cultivation. |
| 13 | Breeding programs and breeding goals in blackberry |
| 14 | Breeding programs and breeding goals in blackcurrant |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE HORTICULTURE PhD PROGRAM LEARNING OUTCOMES** | **CONTRIBUTION LEVEL** |
| **NO** | **LEARNING OUTCOMES (PhD)**  | **3**High | **2**Mid | **1**Low |
| **LO 1** | The ability to develop, expand and deepen the competencies gained at undergraduate and graduate levels in the cultivation and breeding of fruit, vegetables, vineyards and ornamental plants at the level of expertise. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 2** | The ability to define, analyze and solve complex problems that arise in the fields of study of the Department of Horticulture | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 3** | Ability to develop new ideas and thoughts by using modern techniques and tools in the field of Horticulture | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 4** | Ability to access information used in different fields, evaluate and interpret information and apply it to one's own field | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 5** | Ability to obtain data through research in the field of Horticulture, evaluate, record, write and implement projects | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 6** | Ability to work effectively in individual, multidisciplinary and multidisciplinary teams, to lead, to gain creativity and to take responsibility in this regard  | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 7** | Oral and written communication skills in at least one foreign language  | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 8** | Transferring the acquired knowledge to the academic environment and practice, raising awareness of the society and putting it into practice | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 9** | Awareness of the necessity of lifelong learning; ability to access information, follow developments in science and technology, and constantly renew oneself | **[ ]**  | **[x]**  | **[ ]**  |

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

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** |  **HORTICULTURE (PhD)** | **SEMESTER** |   |

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| **COURSE** |
| **CODE** |        | **TITLE** |  The Propagation of Clone Rootstocks in Pomology |

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| **LEVEL** | **HOUR/WEEK** | **Credit** | **ECTS** | **TYPE** | **LANGUAGE** |
| **Theory** | **Practice** | **Laboratory** |
|  **PhD** | 3  | -0  | -0  | 3  | 7,5 | COMPULSORY( X ) | ELECTIVE(   ) | Turkish |
| **CREDIT DISTRIBUTION** |
| **Basic Science** | **Basic Engineering** | **Knowledge in the discipline****[if it contains considerable design content, mark with (√)]** |
|   |   |      |
| **ASSESSMENT CRITERIA** |
| **SEMESTER ACTIVITIES** | **Evaluation Type** | **Number** | **Contribution** **( % )** |
| Midterm | 1 | 25 |
| Quiz |   |    |
| Homework | 1 | 25 |
| Project |   |    |
| Report |   |    |
| Seminar |   |    |
| Other (………) |   |    |
| **Final Examination** | 50 |
| **PREREQUISITE(S)** |        |
| **SHORT COURSE CONTENT** |  In spite of clone rootstocks is not commonly used in our country pomology, they are used in sapling production in the world. The rootstocks are mostly propagated by cutting, layering and in-vitro from vegetative propagation methods. This lesson will focus on the propagation methods of clone rootstocks of apple, pear, sweet cherry, cherry, plum and peach like M 27, Bud.9, M 9, M 26, M 7, MM 106, MM 111, Quince A, CTS 212, Quince C, Mahlep SL-64, Mazzard F-12/1, Gisela 5, Gisela 6, Pixy, Myrobalan B, Myrobalan GF-31, Commen Mussel, Hansen 2168 and GF-43.      |
| **COURSE OBJECTIVES** |  The aim of this course is to teach the basic principles of propagation technologies in the pomology of clone rootstocks. |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** |  Students will learn about the pomology potential of our country in terms of fruit growing by learning the propagation of clone rootstocks used in the world. |
| **LEARNING OUTCOMES OF THE COURSE** |  1 Learns the current situation of clone rootsocks in our country.2 Gains knowledge about the principles of propagation of clone rootstocks in the world.3 Learns the latest techniques in propagation techniques in the world. |
| **TEXTBOOK** |  1. RECENT HEADWAYS IN POMOLOGY EDITED BY Assist. Prof. Dr. Mine PAKYÜREK, ISBN: 978-625-7562-09-6 Cover Design: İbrahim KAYA June / 2021 Ankara / Turkey 2. Temperate-Zone Pomology: Physiology and Culture, Third Edition Paperback – Illustrated, March 13, 2009, by Melvin Neil Westwood (Author)  |
| **OTHER REFERENCES** |  Presentations and articles. |

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| **COURSE SCHEDULE (Weekly)** |
| **WEEK** | **TOPICS** |
| 1 | What is the clonal rootstock? Which are the different from seedling rootstocks? |
| 2 | It is used which methods generally in the propagaion of apple clone rootstocks in the world. |
| 3 | It is which pratical Stool-bed layering? How is the use in the apples? |
| 4 | What are technical ways in the propagation of rootstocks as M9, M26, M7  |
| 5 | Propagation by in vitro of apple clone rootstocks in the world and Türkiye  |
| 6 | Propagation by stool-bed layering of pear clone rootstocks  |
| 7 | Propagation by in vitro of pear clone rootstocks. |
| 8 | Propagation of sweet cherry rootstocks as Gisela 5 and Gisela 6 |
| 9 |  Propagation ways layering and in vitro and green cutting of sweet cherry rootstocks as SL-64, MaxMa 14 ve Mazzard F-12/1. |
| 10 | Propagation ways of prune clone rootstocks in the world and Türkiye |
| 11 | Propagation by green cutting and in vitro of Pixy ve Myrobalan group clone rootstocs |
| 12 | Applications to increase root and shoot development in rootstocks propagated by layering |
| 13 | Propagation ways of peach clone rootstocks |
| 14 | Conclusion and Evaluation |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE HORTICULTURE PhD PROGRAM LEARNING OUTCOMES** | **CONTRIBUTION LEVEL** |
| **NO** | **LEARNING OUTCOMES (PhD)**  | **3**High | **2**Mid | **1**Low |
| **LO 1** | The ability to develop, expand and deepen the competencies gained at undergraduate and graduate levels in the cultivation and breeding of fruit, vegetables, vineyards and ornamental plants at the level of expertise. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 2** | The ability to define, analyze and solve complex problems that arise in the fields of study of the Department of Horticulture | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 3** | Ability to develop new ideas and thoughts by using modern techniques and tools in the field of Horticulture | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 4** | Ability to access information used in different fields, evaluate and interpret information and apply it to one's own field | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 5** | Ability to obtain data through research in the field of Horticulture, evaluate, record, write and implement projects | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 6** | Ability to work effectively in individual, multidisciplinary and multidisciplinary teams, to lead, to gain creativity and to take responsibility in this regard  | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 7** | Oral and written communication skills in at least one foreign language  | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 8** | Transferring the acquired knowledge to the academic environment and practice, raising awareness of the society and putting it into practice | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 9** | Awareness of the necessity of lifelong learning; ability to access information, follow developments in science and technology, and constantly renew oneself | **[ ]**  | **[x]**  | **[ ]**  |

**Prepared by:** Prof. Dr. Yakup ÖZKAN **Date:** 27.04.2022

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** |  **HORTICULTURE (MSc)** | **SEMESTER** |   |

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| **COURSE** |
| **CODE** |  505002525 | **TITLE** |  Variety differentiation and morphological characterization in vegetables |

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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 (√)]** |
|   |   |      |
| **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** |  Processing of related topics in order to increase understanding of variety criteria and characterization definition and how to do in vegetables. |
| **COURSE OBJECTIVES** |  It is aimed to enable a MSc student to gain the ability to analyze the processes of registration of varieties in vegetables, the registration of varieties, the differences between vegetable varieties and the possible effects on the scientific and technical aspects of determining these differences morphologically. |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** |  To be able to identify the varieties of a species belonging to the same variety in different ecologies in vegetables using qualitative, pseudo-qualitative and quantitative effects and to distinguish and interpret these varieties by morphological characterization. |
| **LEARNING OUTCOMES OF THE COURSE** |  At the end of this course, the student;1- Varieties of a species,2-How to define the varieties,3- The concept of open pollinated and hybrid varieties in varieties,4-How to make morphologichal characterization according to species,5-Learns the theoretical and practical information about the registration of plant varieties. |
| **TEXTBOOK** |  Personal lecture notes compiled from various sources and current scientific studies. |
| **OTHER REFERENCES** |  1- Vegetable Seed Production, 3 rd Edition, Raymond A.T. George, CABI, 2009-320 p.2- Tohum ve Tohumculuk ve Teknolojileri Bitki Islahçıları Alt Birliği yayınları (4 cilt)3- UPOV (The International Union for the Protection of New Varieties of Plants) test guidelines |

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| **COURSE SCHEDULE (Weekly)** |
| **WEEK** | **TOPICS** |
| 1 |  Species and varieties distinction in vegetables |
| 2 |  UPOV (The International Union for the Protection of New Varieties of Plants) definition and how it is used |
| 3 |  Variety registration in vegetable species and its situation in our country |
| 4 |  Definition of morphological characterization in vegetables and how it is done |
| 5 |  Morphological characterization in tomato |
| 6 |  Morphological characterization in pepper |
| 7 |  Midterm Examination  |
| 8 |  Morphological characterization in eggplant |
| 9 |  Morphological characterization in squash |
| 10 |  Morphological characterization in melon |
| 11 |  Morphological characterization in watermelon |
| 12 |  Morphological characterization in lettuce |
| 13 |  Photographing techniques in characterization studies in vegetable species  |
| 14 |  The importance of disease testing in characterization studies in vegetable species |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE HORTICULTURE MSc PROGRAM LEARNING OUTCOMES** | **CONTRIBUTION LEVEL** |
| **NO** | **LEARNING OUTCOMES (MSc)**  | **3**High | **2**Mid | **1**Low |
| **LO 1** | To have integrated theoretical and practical (land and laboratory) information on growing and breeding of fruits, vegetables, grapevine and ornamental plants, and to use and transfer these information accurately | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 2** | To have theoretical and practical (land and laboratory) information on growing and breeding of fruits, vegetables, grapevine and ornamental plants, and to use and transfer these information accurately | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 3** | To have the skill of utilizing different techniques for sustainable usage and protection of genetic resources in horticultural area and environment | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 4** | To have the information on good agricultural practices and ecological agriculture, and by the way, to decide the right time of cultural practices of the horticultural crops, and to have the ability of describing the pest and diseases of horticultural plants | **[ ]**  | **[ ]**  | **[x]**  |
| **LO 5** | To have the skill on observing the changes through harvest, post harvest, and storage of horticultural crops, and to have the integrated information on storage conditions | **[ ]**  | **[ ]**  | **[x]**  |
| **LO 6** | To have the ability of getting the data on horticultural area, and evaluation, recording, project creation and application skills | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 7** | To have the ability of working in individual, multiple and different disciplined teams, and having the responsibility | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 8** | Ability to communicate in written and oral forms in Turkish/English; proficiency at least one foreign language. | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 9** | Awareness of life-long learning; ability to reach information; follow developments in science and technology and continuous self-improvement. | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 10** | Understanding of professional and ethical issues and taking responsibility | **[ ]**  | **[x]**  | **[ ]**  |
| **Prepared by :**  |  Assistant Professor Dr Sıtkı ERMİŞ | **Date:** |  08.11.2022 |

**Signature**: