**STATISTICS PhD PROGRAMME**

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| **First Year** | | | | | | |
| **I. Semester** | | | | | | |
| Code | Course Title | ECTS | T+P | Credit | C/E | Language |
| 501011101 | [THE SCIENTIFIC RESEARCH METHODS AND ITS ETHICS](#EN51) | 7.5 | 3+0 | 3 | **C** | Turkish |
| 501411610 | [PROBABILITY THEORY](#EN49) | 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 |
| 501411609 | [MULTIVARIATE ANALYSIS](#EN48) | 7.5 | 3+0 | 3 | **C** | Turkish |
|  | Elective Course-3 | 7.5 | 3+0 | 3 | E | Turkish |
|  | Elective Course-4 | 7.5 | 3+0 | 3 | E | Turkish |
| 501412001 | PhD Seminar | 7.5 | 0+1 | - | **C** | Turkish |
|  | Total of II. Semester | 30 |  | 9 |  |  |
|  | TOTAL OF FIRST YEAR | 60 |  | 21 |  |  |

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| **Second Year** | | | | | | | |
| **III. Semester** | | | | | | | |
| Code | | Course Title | ECTS | T+P | Credit | C/E | Language |
| 501411801 | | PhD PROFICIENCY | 30 | 0+1 | - | **C** | Turkish |
|  | | Total of III. Semester | 30 |  |  |  |  |
| **IV. Semester** | | | | | | | |
| Code | Course Title | | ECTS | T+P | Credit | C/E | Language |
| 501011102 | THESIS PROPOSAL | | 30 | 0+1 | - | **C** | Turkish |
|  | Total of IV. Semester | | 30 |  |  |  |  |
|  | TOTAL OF SECOND YEAR | | 60 |  |  |  |  |

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| **Third Year** | | | | | | | |
| **V. Semester** | | | | | | | |
| Code | | Course Title | ECTS | T+P | Credit | C/E | Language |
| 501411802 | | PhD THESIS STUDY | 25 | 0+1 | - | **C** | Turkish |
| 501411803 | | SPECIALIZATION FIELD COURSE | 5 | 3+0 | - | **C** | Turkish |
|  | | Total of V. Semester | 30 |  |  |  |  |
| **VI. Semester** | | | | | | | |
| Code | Course Title | | ECTS | T+P | Credit | C/E | Language |
| 501411802 | PhD THESIS STUDY | | 25 | 0+1 | - | **C** | Turkish |
| 501411803 | SPECIALIZATION FIELD COURSE | | 5 | 3+0 | - | **C** | Turkish |
|  | | Total of VI. Semester | 30 |  |  |  |  |
|  | TOTAL OF THIRD YEAR | | 60 |  |  |  |  |

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| **Fourth Year** | | | | | | |
| **VII. Semester** | | | | | | |
| Code | Course Title | ECTS | T+P | Credit | C/E | Language |
| 501411802 | PhD THESIS STUDY | 25 | 0+1 | **-** | **C** | Turkish |
| 501411803 | SPECIALIZATION FIELD COURSE | 5 | 3+0 | **-** | **C** | Turkish |
|  | Total of VII. Semester | 30 |  |  |  |  |
| **VIII. Semester** | | | | | | |
| Code | Course Title | ECTS | T+P | Credit | C/E | Language |
| 501411802 | PhD THESIS STUDY | 25 | 0+1 | **-** | **C** | Turkish |
| 501411803 | SPECIALIZATION FIELD COURSE | 5 | 3+0 | - | **C** | Turkish |
|  | Total of VIII. Semester | 30 |  |  |  |  |
|  | TOTAL OF FOURTH YEAR | 60 |  |  |  |  |

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| **Elective Courses** | | | | | | |
| Code | Course Title | ECTS | T+P | Credit | C/E | Language |
| 501411603 | [ADVANCED THEORETICAL STATISTICS I](#EN39) | 7.5 | 3+0 | 3 | E | Turkish |
| 501412603 | [ADVENCED THEORETICAL STATISTICS II](#EN44) | 7.5 | 3+0 | 3 | E | Turkish |
| 501412605 | [Bağımlılık Fonksiyonları](#EN60) | 7.5 | 3+0 | 3 | E | Turkish |
| 501412606 | [Generalized Linear Models and Applications in R](#EN59) | 7.5 | 3+0 | 3 | E | Turkish |
| 501411607 | [RESAMPLING METHODS](#EN40) | 7.5 | 3+0 | 3 | E | Turkish |
| 501411608 | [SOFT COMPUTING METHODS I](#EN41) | 7.5 | 3+0 | 3 | E | Turkish |
| 501412604 | [STAT. TECH. IN MARKETING](#EN47) | 7.5 | 3+0 | 3 | E | Turkish |
| 501411602 | [STATISTICAL ANALYSIS METHODS I](#EN38) | 7.5 | 3+0 | 3 | E | Turkish |
| 501412601 | [STATISTICAL ANALYSIS METHODS II](#EN42) | 7.5 | 3+0 | 3 | E | Turkish |
| 501411601 | [STRUCTURAL EQUATION MODELLING I](#EN37) | 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** | **STATISTICS (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501411601 | **TITLE** | STRUCTURAL EQUATION MODELLING I |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( x ) | TURKISH |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
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| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 30 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | | 1 | | 20 |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Variables and measurement levels, mutual and causal relationship, regression analysis, and confirmatory factor analysis, structural equation modeling. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The best reflect the multi-dimensional model of causal relationships between variables set to create and test. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Students will research a theoretical model for the solution of the problem of scientific research to create and learn to test compliance with the model. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | At the end of this course, students needed to solve the problem in a scientific research model and hypotheses to create the latent variable, the concept of how the abstract concepts of causality relations between the latent variables measured in the test situation and learn to be brought. | | | | | | | |
| **TEXTBOOK** | | | | | LISREL ile Yapısal Eşitlik Modellemesi – 1 Veysel YILMAZ, H.Eray ÇELİK | | | | | | | |
| **OTHER REFERENCES** | | | | | - SHARMA, S. ,(1993). Applied Multivariate Techniques, John Wiley and Sons Inc, New York.- TABANICK, G.B. FIDELL, L.S., (1996). Using Multivariate Statistics, Harper Collngs College Publisher Inc., New York. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Research problem |
| 2 | Research hypotheses and research model |
| 3 | The concept of variable |
| 4 | The concept and classification of variables |
| 5 | Measuring levels and scales |
| 6 | Midterm Examination 1 |
| 7 | Correlation |
| 8 | Multiple regression |
| 9 | Factor analysis |
| 10 | Factor analysis |
| 11 | Midterm Examination 2 |
| 12 | Confirmatory Factor Analysis |
| 13 | The creation of a structural equation model |
| 14 | Structural equation modeling with Statistica |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Ability to comprehend and practice math, basic sciences and engineering sciences at the highest level in Statistics and related fields. | | |  | |  |  |
| **LO 2** | Knowledge of the social, environmental, health, safety and judicial dimensions of Statistical applications, knowledge of project management and workplace practices in the field as well as the awareness of limitations that such factors impose on the practices. | | |  | |  |  |
| **LO 3** | Ability to design multi-disciplinary innovative projects, plan, manage, carry-out and complete them | | |  | |  |  |
| **LO 4** | Ability to present the academic works and their results in all kinds of respectable academic environments and publish them. | | |  | |  |  |
| **LO 5** | Ability to present the academic works and their results in all kinds of respectable Academic environments and publish them. | | |  | |  |  |
| **LO 6** | Develop an project based work approach. | | |  | |  |  |
| **LO 7** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. | | |  | |  |  |
| **LO 8** | Ability to function effectively in multidisciplinary teams, to lead such teams and suggest solutions in such work environments; ability to work independently and take responsibility. | | |  | |  |  |
| **LO 9** | Develop an positive approach towards life time learning. | | |  | |  |  |
| **Prepared by :** | | | Prof. Dr. Veysel YILMAZ | **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** | **STATISTICS (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501411603 | **TITLE** | ADVANCED THEORETICAL STATISTICS I |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( x ) | TURKISH |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
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| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 30 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | | 1 | | 20 |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Theoretical information on the univariate random variable (expected value, the concept of random variables, functions of random variable, the distribution of a single variable, discrete and continuous probability distributions) | | | | | | | |
| **COURSE OBJECTIVES** | | | | | To teach the theory of statistical techniques. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Theoretical understanding the core subjects. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Students will learn the basic features of a single variable and the probability distributions. | | | | | | | |
| **TEXTBOOK** | | | | | Book Mathematical Statistics I and II, lecture notes, Veysel YILMAZ and H.Eray Çelik | | | | | | | |
| **OTHER REFERENCES** | | | | | - İnal, C. Günay S(1999 ).Olasılık ve Matematiksel İstatistik, Hacettepe Ünv. Yayınları- Roussas, G. G. (1972). A First Course in Mathematical Statistics, Addison-- Freund, J.E. (2001). Matematiksel İstatistik. (Çeviren Şenesen, Ü.) İstanbul: Literatür Yayıncılık.- Knight K. (2000).Mathematical Statistics, Chapman & Hall/CRC, US.- Shao, J. (1999). Mathematical Statistics, Springer-Verlag New York, Incorporated. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Discrete probability function |
| 2 | Discrete probability function, expected value, marginal functions, conditional functions |
| 3 | Continuous probability density function |
| 4 | Continuous Probability function, expected value, marginal functions, conditional functions |
| 5 | Continuous Probability function, expected value, marginal functions, conditional functions |
| 6 | Midterm Examination 1 |
| 7 | Moments and Moment generating function |
| 8 | Moment generating function for discrete and continuous random variables |
| 9 | Moment generating function for discrete and continuous random variables |
| 10 | Theoretical probability distributions of discrete and continuous random variables |
| 11 | Midterm Examination 2 |
| 12 | Theoretical probability distributions of discrete and continuous random variables |
| 13 | The distribution functions of random variables (univariate case) |
| 14 | The distribution functions of random variables (univariate case) |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Ability to comprehend and practice math, basic sciences and engineering sciences at the highest level in Statistics and related fields. | | |  | |  |  |
| **LO 2** | Knowledge of the social, environmental, health, safety and judicial dimensions of Statistical applications, knowledge of project management and workplace practices in the field as well as the awareness of limitations that such factors impose on the practices. | | |  | |  |  |
| **LO 3** | Ability to design multi-disciplinary innovative projects, plan, manage, carry-out and complete them | | |  | |  |  |
| **LO 4** | Ability to present the academic works and their results in all kinds of respectable academic environments and publish them. | | |  | |  |  |
| **LO 5** | Ability to present the academic works and their results in all kinds of respectable Academic environments and publish them. | | |  | |  |  |
| **LO 6** | Develop an project based work approach. | | |  | |  |  |
| **LO 7** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. | | |  | |  |  |
| **LO 8** | Ability to function effectively in multidisciplinary teams, to lead such teams and suggest solutions in such work environments; ability to work independently and take responsibility. | | |  | |  |  |
| **LO 9** | Develop an positive approach towards life time learning. | | |  | |  |  |
| **Prepared by :** | | | Prof. Dr. Veysel Yılmaz | **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** | **STATISTICS (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501411607 | **TITLE** | Resampling Methods |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | |  |
| Quiz | | | | |  | |  |
| Homework | | | | | 2 | | 30 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 40 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Basic criteria and types of resampling methods, Randomisation (Permutation) method, Cross-Validation method, Jacknife method, Bootstrap method, basic concepts of Bootstrap method, Emprical distribution function and principle of Plug-in, Bootstrap standard errors, Bootstrap confidence intervals, hypothesis testing with the Bootstrap, Permutation Tests, Cross Validation and other estimates of prediction error. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The course will introduce computer intensive methods of statistical analysis and their application to statistical modeling. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Evaluate, analyze the resampling methods | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Understand the importance of resampling methods as it is applied in the theory and practice of statistics,  2. Evaluate the strengths and weaknesses of different resampling methods,  3. Gain techniques, skills, computers and software knowledge to solve real life problems with resampling methods  4. Evaluate, analyze the resampling methods | | | | | | | |
| **TEXTBOOK** | | | | | Efron, B.(1982).The Jacknife, the Bootstrap and Other Resampling Plans. CBMS-NSF Regional Conference Series in Applied Mathematics | | | | | | | |
| **OTHER REFERENCES** | | | | | Efron B. and Tibshirani R.J.(1993). An Introduction to the Bootstrap. Chapman&Hall/CRC | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Basic Criteria and kinds of Resampling methods |
| 2 | Randomisation (Permutation) method |
| 3 | Cross-Validation method |
| 4 | Jacknife method |
| 5 | Application 1 |
| 6 | Midterm Examination 1 |
| 7 | Bootstrap method, basic concepts of Bootstrap method |
| 8 | Emprical distribution function and principle of Plug-in |
| 9 | Bootstrap standard errors |
| 10 | Application 2 |
| 11 | Midterm Examination 2 |
| 12 | Bootstrap confidence intervals |
| 13 | Hypothesis testing with the Bootstrap, Permutation Tests, Cross Validation and other estimates of prediction error. |
| 14 | Application 3 |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Ability to comprehend and practice math, basic sciences and engineering sciences at the highest level in Statistics and related fields. | | |  | |  |  |
| **LO 2** | Knowledge of the social, environmental, health, safety and judicial dimensions of Statistical applications, knowledge of project management and workplace practices in the field as well as the awareness of limitations that such factors impose on the practices. | | |  | |  |  |
| **LO 3** | Ability to design multi-disciplinary innovative projects, plan, manage, carry-out and complete them | | |  | |  |  |
| **LO 4** | Ability to present the academic works and their results in all kinds of respectable academic environments and publish them. | | |  | |  |  |
| **LO 5** | Ability to present the academic works and their results in all kinds of respectable Academic environments and publish them. | | |  | |  |  |
| **LO 6** | Develop an project based work approach. | | |  | |  |  |
| **LO 7** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. | | |  | |  |  |
| **LO 8** | Ability to function effectively in multidisciplinary teams, to lead such teams and suggest solutions in such work environments; ability to work independently and take responsibility. | | |  | |  |  |
| **LO 9** | Develop an positive approach towards life time learning. | | |  | |  |  |
| **Prepared by :** | | | Assoc.Prof.Dr.Özlem ALPU | **Date:** | | 30.04.2015 | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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

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| **COURSE** | | | |
| **CODE** | 501411608 | **TITLE** | Soft Computing Methods I |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( x ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | |  |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 30 |
| Project | | | | | 1 | | 30 |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 40 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | In this course, the main features and flexible methods of calculation methods will be shown. These methods include neural networks, fuzzy logic and genetic algorithms. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | Nowadays, the statistical evaluation of the data, taking advantage of artificial intelligence applications. These applications typically performed on computer Artificial Neural Networks, Fuzzy Logic and Genetic Algorithms, and so on. The purpose of this course, the students in the basics of the theory of soft computing technologies and non-traditional approaches to solving real-life problems, to provide information on the basics. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Students will learn applications of artificial intelligence, as an alternative to the classical statistical analysis. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Ability to gain real-life solutions to the problems of artificial intelligence applications. | | | | | | | |
| **TEXTBOOK** | | | | | S. Haykin, Neural Network: A Comprehensive Foundation, 3rd Edition, Prentice-HallAliev, R. A., Aliev, R.R., Soft Computing and its Application, World Scientific Publishing Co. Pte, Ltd. | | | | | | | |
| **OTHER REFERENCES** | | | | | Çetin Elmas, Yapay Zeka Uygulamaları, Seçkin YayıncılıkVasif Vagifoğlu Nabiyev, Yapay Zeka: İnsan-Bilgisayar Etkileşimi, Seçkin Yayıncılık | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Intorduction to soft computing and giving definitions |
| 2 | Biological and artificial neural networks, history of neural networks |
| 3 | Structure and classification of Artificial Neural Networks |
| 4 | Learning strategies and learning algorithms on Artificial Neural Networks |
| 5 | Learning strategies and learning algorithms on Artificial Neural Networks (Continue) |
| 6 | Midterm Examination 1 |
| 7 | Homework 1 presentation |
| 8 | Multilayer Perceptron, Time delay neural network (TDNN), Radial basis function neural betwork (RBFNN), Generalized regression neural network (GRNN), Learning Vector Quantization (LVQ), Adaptive resonance theory (ART), v.b. |
| 9 | Fuzzy Logic |
| 10 | With the use of fuzzy logic and artificial neural networks. |
| 11 | Midterm Examination 2 |
| 12 | Homework 2 presentation |
| 13 | The use of fuzzy logic and artificial neural networks in statistics applications. |
| 14 | The use of fuzzy logic and artificial neural networks in statistics applications (Continue). |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Ability to comprehend and practice math, basic sciences and engineering sciences at the highest level in Statistics and related fields. | | |  | |  |  |
| **LO 2** | Knowledge of the social, environmental, health, safety and judicial dimensions of Statistical applications, knowledge of project management and workplace practices in the field as well as the awareness of limitations that such factors impose on the practices. | | |  | |  |  |
| **LO 3** | Ability to design multi-disciplinary innovative projects, plan, manage, carry-out and complete them | | |  | |  |  |
| **LO 4** | Ability to present the academic works and their results in all kinds of respectable academic environments and publish them. | | |  | |  |  |
| **LO 5** | Ability to present the academic works and their results in all kinds of respectable Academic environments and publish them. | | |  | |  |  |
| **LO 6** | Develop an project based work approach. | | |  | |  |  |
| **LO 7** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. | | |  | |  |  |
| **LO 8** | Ability to function effectively in multidisciplinary teams, to lead such teams and suggest solutions in such work environments; ability to work independently and take responsibility. | | |  | |  |  |
| **LO 9** | Develop an positive approach towards life time learning. | | |  | |  |  |
| **Prepared by :** | | | Assist. Prof. Dr. Özer Özaydın | **Date:** | |  | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **STATISTICS (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501412602 | **TITLE** | Alternative Regression Methods |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | |  |
| Quiz | | | | |  | |  |
| Homework | | | | | 2 | | 30 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 40 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Least Absolute Deviations Regression, Least Median Squares Regression, M regression, MM regression, Least Trimmed Square Regression, Ridge Regression. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | To introduce alternative regression methods and explore the mathematical structure of these methods. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Evaluate, analyze the alternative regression methods. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Understand the importance of alternative regression methods as it is applied in the theory and practice of statistics,  2. Evaluate the strengths and weaknesses of different alternative regression methods,  3. Gain techniques, skills, computers and software knowledge to solve real life problems with alternative regression methods,  4. Evaluate, analyze the alternative regression methods. | | | | | | | |
| **TEXTBOOK** | | | | | D. Birkes, Y. Dodge.(1993). Alternative Methods of Regression. John Wiley and Sons. | | | | | | | |
| **OTHER REFERENCES** | | | | | F.E. Harrell.(2001). Regression Modeling Strategies. Springer. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Least Absolute Deviations Regression |
| 2 | Application 1 |
| 3 | Least Median Squares Regression |
| 4 | Application 2 |
| 5 | Least Trimmed Square Regression |
| 6 | Midterm Examination 1 |
| 7 | Application 3 |
| 8 | M regression |
| 9 | Application 4 |
| 10 | MM regression |
| 11 | Midterm Examination 2 |
| 12 | Application5 |
| 13 | Ridge Regression |
| 14 | Application 6 |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Ability to comprehend and practice math, basic sciences and engineering sciences at the highest level in Statistics and related fields. | | |  | |  |  |
| **LO 2** | Knowledge of the social, environmental, health, safety and judicial dimensions of Statistical applications, knowledge of project management and workplace practices in the field as well as the awareness of limitations that such factors impose on the practices. | | |  | |  |  |
| **LO 3** | Ability to design multi-disciplinary innovative projects, plan, manage, carry-out and complete them | | |  | |  |  |
| **LO 4** | Ability to present the academic works and their results in all kinds of respectable academic environments and publish them. | | |  | |  |  |
| **LO 5** | Ability to present the academic works and their results in all kinds of respectable Academic environments and publish them. | | |  | |  |  |
| **LO 6** | Develop an project based work approach. | | |  | |  |  |
| **LO 7** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. | | |  | |  |  |
| **LO 8** | Ability to function effectively in multidisciplinary teams, to lead such teams and suggest solutions in such work environments; ability to work independently and take responsibility. | | |  | |  |  |
| **LO 9** | Develop an positive approach towards life time learning. | | |  | |  |  |
| **Prepared by :** | | | Assoc.Prof.Dr. Özlem ALPU | **Date:** | | 30.04.2015 | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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

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| **COURSE** | | | |
| **CODE** | 501402521 | **TITLE** | ADVENCED THEORETICAL STATİSTİCS II |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( x ) | TURKISH |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
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| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 30 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | | 1 | | 20 |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Theoretical information related to the multivariate random variable (expected value, the concept of random variables, a multivariate random variable, function, Sampling distributions, multivariate normal distribution. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | Theoretical information related to the multivariate random variable | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Theoretical understanding core subjects in | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Students in this course will learn the basic features and the multivariate normal distribution. | | | | | | | |
| **TEXTBOOK** | | | | | Matematiksel İstatistik I ve II ders notları kitabı, Veysel YILMAZ ve H.Eray Çelik | | | | | | | |
| **OTHER REFERENCES** | | | | | -İnal, C. Günay S(1999 ).Olasılık ve Matematiksel İstatistik, Hacettepe Ünv. Yayınları- Roussas, G. G. (1972). A First Course in Mathematical Statistics, Addison-- Freund, J.E. (2001). Matematiksel İstatistik. (Çeviren Şenesen, Ü.) İstanbul: Literatür Yayıncılık.- Knight K. (2000).Mathematical Statistics, Chapman & Hall/CRC, US.- Shao, J. (1999). Mathematical Statistics, Springer-Verlag New York, Incorporated. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Theoretical information related to the multivariate random variable |
| 2 | Theoretical information related to the multivariate random variable |
| 3 | A multivariate random variable functions |
| 4 | A multivariate random variable functions |
| 5 | A multivariate random variable functions |
| 6 | Midterm Examination 1 |
| 7 | Sampling distributions |
| 8 | Sampling distributions |
| 9 | Sampling distributions |
| 10 | Sampling distributions |
| 11 | Midterm Examination 2 |
| 12 | Multivariate normal distribution |
| 13 | Multivariate normal distribution |
| 14 | Multivariate normal distribution |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Ability to comprehend and practice math, basic sciences and engineering sciences at the highest level in Statistics and related fields. | | |  | |  |  |
| **LO 2** | Knowledge of the social, environmental, health, safety and judicial dimensions of Statistical applications, knowledge of project management and workplace practices in the field as well as the awareness of limitations that such factors impose on the practices. | | |  | |  |  |
| **LO 3** | Ability to design multi-disciplinary innovative projects, plan, manage, carry-out and complete them | | |  | |  |  |
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| **LO 5** | Ability to present the academic works and their results in all kinds of respectable Academic environments and publish them. | | |  | |  |  |
| **LO 6** | Develop an project based work approach. | | |  | |  |  |
| **LO 7** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. | | |  | |  |  |
| **LO 8** | Ability to function effectively in multidisciplinary teams, to lead such teams and suggest solutions in such work environments; ability to work independently and take responsibility. | | |  | |  |  |
| **LO 9** | Develop an positive approach towards life time learning. | | |  | |  |  |
| **Prepared by :** | | | Prof. Dr. Veysel Yılmaz | **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** | **STATISTICS (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501412604 | **TITLE** | STAT. TECH. IN MARKETING |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( x ) | TURKISH |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
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| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 30 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | | 1 | | 20 |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | This course some of the statistical techniques used in marketing research, and software applications. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | Statistical techniques solve a marketing problem. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Statistical techniques solve a marketing problem. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Learn with the help of statistical techniques used for marketing research with software. | | | | | | | |
| **TEXTBOOK** | | | | | -KOTLER, P., (1991). Marketing Management Analysis, Implementation and Control, Prentice – Hall Internation Inc.-ODABAŞI, Y., (1998). Tüketici Davranışı ve Pazarlama Stratejisi, Anadolu Üniversitesi-SHARMA, S. ,(1993). Applied Multivariate Techniques, John Wiley and Sons Inc, New York.-TABANICK, G.B. FIDELL, L.S., (1996). Using Multivariate Statistics, Harper Collngs College Publisher Inc., New York.-Statistics in Market Research (Arnold Applications of Statistics Series)-Statistics for Marketing and Consumer Research.by Mario Mazzocchi | | | | | | | |
| **OTHER REFERENCES** | | | | |  | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Marketing Studies Introduction (Definitions / Rules) |
| 2 | Importance And Benefits Of Marketing Research |
| 3 | Market Research Stages (Selection Problem) |
| 4 | Development Of Hypotheses And Research Model |
| 5 | Qualitative And Quantitative Statistical Techniques Used İn Marketing Research |
| 6 | Midterm Examination 1 |
| 7 | Qualitative And Quantitative Statistical Techniques Used İn Marketing Research |
| 8 | Factor Analysis |
| 9 | Factor Analysis Software |
| 10 | Cluster Analysis |
| 11 | Midterm Examination 2 |
| 12 | Cluster Analysis Software |
| 13 | Correspondance Analysis |
| 14 | Correspondence Analysis Software |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Ability to comprehend and practice math, basic sciences and engineering sciences at the highest level in Statistics and related fields. | | |  | |  |  |
| **LO 2** | Knowledge of the social, environmental, health, safety and judicial dimensions of Statistical applications, knowledge of project management and workplace practices in the field as well as the awareness of limitations that such factors impose on the practices. | | |  | |  |  |
| **LO 3** | Ability to design multi-disciplinary innovative projects, plan, manage, carry-out and complete them | | |  | |  |  |
| **LO 4** | Ability to present the academic works and their results in all kinds of respectable academic environments and publish them. | | |  | |  |  |
| **LO 5** | Ability to present the academic works and their results in all kinds of respectable Academic environments and publish them. | | |  | |  |  |
| **LO 6** | Develop an project based work approach. | | |  | |  |  |
| **LO 7** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. | | |  | |  |  |
| **LO 8** | Ability to function effectively in multidisciplinary teams, to lead such teams and suggest solutions in such work environments; ability to work independently and take responsibility. | | |  | |  |  |
| **LO 9** | Develop an positive approach towards life time learning. | | |  | |  |  |
| **Prepared by :** | | | Prof. Dr. Veysel YILMAz | **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** | **STATISTICS (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** |  | **TITLE** | Multivariate Analysis |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  ( x ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Multivariate data analysis and its application areas, data matrices and measurement scales, multivariate distributions, the multivariate normal distribution (MND), multivariate hypothesis tests, Principal component and factor analysis, conjoint analysis, correspondence analysis, homogeneity analysis, multidimensional scaling. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aim of the course is to introduce the concepts and methods of multivariate analysis and to provide exercises in the application of multivariate data analysis to related problems. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Evaluate and analyze the multivariate data. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1)apply knowledge of Multivariate Statistics  2)design and conduct experiments as well as to analyze and interpret data  3)identify, formulate and solve real life problems  4)get an understanding of professional and ethical responsibility | | | | | | | |
| **TEXTBOOK** | | | | | Tatlıdil, H.(1992). Uygulamalı Çok Değişkenli İstatistiksel Analiz, Ankara. | | | | | | | |
| **OTHER REFERENCES** | | | | | Jobson, J, D.(1991). Applied Multivariate Data Analysis, Volume I-II, Springer- Verlag, New York.Özdamar, K.( 1999). Paket Programlar ile İstatistiksel Veri Analizi, Kaan Kitabevi, Eskişehir. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Multivariate data analysis and its application areas |
| 2 | data matrices and measurement scales |
| 3 | multivariate distributions |
| 4 | the multivariate normal distribution (MND) |
| 5 | multivariate hypothesis tests |
| 6 | Midterm Examination 1 |
| 7 | multivariate hypothesis tests |
| 8 | Principal component analysis |
| 9 | factor analysis |
| 10 | correspondence analysis |
| 11 | Midterm Examination 2 |
| 12 | Mulitivariate correspondence analysis |
| 13 | homogeneity analysis |
| 14 | Applications |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Ability to comprehend and practice math, basic sciences and engineering sciences at the highest level in Statistics and related fields. | | |  | |  |  |
| **LO 2** | Knowledge of the social, environmental, health, safety and judicial dimensions of Statistical applications, knowledge of project management and workplace practices in the field as well as the awareness of limitations that such factors impose on the practices. | | |  | |  |  |
| **LO 3** | Ability to design multi-disciplinary innovative projects, plan, manage, carry-out and complete them | | |  | |  |  |
| **LO 4** | Ability to present the academic works and their results in all kinds of respectable academic environments and publish them. | | |  | |  |  |
| **LO 5** | Ability to present the academic works and their results in all kinds of respectable Academic environments and publish them. | | |  | |  |  |
| **LO 6** | Develop an project based work approach. | | |  | |  |  |
| **LO 7** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. | | |  | |  |  |
| **LO 8** | Ability to function effectively in multidisciplinary teams, to lead such teams and suggest solutions in such work environments; ability to work independently and take responsibility. | | |  | |  |  |
| **LO 9** | Develop an positive approach towards life time learning. | | |  | |  |  |
| **Prepared by :** | | | Prof. Dr. Zeki YILDIZ | **Date:** | | 25.6.2015 | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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

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| **COURSE** | | | |
| **CODE** |  | **TITLE** | Probability Theory |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  ( x ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 30 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | | 1 | | 20 |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | measure and probability spaces, random variables, expected values, generating functions, independence,transformations, convergence. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | Probability Theory and applications learning with courses. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | students should be aware of the fact that statistics is an art as well as a science | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | prepare for another courses and statistics, understanding of the logic behind statistical techniques as well as practice in using them.. | | | | | | | |
| **TEXTBOOK** | | | | | "Statistical Inference" by G.Casella and R.Berger, Thomson Information/Publishing, “A First Course in Probability”, Sheldon Ross, Prentice Hall. | | | | | | | |
| **OTHER REFERENCES** | | | | | “Probability and Statistics for Engineers and Scientists” Ronald Walpole, Raymond Myers, Sharon Myers, Keying Ye. Prentice Hall. "Probability Theory & Statistics" Jørgen Larsen,2006 and Türkish probability books | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Measurement and Kombinatorik analaysis |
| 2 | Probability aksioms |
| 3 | İndependent events, conditional probability, bayes |
| 4 | Generating functions |
| 5 | Discreate distributions |
| 6 | Midterm Examination 1 |
| 7 | Bernoulli, Binom, Poisson, Geometric and Negatif Binom etc. |
| 8 | Continous distributions |
| 9 | Normal, Gamma, Beta, exponencial etc. |
| 10 | Multivariate distributions |
| 11 | Midterm Examination 2 |
| 12 | Chi square, t, F distributions etc. |
| 13 | Expected value. variance, covariance, correlation |
| 14 | Limit theorems |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Ability to comprehend and practice math, basic sciences and engineering sciences at the highest level in Statistics and related fields. | | |  | |  |  |
| **LO 2** | Knowledge of the social, environmental, health, safety and judicial dimensions of Statistical applications, knowledge of project management and workplace practices in the field as well as the awareness of limitations that such factors impose on the practices. | | |  | |  |  |
| **LO 3** | Ability to design multi-disciplinary innovative projects, plan, manage, carry-out and complete them | | |  | |  |  |
| **LO 4** | Ability to present the academic works and their results in all kinds of respectable academic environments and publish them. | | |  | |  |  |
| **LO 5** | Ability to present the academic works and their results in all kinds of respectable Academic environments and publish them. | | |  | |  |  |
| **LO 6** | Develop an project based work approach. | | |  | |  |  |
| **LO 7** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. | | |  | |  |  |
| **LO 8** | Ability to function effectively in multidisciplinary teams, to lead such teams and suggest solutions in such work environments; ability to work independently and take responsibility. | | |  | |  |  |
| **LO 9** | Develop an positive approach towards life time learning. | | |  | |  |  |
| **Prepared by :** | | | Assist. Prof. Dr. Günseli Kurt | **Date:** | | 4.6.2015 | | | |

**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** | **STATISTICS (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** |  | **TITLE** | Generalized Linear Models and Applications in R |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 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 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | In this lesson, Basic concepts given in linear models such as least squares and maximum likelihood estimators, confidence intervals, hypothesis tests will be explained, and then Generalized Linear Models (GLMs) will be introduced. The concept of the GLM, maximum likelihood estimators for the GLMs, quasi-likelihood, and important distribution using in the GLMs, and the link function of these distributions will be explained. Finally, applications will be made in the R program related to the concept of the GLMs. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | 1) The student who taken this course will have known the alternative methods of the linear regression model.  2) The students will have the ability to decide which model can be used in real data problems according to the data structure.  3) The student will learn the modeling of real data problems via the R program. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | The students who take this course will have known about the different regression models that are used to model real data problems in which the normality assumption does not hold. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1) Having an idea about the GLMs,  2) Having an idea about the modeling of the real data problems,  3) Having an idea about the models used in the R program,  4) Getting the ability to apply alternative regression models used in the real data problems and interpret the R output, | | | | | | | |
| **TEXTBOOK** | | | | | McCullagh, P., Nelder, J. A. (1989) Generalized Linear Models, Springer. | | | | | | | |
| **OTHER REFERENCES** | | | | | Myers, R. H., Montgomery, D. C., Vining G. G., Robinson, T. J. (2010) Generalized Linear Models with Applications in Engineering and the Sciences, Wiley. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Linear regression model |
| 2 | Multiple linear regression model |
| 3 | The likelihood equations in the GLMs |
| 4 | The important distributions using in the GLMs |
| 5 | Link Functions |
| 6 | Applications in R |
| 7 | Midterm exam |
| 8 | Gamma regression model |
| 9 | Applications of the Gamma regression model in R |
| 10 | Logistic regression model |
| 11 | Applications of the logistic regression model in R |
| 12 | Poisson regression model |
| 13 | Applications of the Poisson regression model in R |
| 14 | Applications of the Poisson regression model in R |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS PhD PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Ability to comprehend and practice math, basic sciences and engineering sciences at the highest level in Statistics and related fields. | | |  | |  |  |
| **LO 2** | Knowledge of the social, environmental, health, safety and judicial dimensions of Statistical applications, knowledge of project management and workplace practices in the field as well as the awareness of limitations that such factors impose on the practices. | | |  | |  |  |
| **LO 3** | Ability to design multi-disciplinary innovative projects, plan, manage, carry-out and complete them | | |  | |  |  |
| **LO 4** | Ability to present the academic works and their results in all kinds of respectable academic environments and publish them. | | |  | |  |  |
| **LO 5** | Ability to present the academic works and their results in all kinds of respectable Academic environments and publish them. | | |  | |  |  |
| **LO 6** | Develop an project based work approach. | | |  | |  |  |
| **LO 7** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. | | |  | |  |  |
| **LO 8** | Ability to function effectively in multidisciplinary teams, to lead such teams and suggest solutions in such work environments; ability to work independently and take responsibility. | | |  | |  |  |
| **LO 9** | Develop an positive approach towards life time learning. | | |  | |  |  |
| **Prepared by :** | | | Assistant Professor Y. Murat BULUT | **Date:** | | 11.11.2020 | | | |

**Signature**:

**T.C.**

**ESKİŞEHİR OSMANGAZİ ÜNİVERSİTESİ**

**FEN BİLİMLERİ ENSTİTÜSÜ**

**DERS BİLGİ FORMU**

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| **ANABİLİM DALI** | İSTATİSTİK (DR) | **YARIYIL** |  |

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| **DERSİN** | | | |
| **KODU** |  | **ADI** | Bağımlılık Fonksiyonları |

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| **DÜZEYİ** | **HAFTALIK SAATİ** | | | | | | **Kredisi** | **AKTS** | **TÜRÜ** | | | **DİLİ** |
| **Teorik** | | **Uygulama** | **Laboratuvar** | | |
| **DR** | 3 | | 0 | 0 | | | 3 | 7,5 | Zorunlu  ( ) | | Seçmeli  ( S ) | Türkçe |
| **KREDİ DAĞILIMI**  **Dersin kredisini aşağıya işleyiniz.**  **(Gerekli görürseniz krediyi paylaştırınız.)** | | | | | | | | | | | | |
| **Temel Bilim** | | **Temel Mühendislik** | | | | **Alan Bilgisi**  **[Önemli düzeyde tasarım içeriyorsa (√) koyunuz.]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **DEĞERLENDİRME ÖLÇÜTLERİ** | | | | | | | | | | | | |
| **YARIYIL İÇİ**  **FAALİYETLERİ** | | | | | **Faaliyet türü** | | | | | **Sayı** | | **Katkısı ( % )** |
| Ara Sınav | | | | | 1 | | 30 |
| Kısa Sınav | | | | |  | |  |
| Ödev | | | | | 1 | | 20 |
| Proje | | | | |  | |  |
| Rapor | | | | |  | |  |
| Diğer (     ) | | | | |  | |  |
| **Yarıyıl Sonu Sınavı** | | | | | | | 50 |
| **VARSA ÖNERİLEN ÖNKOŞUL(LAR)** | | | | | Yok | | | | | | | |
| **DERSİN KISA İÇERİĞİ** | | | | | Bağımlılık Fonksiyonları veya kısa adıyla kapulalar, tek değişkenli marjinal dağılım fonksiyonlarını çok değişkenli dağılım fonksiyonlarına bağlayan fonksiyonlardır. Bu yüzden kapulalar çok değişkenli dağılımla tek değişkenli dağılımlar arasında ve aynı zamanda tek değişkenli dağılımların kendi aralarındaki bağımlılık yapısını ortaya koyar. Literatürde yer alan birçok bağımlılık kavramı kapulalarla ifade edilebilir. | | | | | | | |
| **DERSİN AMAÇLARI** | | | | | İncelenen alanda karşılaşılan değişkenler arasındaki bağımlılığı birçok yönden modellemek için kapulalar çok yararlı istatistiksel araçlardır. | | | | | | | |
| **DERSİN MESLEK EĞİTİMİNİ SAĞLAMAYA YÖNELİK KATKISI** | | | | | Kapula teorisi kavramlarını öğrenen bir öğrenci özellikle incelediği alandaki değişkenler arası ilişkilere bakmada geniş bir bakış açısı kazanır. | | | | | | | |
| **DERSİN ÖĞRENME ÇIKTILARI** | | | | | Bu dersi başarılı bir şekilde öğrenen öğrenci,  -Değişkenler arasındaki ilişkileri daha iyi kavrama ve analiz etme,  -Değişkenler arası yeni ilişkiler kurmada yeni çok değişkenli dağılımlar inşa etme,  -Farklı bağımlılık türlerini sentezleme,  -Olaylar arasında zaman ve mekan boyutunda ortaya çıkabilecek nedensellik ilişkilerini daha doğru kurma yeteneği kazanacaktır. | | | | | | | |
| **TEMEL DERS KİTABI** | | | | | An Introduction to Copulas, Roger B. Nelsen, Springer, Second Edition, 2006 | | | | | | | |
| **YARDIMCI KAYNAKLAR** | | | | | -Principles of Copula Theory, F. Durante, C. Sempi, CRC Press, 2016.-Multivariate Models and Dependence Concepts, H. Joe, Chapman & Hall, 1997.-Dependence Modeling with Copulas, H. Joe, Chapman & Hall/CRC, 2015. | | | | | | | |

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| **DERSİN HAFTALIK PLANI** | |
| **HAFTA** | **İŞLENEN KONULAR** |
| 1 | Tanımlar ve Temel Özellikler |
| 2 | Sklar Teoremi, Fréchet-Hoeffding Sınırları |
| 3 | Simetri ve Sıralama |
| 4 | Kapula İnşa Yöntemleri, Tersinme ve Geometrik Yöntemler |
| 5 | Cebirsel Yöntemler |
| 6 | Belirlenmiş Özelliklere Sahip Kapulalar |
| 7 | Çok değişkenli Kapulaların İnşası |
| 8 | Arşimedyen Kapulalar, Bir Parametreli Aileler, Temel Özellikler |
| 9 | Sıralama ve Limit Durumlar |
| 10 | İki Parametreli Aileler |
| 11 | Çok Değişkenli Arşimedyen Kapulalar |
| 12 | Bağımlılık, Uyumluluk |
| 13 | Bağımlılık Özellikleri |
| 14 | Diğer Birliktelik Ölçüleri, Kuyruk Bağımlılığı |
| 15,16 | *Yarıyıl Sonu Sınavı* |

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| **DERSİN ÖĞRENME ÇIKTILARININ İSTATİSTİK DR PROGRAMI**  **ÖĞRENME ÇIKTILARINA KATKISI** | | | | | **Katkı Düzeyi** | | | |
| **NO** | | **ÖĞRENME ÇIKTILARI (DR)** | | | **3**  Yüksek | | **2**  Orta | **1**  Az |
| **ÖÇ 1** | | Yüksek Lisans düzeyi yeterliliklerine dayalı olarak, bilgilerini ilgili anabilim dallarında ve bilim dallarında uzmanlık düzeyinde geliştirir. | | |  | |  |  |
| **ÖÇ 2** | | Araştırma yöntemlerini kullanarak alanı ile ilgili sorunlara özgün çözümler üretebilir. | | |  | |  |  |
| **ÖÇ 3** | | Çalışma alanındaki konularda/uygulamalarda, evrensel ve toplumsal değerlere duyarlı, ülke çıkarlarını gözeten, araştıran, üreten, etik değerlere sahip bir bireydir. | | |  | |  |  |
| **ÖÇ 4** | | Alanındaki kazanımlarını disiplinler arası çalışmalarda kullanma yetkinliğine sahiptir. | | |  | |  |  |
| **ÖÇ 5** | | Bilimsel yayınlara erişme, okuma, anlama ve yorum yapabilme becerisine sahiptir. | | |  | |  |  |
| **ÖÇ 6** | | Proje tabanlı çalışma yönünde tutum geliştirir. | | |  | |  |  |
| **ÖÇ 7** | | Alanındaki güncel gelişmeleri ve/veya kendi çalışmalarını, nicel ve nitel veriler ile destekleyerek alanındaki ve alan dışındaki gruplara, yazılı, sözlü, görsel ve uygulamalı olarak sistemli biçimde aktarır. | | |  | |  |  |
| **ÖÇ 8** | | Akademik ve kültürel birikimi ile bilgi toplumu olma sürecine katkıda bulunur. | | |  | |  |  |
| **ÖÇ 9** | | Yaşam boyu öğrenmeye ilişkin olumlu tutum geliştirir. | | |  | |  |  |
| **Dersin Öğretim Üyesi** | | Prof. Dr. Salih ÇELEBİOĞLU | **Tarih:** | | 11.11.2020 | | | |

**İmza**: