**STATISTICS MSc PROGRAMME**

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| **First Year** | | | | | | |
| **I. Semester** | | | | | | |
| Code | Course Title | ECTS | T+P | Credit | C/E | Language |
| 501011101 | [THE SCIENTIFIC RESEARCH METHODS AND ITS ETHICS](#EN48) | 7.5 | 3+0 | 3 | **C** | Turkish |
| 501401521 | [STATISTICAL THEORY](#EN1) | 7.5 | 3+0 | 3 | **C** | Turkish |
|  | Elective Course-1 | 7.5 | 3+0 | 3 | E | Turkish |
|  | Elective Course-2 | 7.5 | 3+0 | 3 | E | Turkish |
|  | Total of I. Semester | 30 |  | 12 |  |  |
| **II. Semester** | | | | | | |
| Code | Course Title | ECTS | T+P | Credit | C/E | Language |
|  | Elective Course-3 | 7.5 | 3+0 | 3 | E | Turkish |
|  | Elective Course-4 | 7.5 | 3+0 | 3 | E | Turkish |
|  | Elective Course-5 | 7.5 | 3+0 | 3 | E | Turkish |
| 501402001 | 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 |
| 501401702 | MSc THESIS STUDY | | 25 | | 0+1 | - | **C** | Turkish |
| 501401703 | SPECIALIZATION FIELD COURSE | | 5 | | 3+0 | - | **C** | Turkish |
|  | | Total of III. Semester | 30 |  | |  |  |  | |
| **IV. Semester** | | | | | | | | | |
| Code | | Course Title | ECTS | T+P | | Credit | C/E | Language | |
| 501401702 | | MSc THESIS STUDY | 25 | 0+1 | | - | **C** | Turkish | |
| 501401703 | | SPECIALIZATION FIELD COURSE | 5 | 3+0 | | - | **C** | Turkish | |
|  | | Total of IV. Semester | 30 |  | |  |  |  | |
|  | | TOTAL OF SECOND YEAR | 60 |  | |  |  |  | |

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| **Elective Courses** | | | | | | |
| Code | Course Title | ECTS | T+P | Credit | C/E | Language |
| 501401505 | [ADVANCED REGRESSION ANALYSIS I](#EN4) | 7.5 | 3+0 | 3 | E | Turkish |
| 501402506 | [ADVANCED REGRESSION ANALYSIS II](#EN21) | 7.5 | 3+0 | 3 | E | Turkish |
| 501402511 | [ADVANCED TIME SERIES ANALYSIS I](#EN24) | 7.5 | 3+0 | 3 | E | Turkish |
| 501402523 | [ADVANCED TIME SERIES ANALYSIS II](#EN33) | 7.5 | 3+0 | 3 | E | Turkish |
| 501401506 | [APPLIED ECONOMETRICS I](#EN5) | 7.5 | 3+0 | 3 | E | Turkish |
| 501402507 | [APPLIED ECONOMETRICS II](#EN22) | 7.5 | 3+0 | 3 | E | Turkish |
| 501401523 | [BUSINESS MODEL](#EN49) | 7.5 | 3+0 | 3 | E | Turkish |
| 501401503 | [CATEGORICAL DATA ANALYIS IN SPECIAL TOPICS](#EN3) | 7.5 | 3+0 | 3 | E | Turkish |
| 501402502 | [COMPUTATIONAL STATICTICAL METHODS](#EN17) | 7.5 | 3+0 | 3 | E | Turkish |
| 501402503 | [DATA ANALYSIS WITH STATISTICAL PACKAGE PROGRAMS](#EN18) | 7.5 | 3+0 | 3 | E | Turkish |
| 501401509 | [EXPERIMENTAL DESIGN I](#EN7) | 7.5 | 3+0 | 3 | E | Turkish |
| 501402505 | [EXPERIMENTAL DESIGN II](#EN20) | 7.5 | 3+0 | 3 | E | Turkish |
| 501402524 | [EXPLANATORY DATA ANALYSIS AND VISUALIZATION](#EN53) | 7.5 | 3+0 | 3 | E | Turkish |
| 501401524 | [FINANCIAL MARKET RISK AND MANAGEMENT](#EN50) | 7.5 | 3+0 | 3 | E | Turkish |
| 501402527 | [FINANCIAL PORTFOLIO MANAGEMENT](#EN55) | 7.5 | 3+0 | 3 | E | Turkish |
| 501402516 | [GENERAL LINEAR MODELS](#EN12) | 7.5 | 3+0 | 3 | E | Turkish |
| 501401522 | [KNOWLEDGE DISCOVERY IN DATABASES AND DATA MINING](#EN46) | 7.5 | 3+0 | 3 | E | Turkish |
| 501401515 | [LINEAR MODELS I](#EN11) | 7.5 | 3+0 | 3 | E | Turkish |
| 501402518 | [LINEAR MODELS II](#EN29) | 7.5 | 3+0 | 3 | E | Turkish |
| 501401510 | [MANAGARIAL DECISION MAKING](#EN52) | 7.5 | 3+0 | 3 | E | Turkish |
| 501401526 | [MATRIX THEORY](#EN54) | 7.5 | 3+0 | 3 | E | Turkish |
| 501402604 | [MULTI-CRITERIA DECISION MAKING](#EN36) | 7.5 | 3+0 | 3 | E | Turkish |
| 501401507 | [MULTIVARIATE DATA ANALYSIS I](#EN6) | 7.5 | 3+0 | 3 | E | Turkish |
| 501402520 | [MULTIVARIATE DATA ANALYSIS II](#EN31) | 7.5 | 3+0 | 3 | E | Turkish |
| 501401517 | [MULTIVARIATE STATISTICAL ANALYSIS I](#EN13) | 7.5 | 3+0 | 3 | E | Turkish |
| 501402501 | [MULTIVARIATE STATISTICAL ANALYSIS II](#EN16) | 7.5 | 3+0 | 3 | E | Turkish |
| 501402522 | [NONLINEAR PROGRAMMING](#EN32) | 7.5 | 3+0 | 3 | E | Turkish |
| 501401512 | [OPTIMIZATION I](#EN8) | 7.5 | 3+0 | 3 | E | Turkish |
| 501401519 | [PANEL DATA ANALYSIS I](#EN45) | 7.5 | 3+0 | 3 | E | Turkish |
| 501402525 | [PANEL DATA ANALYSIS II](#EN34) | 7.5 | 3+0 | 3 | E | Turkish |
| 501402504 | [PROBABILITY MODELS II](#EN19) | 7.5 | 3+0 | 3 | E | Turkish |
| 501401525 | [PROBLEM SOLVING AND DECISION MAKING TECHNIQUES](#EN51) | 7.5 | 3+0 | 3 | E | Turkish |
| 501401513 | [REGRESSION MODELS FOR CATEGORICAL DEPENDENT VARIABLES I](#EN9) | 7.5 | 3+0 | 3 | E | Turkish |
| 501402513 | [REGRESSION MODELS FOR CATEGORICAL DEPENDENT VARIABLES II](#EN25) | 7.5 | 3+0 | 3 | E | Turkish |
| 501401514 | [ROBUST STATICTICAL METHODS](#EN10) | 7.5 | 3+0 | 3 | E | Turkish |
| 501401518 | [SERVICE SYSTEMS](#EN14) | 7.5 | 3+0 | 3 | E | Turkish |
| 501402510 | [SIMULATION METHODOLOGY](#EN23) | 7.5 | 3+0 | 3 | E | Turkish |
| 501401520 | [STATISTICAL ANALYSIS WITH SOFTWARES I](#EN15) | 7.5 | 3+0 | 3 | E | Turkish |
| 501402526 | [STATISTICAL ANALYSIS WITH SOFTWARES II](#EN35) | 7.5 | 3+0 | 3 | E | Turkish |
| 501402515 | [STATISTICAL INFERENCE II](#EN27) | 7.5 | 3+0 | 3 | E | Turkish |
| 501402517 | [STATISTICAL INFERENCE II](#EN28) | 7.5 | 3+0 | 3 | E | Turkish |
| 501402528 | [Statistical Methods in Machine Learning](#EN56) | 7.5 | 3+0 | 3 | E | Turkish |
| 501401501 | [SURVEY DESIGN AND ANALYSIS](#EN2) | 7.5 | 3+0 | 3 | E | Turkish |
| 501402519 | [SYSTEM RELIABILITY](#EN30) | 7.5 | 3+0 | 3 | E | Turkish |
| 501402514 | [THEORETICAL STATISTICS](#EN26) | 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 (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** |  | **TITLE** | Statistical Theory |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 2 | | 60 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 40 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Sampling statistics and sampling distributions, parameter estimation and methods of parameter estimation, small sample properties of estimators and asismpthtotical properties, Hypothesis testing, Neyman-Pearson lemma, monotone likelihood ratio, similar tests and likelihood ratio tests. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | To create the basic concepts of statistical inference | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | 1) summarize the basic methods of statistical theory  2) Students will be able to methods of estimation and comparision of them.  3) Students be able to use the methods of hypothesis testing and can test building. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | By the end of the course students should be able to:  Having learned and used the fundamentals of statistical inference and use of them | | | | | | | |
| **TEXTBOOK** | | | | | Casella, G. (2001) Statistical Inference. Pacific Grove, Calif. : Wadsworth.Shao, J. (2007) Mathematical Statistics. Springer:USAAkdi,Y. (2010) Matematiksel Đstatistiğe Giriş, Gazi Kitabevi. | | | | | | | |
| **OTHER REFERENCES** | | | | | Several English and Turkish statistics books. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Population, sample, sampling and statistical contents.Some statistics and distributions. |
| 2 | sample distribution function, order statistics, conversion of statistics |
| 3 | Parameter estimation, desired properties of estimators. |
| 4 | Unbiased minimum variance estimators, Cramer-Rao Inequality |
| 5 | Sufficient statistics, Rao-Blackwell Theorem, Lehmann-Scheffe Theorem. |
| 6 | Midterm Examination 1 |
| 7 | Methods of parameter estimation. Maximum Likelihood Methods |
| 8 | Introduction to hypothesis testing. Test funcition, test statistics, significant level and power function |
| 9 | Most powerfull test funciton of simple hypothesis. Neymann-Pearson Lemma. |
| 10 | Hypothesis testing in families with monotone likelihood ratio. Karlin-Rubin Theorem. |
| 11 | Midterm Examination 2 |
| 12 | Application of hypothesis testing |
| 13 | Confidence Interval |
| 14 | Bayes Estimation methods, hypothesis testing and confidence interval |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **Prepared by :** | Assoc.Prof. Arzu Altın Yavuz | **Date:** | 5/06/2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **STATISTICS (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501401501 | **TITLE** | SURVEY DESIGN AND ANALYSIS |

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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 (√)]** | | | | | | |
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| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 30 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | | 1 | | 20 |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | This course involves process required for the solution of the problem of scientific research data compiled through questionnaire and statistical techniques used in the analysis of the data obtained through the questionnaire included. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The primary objective of this course is how to design a survey to collect data needed to solve the survey problem, the second objective of the questionnaire method and appropriate statistical techniques for the analysis of the data collected with the help of software that is ready to teach. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Students, scientific research and data collection methods for the analysis of the data collected with the help of ready-learn software. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | At the end of this course, students will learn how to compile data, collected through a questionnaire, needed for the solution of a scientific problem, and will learn data analysis with some statistical techniques. | | | | | | | |
| **TEXTBOOK** | | | | | Brace, I. (2004). Questionnaire Design, Kogan Page Limited.- Houtkoop-Steenstra, H.(2000). Interaction & the Standardized Survey Interview : The Living Questionnaire, Cambridge University Press- Landau S., Everitt, B.S.(2004). A handbook of statistical analyses using SPSS, Chapman & Hall/CRC Press LLC. | | | | | | | |
| **OTHER REFERENCES** | | | | |  | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Research problem |
| 2 | Research hypotheses and research model |
| 3 | Sampling |
| 4 | Data collection tools |
| 5 | Questionnaire design and scale |
| 6 | Midterm Examination 1 |
| 7 | Questionnaire design and scale |
| 8 | Questionnaire design and scale |
| 9 | The reliability of the questionnaire for the pilot study area |
| 10 | Implementation of the survey area |
| 11 | Midterm Examination 2 |
| 12 | Data entry software |
| 13 | Data analysis software |
| 14 | Data analysis with software |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **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 (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501401503 | **TITLE** | CATEGORICAL DATA ANALYIS IN SPECIAL TOPICS |

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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 (√)]** | | | | | | |
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| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 30 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | | 1 | | 20 |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | This course includes measuring levels used in statistics and analysis of categorical data. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The primary objectives of this course is that teaching appropriate statistical techniques for the analysis of categorical data, and the softwares. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | The primary objectives of this course is that teaching appropriate statistical techniques for the analysis of categorical data, and the softwares. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | At the end of this course, students will learn statistical approaches used in case of categorical data needed for the solution of a scientific problem, and will learn some statistical techniques to be used for analysis of categorical data. | | | | | | | |
| **TEXTBOOK** | | | | |  | | | | | | | |
| **OTHER REFERENCES** | | | | | An introduction to categorical data analysis, : Alan Agresti-The Analysis of Cross-Classified Categorical Data , Stephen E. Fienberg-Statistical methods for categorical data analysis, Daniel A. Powers,Yu Xie-Categorical data analysis: using the SAS system, Maura E. Stokes,Charles S. Davis,Gary G. Koc | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Research problem |
| 2 | Research hypotheses and research model |
| 3 | The concept of variable |
| 4 | Classification of variables |
| 5 | Measuring levels and scales |
| 6 | Midterm Examination 1 |
| 7 | Measuring levels and scales |
| 8 | The concept of a categorical variable |
| 9 | The concept of a categorical variable |
| 10 | Categorical data |
| 11 | Midterm Examination 2 |
| 12 | Categorical data analysis |
| 13 | Logarithmic Linear Models |
| 14 | Graphical Models |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **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 (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501401505 | **TITLE** | Advanced Regression Analysis I |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 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 (√)]** | | | | | | |
| x | |  | | | | 3 | | | | | | |
| **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** | | | | | Multivariate regression analysis, Logistic regression analysis, Residuals analysis, Cox regression analysis. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | To introduce the concepts of regression analysis | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | To introduce the concepts of regression analysis and to provide exercises in the application of regression analysis to related problems. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1-To explain and application the principles of solution the multivariate regression analysis.  2-To explain and application the principles of solution the logistic regression analysis.  3-To explain and application the principles of solution the residuals analysis.  4-To explain and application the principles of solution the Cox regression analysis.. | | | | | | | |
| **TEXTBOOK** | | | | | Introduction to Linear Regression Analysis | | | | | | | |
| **OTHER REFERENCES** | | | | | Statistical software | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Multivariate regression analysis |
| 2 | Multivariate regression analysis |
| 3 | Multivariate regression analysis |
| 4 | Residuals analysis |
| 5 | Residuals analysis |
| 6 | Midterm Examination 1 |
| 7 | Cox regression analysis |
| 8 | Cox regression analysis |
| 9 | Cox regression analysis |
| 10 | Cox regression analysis |
| 11 | Midterm Examination 2 |
| 12 | Logistic regression |
| 13 | Logistic regression |
| 14 | Logistic regression |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **Prepared by :** | Yrd.Doç.Dr.Cengiz Aktaş | **Date:** | 5/05/2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **STATISTICS (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501401506 | **TITLE** | Applied Econometrics I |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 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 (√)]** | | | | | | |
| x | |  | | | | 3 | | | | | | |
| **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** | | | | | The linear probability model, logit model, probit model, autoregressive and distributed lag models. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | To introduce the technics of econometrisc. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | To introduce the concepts of econometrisc analysis and to provide exercises in the application of econometrisc analysis to related problems. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1-To explain and application the principles of solution the the linear probability models.  2-To explain and application the principles of solution the logit model.  3-To explain and application the principles of solution the probit model.  4-To explain and application the principles of solution the autoregressive and distributed lag models. | | | | | | | |
| **TEXTBOOK** | | | | | Basic Econometrics, Temel Ekonometri, Ekonometri I. | | | | | | | |
| **OTHER REFERENCES** | | | | | Statistical software | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | The linear probability models |
| 2 | The linear probability models |
| 3 | The linear probability models |
| 4 | Logit model. |
| 5 | Logit model. |
| 6 | Midterm Examination 1 |
| 7 | Probit model |
| 8 | Probit model |
| 9 | Probit model |
| 10 | Probit model |
| 11 | Midterm Examination 2 |
| 12 | Autoregressive and distributed lag models |
| 13 | Autoregressive and distributed lag models |
| 14 | Autoregressive and distributed lag models |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **Prepared by :** | Yrd.Doç.Dr.Cengiz Aktaş | **Date:** | 5/05/2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **STATISTICS (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501401507 | **TITLE** | Multivariate Data Analysis I |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 |  | COMPULSORY  (   ) | | ELECTIVE  ( \* ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| \* | |  | | | |  | | | | | | |
| **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** | | | | | 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** | | | | | 1-Tatlıdil, H.(1992). Uygulamalı çok Değişkenli İstatistiksel Analiz, Ankara.2-Jobson, J, D.(1991). Applied Multivariate Data Analysis, Volume I-II, Springer- Verlag, New York. | | | | | | | |
| **OTHER REFERENCES** | | | | |  | | | | | | | |

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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 | conjoint analysis |
| 11 | Midterm Examination 2 |
| 12 | correspondence analysis |
| 13 | homogeneity analysis |
| 14 | Applications |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **Prepared by :** | Prof.Dr.Zeki YILDIZ | **Date:** | 5th. May, 2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **STATISTICS (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501401509 | **TITLE** | Experimental Design I |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Experiment, treatment and experimental error concepts, principles of experimental design, analysis of variance, completely randomized design, randomized blocks, latin squares, Bartlett’s test for equality of variance, comparing pairs of treatment means, estimating missing values, estimating model parameters and the general regression significance test, nested or hierarchial designs and the split plot design. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | To introduce students to the standart concepts and methods of experimental design, modeling and to provide exercises in the application of simple experimental design to appropriate problems | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | To introduce students to the standart concepts and methods of experimental design, modeling and to provide exercises in the application of simple experimental design to appropriate problems | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Design and conduct experiments as well as to analyze and interpret data | | | | | | | |
| **TEXTBOOK** | | | | | Çömlekçi, N.(2003). DENEY TASARIMI İLKE VE TEKNİKLERİ. Alfa Yayınları | | | | | | | |
| **OTHER REFERENCES** | | | | | Montgomery, D.C.(1984). Design and analysis of experiments. John Wiley & SonsKempthorne, O (1967). Design and analysis of experiments. John Wiley & SonsMendelhall, W (1968). The design and analysis of experiments. Wadsworth publishing company | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Experiment, treatment and experimental error concepts |
| 2 | Analysis of variance |
| 3 | Completely randomized design and Bartlett’s test for equality of variance |
| 4 | Comparing pairs of treatment means (Lsd, Duncan, Tukey and Dunnett test) |
| 5 | Unbalanced case, General regression approach |
| 6 | Midterm Examination 1 |
| 7 | Orthogonol contrasts |
| 8 | Randomized blocks |
| 9 | Missing value in randomized blocks and General regression approach in randomized blocks |
| 10 | Orthogonol contrasts in randomized blocks |
| 11 | Midterm Examination 2 |
| 12 | Latin squares, Missing value in latin squares, General regression approach in latin squares |
| 13 | Orthogonol contrasts in latin squares |
| 14 | Nested or hierarchial designs and the split plot design. |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **Prepared by :** | Assoc. Prof. Zeynep Filiz | **Date:** | 5/5/2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **STATISTICS (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501401512 | **TITLE** | OPTIMIZATION I |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | Türkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Fundamental optimization methods, linear programming, integer programming, network models, dynamic programming. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | To understand the theory of optimization methods and algorithms developed for solving various types of optimization problems | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | To develop and promote research interest in applying optimization techniques. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Understand the fundamentals of the convex analysis.  2.To define fundamental optimization methods of operations research  3.To selecting appropriate models.  4. To apply operational research models on real world problems. | | | | | | | |
| **TEXTBOOK** | | | | | Wayne L. Winston, Introduction to Mathematical Programming: Applications and Algorithms, Duxbury Press, 1995 | | | | | | | |
| **OTHER REFERENCES** | | | | |  | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Least-squares and linear programming |
| 2 | Convex optimization |
| 3 | Affine and convex sets |
| 4 | Convex functions |
| 5 | Convex optimization problems |
| 6 | Midterm Examination 1 |
| 7 | Linear optimization problems |
| 8 | Quadratic optimization problems |
| 9 | Geometric programming . |
| 10 | Vector optimization |
| 11 | Midterm Examination 2 |
| 12 | Unconstrained minimization problems . |
| 13 | Descent methods |
| 14 | Newton’s method |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **Prepared by :** | Assoc. Prof. Dr. H. Kıvanç Aksoy | **Date:** | 6/5/2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **STATISTICS (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501401513 | **TITLE** | Regression Models for Categorical Dependent Variables I |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | 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 | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 40 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Data structure used in qualitative dependent variable models, random utility theory, latent variable theory, Linear Probability model, Probit model, Logit model and assumptions of these models, estimation of the model parameters, comparison of these models, goodness of fit tests, Sequential Probit models, Interpretation Sequential Probit models. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | To introduce qualitative dependent variable models and explores the mathematical structure of these methods. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Evaluate, analyze the qualitative dependent variable models. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Understand the importance of qualitative dependent variable models as it is applied in the theory and practice of statistics,  2. Have acquired the necessary skills to design a research with qualitative dependent variable,  3. Be conversant regression models with qualitative data,  4. Evaluate the strengths and weaknesses of different qualitative dependent variable models,  5. Gain techniques, skills, computers and software knowledge to solve real life problems with qualitative dependent variable | | | | | | | |
| **TEXTBOOK** | | | | | Long J.S.(1997). Regression Models for Categorical and Limited Dependent Variables. Thousand Oaks:Sage Publications Inc | | | | | | | |
| **OTHER REFERENCES** | | | | | Powers, D.A.(2000). Statistical Methods for Categorical Data Analysis. Academic Press. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Data structure used in qualitative dependent variable models, |
| 2 | Random utility theory |
| 3 | Latent variable theory |
| 4 | Linear Probability model |
| 5 | Probit model |
| 6 | Midterm Examination 1 |
| 7 | Logit model |
| 8 | Assumptions of these models |
| 9 | Estimation of the model parameters |
| 10 | Comparison of these models |
| 11 | Midterm Examination 2 |
| 12 | Goodness of fit tests og these models |
| 13 | Sequential Probit models |
| 14 | Applications |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **Prepared by :** | Doç.Dr.Özlem ALPU | **Date:** | 29.04.2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **STATISTICS (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501401514 | **TITLE** | Robust Statictical Methods |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | | Calculator | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Robustness of sample mean and variance, robustness of t and F tests, Maximum Likelihood, Modified Maximum Likelihood, Huber M-estimators, linear regression under nonnormality, analysis of variance under nonnormality. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The purpose of this course is to teach alternative ways of obtaining estimators and test statistics which are not sensitive to outliers and non-normality. Thus, students will gain a different perspectives for analyzing data sets which are not satisfying usual statistical assumptions. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Students will gain a different perspectives for analyzing data sets which are not satisfying usual statistical assumptions. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | By the end of the course students should be able to:  1. Understand the importance of outliers and non-normality in statistical analysis,  2. Learn weak sides of the normal theory estimators and tests,  3. Understand the importance of using alternative methods for analyzing non-normal data,  4.Compare the normal theory estimators and tests with robust estimators and tests. | | | | | | | |
| **TEXTBOOK** | | | | | 1. Tiku, M. L., Akkaya, A. D., (2004). Robust Estimation and Hypothesis Testing, New Age Publishers.2. Tiku, M. L., Tan, W. Y. And Balakrishnan, N., (1986). Robust Inference, Marcel Dekker. | | | | | | | |
| **OTHER REFERENCES** | | | | | Several English and Turkish statistics books. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Robustness of sample mean and variance |
| 2 | Robustness of sample mean and variance |
| 3 | robustness of t and F tests |
| 4 | robustness of t and F tests |
| 5 | Maximum Likelihood Estimation Method |
| 6 | Midterm Examination 1 |
| 7 | Modified Maximum Likelihood Estimation Method |
| 8 | Modified Maximum Likelihood Estimation Method |
| 9 | Huber M-estimators |
| 10 | Huber M-estimators |
| 11 | Midterm Examination 2 |
| 12 | linear regression under nonnormality |
| 13 | analysis of variance under nonnormality |
| 14 | Manalysis of variance under nonnormality |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **Prepared by :** | Assoc.Prof. Arzu Altın Yavuz | **Date:** | 28/05/2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **STATISTICS (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501401515 | **TITLE** | Linear Models I |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7.5 | COMPULSORY  (   ) | | ELECTIVE  ( x ) | 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 | | 40 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | | - | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Elementary matrix operations, Quadratic forms and their distributions, Estimation in the full rank model: matrix formulation of the full rank model, least squares estimators of the model parameter, further properties of least squares estimators, maximum likelihood estimators, Hypothesis testing in the full rank model. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The main of the course is to provide a readable introduction to the theory of linear statistical models that links the theory to the applications that are already familiar to the beginner. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course should serve as a bridge to the more advanced texts on the subject. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | By the end of the course students should be able to:  1.link applications and theory in linear models. link applications and theory in linear models.  2.model any data. model any data. model any data.  3.further explore the literature and more correctly interpret the output from a linear models computer package. | | | | | | | |
| **TEXTBOOK** | | | | | Myers, R.H. and Milton, J.S. (1991). “A First Course in the Theory of Linear Statistical Models”. PWS\_KENT Publish Company. | | | | | | | |
| **OTHER REFERENCES** | | | | | 1. Öztürk, F. (1996). “Lineer Modeller ”. Ankara Üniversitesi Yayınları. 2.Rencher, A.C. (2007). “Linear Models in Statistics”. Wiley & Sons Inc. New York.3. Muller, K.E. and Stewart, P.W. (2006). “Linear Model Theory: Univariate, Multivariate, and Mixed Models”. Wiley & Sons Inc. New Jersey. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Elementary matrix operations: transpose and vector notation, inverses of matrices and orthogonality, eigenvalues and rank, idempotent matrices and the trace |
| 2 | Quadratic forms and their distributions |
| 3 | Differentiations of quadratic forms and expectation and variance of vectors and matrices |
| 4 | Distribution of some special quadratic forms |
| 5 | Estimation in the full rank model, matrix formulation of the full rank model |
| 6 | Midterm Examination 1 |
| 7 | Least squares estimators of the model parameter, further properties of least squares estimators |
| 8 | Maximum likelihood estimators |
| 9 | Interval estimation of the coefficients, interval estimation of linear functions of the coefficients |
| 10 | Joint confidence region on the regression coefficients |
| 11 | Midterm Examination 2 |
| 12 | Hypothesis testing in the full rank model: hypothesis testing for regression coefficients in the full rank models |
| 13 | Partial and sequential tests |
| 14 | Hypothesis tests on a subvector of . |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **Prepared by :** | Assoc.Prof.Hatice Şamkar | **Date:** | 28/05/2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **STATISTICS (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501402516 | **TITLE** | General Linear Models |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7.5 | COMPULSORY  (   ) | | ELECTIVE  ( x ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | |  |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 40 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | | - | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Estimation in the Less Than Full Rank Model: introduction to conditional inverses, introduction to estimability, estimating in the less than full rank model, interval estimation in the less than full rank model. Hypothesis Testing in the Less Than Full Rank Model: reparameterization: one-way classification model, testing a hypothesis on a treatment contrast, two-factor design without interaction, randomized complete block design, two-factor design with interaction, Analysis of Covariance: one-way model with one covariate, two-way model with one covariate, one-way model with multiple covariates. Analysis of Variance Models: one-way analysis of variance, two-way analysis of variance, the cell means model for unbalanced data. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The main of the course is to improve the student's ability to apply the theory in exploratory data analysis and statistical modelling. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course should serve as a bridge to the more advanced texts on the subject. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | By the end of the course students should be able to:  1.analyse real data problems.  2.model any data.  3.familiar with the concepts of exploratory data analysis. | | | | | | | |
| **TEXTBOOK** | | | | | 1.Myers, R.H. and Milton, J.S. (1991). “A First Course in the Theory of Linear Statistical Models”. PWS KENT Publish Company. | | | | | | | |
| **OTHER REFERENCES** | | | | | 1.Öztürk, F. (1996). “Lineer Modeller ”. Ankara Üniversitesi Yayınları. 2.Rencher, A.C. (2007). “Linear Models in Statistics”. Wiley & Sons Inc. New York.3.Muller, K.E. and Stewart, P.W. (2006). “Linear Model Theory: Univariate, Multivariate, and Mixed Models”. Wiley & Sons Inc. New Jersey. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Estimation in the Less Than Full Rank Model: introduction to conditional inverses, introduction to estimability, some estimability theorems |
| 2 | Estimating of variance in the less than full rank model |
| 3 | Interval estimation in the less than full rank model |
| 4 | Hypothesis Testing in the Less Than Full Rank Model |
| 5 | Reparameterization: one-way classification model, |
| 6 | Midterm Examination 1 |
| 7 | Testing a hypothesis on a treatment contrast, |
| 8 | Two-factor design without interaction |
| 9 | Randomized complete block design, |
| 10 | Two-factor design with interaction |
| 11 | Midterm Examination 2 |
| 12 | Analysis of Covariance: one-way model with one covariate, two-way model with one covariate, one-way model with multiple covariates. |
| 13 | Analysis of Variance Models: one-way analysis of variance: balanced case, two-way analysis of variance: balanced case, |
| 14 | Analysis of variance: the cell means model for unbalanced data. |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **Prepared by :** | Assoc.Prof.Hatice Şamkar | **Date:** | 29/05/2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **STATISTICS (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501401517 | **TITLE** | Multivariate Statistical Analysis I |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Multivariate Distributions, Multivariate Analysis Of Variance, Cluster Analysis, Discriminant Analysis, Principal Components Analysis, Factor Analysis. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | To be conversant with multivariate research methods | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | To introduce the concepts and methods of multivariate analysis and to provide exercises in the application of multivariate data analysis to related problems. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Design and conduct methods of multivariate analysis as well as to analyze and interpret data | | | | | | | |
| **TEXTBOOK** | | | | | Johnson, R.A and Wichern, D.W. (1982) Applied Multivariate Statistical Analysis, Prentice- Hall | | | | | | | |
| **OTHER REFERENCES** | | | | | Tatlıdil, H. (1996) Uygulamalı Çok Değişkenli İstatistiksel Analiz, Akademi Matbaası, Ankara.Morrison D.F. (1990) Multivariate Statistical Mehtods, McGraw- Hill.Alpar R. (1997) Uygulamalı Çok Değişkenli İstatistiksel Yöntemlere I, Bağırhan Yayınevi, Ankara. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Multivariate data analysis and its application areas |
| 2 | Data matrices and measurement scales and the multivariate normal distribution: |
| 3 | Inferences about a mean vector: Hotelling’s T2 and Likelihood ratio tests. |
| 4 | Comparisons of several multivariate means: comparing mean vectors from two populations |
| 5 | Comparisons of several multivariate means: One-way MANOVA |
| 6 | Midterm Examination 1 |
| 7 | Cluster analysis: similarity measures, |
| 8 | Hierarchical clustering methods and Nonhierarchical clustering methods. |
| 9 | Discriminant analysis: Classification with two multivariate normal populations |
| 10 | Discriminant analysis: Classification with several populations |
| 11 | Midterm Examination 2 |
| 12 | Principal Components Analysis |
| 13 | Factor analysis: the factor analysis model and estimation |
| 14 | Factor analysis: factor rotation, factor scores. |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **Prepared by :** | Assoc. Prof. Zeynep Filiz | **Date:** | 5/5/2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **STATISTICS (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501401518 | **TITLE** | Service Systems |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | Türkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | The course covers design of production and service systems, operating and controlling production and service systems and related performance measures. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The primary focus of this course is production and operations management function, which comprises the planning, coordination, and execution of all activities directly associated to manufacturing items or providing services. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | To develop and promote research interest in applying Operations Research Techniques for service systems. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. To define goals and targets for production and service systems  2. To introduce production engineering, capacity planning, location planning.  3. To introduce production scheduling, MRP, cost control concepts.  4. To model and manage supply chains | | | | | | | |
| **TEXTBOOK** | | | | | Stevenson, W. J., Production Operations Management, McGraw-Hill-Irwin, 1999. | | | | | | | |
| **OTHER REFERENCES** | | | | |  | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Fundamental Insights: The M/M/s Type Systems |
| 2 | Little's Law and Generalizations |
| 3 | Distributional Laws |
| 4 | Priority, Polling Systems |
| 5 | Multiserver Queues |
| 6 | Midterm Examination 1 |
| 7 | Applications to Call Centers |
| 8 | Open Jackson Networks |
| 9 | Closed Jackson Networks |
| 10 | Transient Behavior of Queueing Systems |
| 11 | Midterm Examination 2 |
| 12 | Stability of Queueing Networks |
| 13 | Optimization of Queueing Systems |
| 14 | Queues in Heavy Traffic |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **Prepared by :** | Assoc. Prof. Dr. H. Kıvanç Aksoy | **Date:** | 6/5/2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **STATISTICS (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501401519 | **TITLE** | Panel Data Analysis I |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( x ) | 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 | | 40 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Structure of Panel data, Advantages and disadvantages of Panel data models, Panel data models: Fixed effect model and random effect model, Compare to fixed effect model and random effect model, Test of random effects, Hausman test and statistical programme practicises about these issues. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | Research of Panel Data Analysis methods in theory and practice | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | |  | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Recognizing panel data structure and being knowledgeable about panel data models. Learning panel data models in theoretical framework for analysing data which are appropriate for panel data structure and to acquire skill about using them in statistical packet programmes. | | | | | | | |
| **TEXTBOOK** | | | | | Ferda Yerdelen Tatoğlu, "Panel Veri Ekonometris", Beta, İstanbul (2012). | | | | | | | |
| **OTHER REFERENCES** | | | | | Baltagi, B. H., “Econometric Analysis of Panel Data 2th Edt.”, John Wiley and Sons, New York, 451-462 (2001).Gujarati, D.N., “Temel Ekonometri”, Şenesen, Ü., Şenesen, G.G., Literatür, İstanbul (1999).Gujarati, D.N., “Basic Econometrics 4th Edt.”, McGraw Hill, New York (2003).Hasio, C., “Benefit and Limitations of Panel Data”, Econometric Reviews, 4:121-174 (1985).Woolridge, J.,”Econometric Analysis of Cross-Section and Panel Data”, MIT Press, pp. 130, 279, 420-449, (2002). | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Basic concepts of Panel Data |
| 2 | Linear Panel Data models and estimation methods |
| 3 | One way unit effects panel data models: Fixed effects model |
| 4 | One way unit effects panel data models: Random effects model |
| 5 | Computer exercises |
| 6 | Midterm Examination 1 |
| 7 | Estimation methods of Panel Data models |
| 8 | Preferences among the estimation methods of Panel Data models |
| 9 | Computer exercises |
| 10 | Computer exercises |
| 11 | Midterm Examination 2 |
| 12 | Tests of basic assumptions of Panel Data models: Heteroscedasticity |
| 13 | Tests of basic assumptions of Panel Data models: Autocorelation |
| 14 | Computer exercises |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **Prepared by :** | Assist. Prof. Dr. Gaye KARPAT ÇATALBAŞ | **Date:** | 21.05.2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **STATISTICS (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501401520 | **TITLE** | Statistical Analysis with Softwares I |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( x ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
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| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | |  |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 30 |
| Project | | | | | 1 | | 30 |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 40 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Data entry, preperation of data to statistical analysis and making statistical analysis in the softwares. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | In this course, students throughout the under graduate they intended to teach theoretical issues inmaking the software available. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | The student, ready to provide solutions to statistical problems will face when they graduate will learn to use software. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Data entry, data analysis and statistical analysis of what should be done in statistical softwares before they are ready to learn. | | | | | | | |
| **TEXTBOOK** | | | | | EROL, H., SPSS Paket Programı ile İstatistiksel Veri Analizi, Nobel Kitabevi, ADANA, 2010.Özdamar, K., Paket Programlar ile İstatistiksel veri Analizi I, 5. Basım, Kaan Kitabevi, ESKİŞEHİR, 2004. | | | | | | | |
| **OTHER REFERENCES** | | | | | Özdamar, K., Paket Programlar ile İstatistiksel veri Analizi II Çok Değişkenli Analizler, 5. Basım, Kaan Kitabevi, ESKİŞEHİR, 2004.Tekin, V. N., SPSS Uygulamalı İstatistik Teknikleri, Seçkin Yayınevi, 2. Baskı, Ankara, 2009.Gürsakal, N., (1997), Bilgisayar Uygulamalı İstatistik I, Marmara Yayınları, Bursa.Gürsakal, N., (1997), Bilgisayar Uygulamalı İstatistik II, Marmara Yayınları, Bursa.Gamgam, H., Altunkaynak, B., (2008), Parametrik Olmayan Yöntemler SPSS Uygulamalı, Gazi Kitabevi, Ankara.Akgül, A., Çevik, O., (2005), İstatistiksel Analiz Teknikleri - SPSS'de İşletme Yönetimi Uygulamaları, Emek OfsetSAS User’s Guide.SPSS User’s GuideMinitab User’s Guide | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Statistical softwares used for statistical analysis |
| 2 | Data and variable view in statistical softwares, data entry and variable definition |
| 3 | Data manipulation in statistical softwares |
| 4 | Data manipulation in statistical softwares (cont.) |
| 5 | Analyze menu, descriptive statistics (Frequencies, descriptive statistics and data description) |
| 6 | Midterm Examination 1 |
| 7 | Raw data, Ci-Square analysis with cross tabulations |
| 8 | Comparision of means – one sample t test, Comparision of means- independent two samples t test) |
| 9 | Comparision of means- paired samples |
| 10 | Comparision of means- One WAy Anova |
| 11 | Midterm Examination 2 |
| 12 | Measure of relations between variables, Linear Regression Analysis |
| 13 | Multiple Linear Regression Analysis |
| 14 | Multiple Linear Regression Analysis (cont.) |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **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 (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501402501 | **TITLE** | Multivariate Statistical Analysis II |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) |  |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
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| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Multivariate Distributions, Multivariate Analysis Of Variance, Canonical Correlation Analysis, Multidimensional Scaling, Correspondence Analysis, Logistic regression analysis, Conjoint Analysis | | | | | | | |
| **COURSE OBJECTIVES** | | | | | To be conversant with multivariate research methods | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | To introduce the concepts and methods of multivariate analysis and to provide exercises in the application of multivariate data analysis to related problems. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Design and conduct methods of multivariate analysis as well as to analyze and interpret data | | | | | | | |
| **TEXTBOOK** | | | | | Johnson, R.A and Wichern, D.W. (1982) Applied Multivariate Statistical Analysis, Prentice- Hall | | | | | | | |
| **OTHER REFERENCES** | | | | | Tatlıdil, H. (1996) Uygulamalı Çok Değişkenli İstatistiksel Analiz, Akademi Matbaası, Ankara.Morrison D.F. (1990) Multivariate Statistical Mehtods, McGraw- Hill.Alpar R. (1997) Uygulamalı Çok Değişkenli İstatistiksel Yöntemlere I, Bağırhan Yayınevi, Ankara. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Multivariate data analysis and its application areas |
| 2 | Data matrices and measurement scales and the multivariate normal distribution: |
| 3 | Inferences about a mean vector: Hotelling’s T2 and Likelihood ratio tests. |
| 4 | Comparisons of several multivariate means: comparing mean vectors from two populations |
| 5 | Comparisons of several multivariate means: One-way MANOVA |
| 6 | Midterm Examination 1 |
| 7 | Canonical Correlation Analysis |
| 8 | Multidimensional Scaling |
| 9 | Correspondence Analysis |
| 10 | Logistic regression analysis |
| 11 | Midterm Examination 2 |
| 12 | Conjoint Analysis |
| 13 | Comparisons of multivariate data analysis |
| 14 | Application of multivariate data analysis in SPSS |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **Prepared by :** | Assoc. Prof.. Zeynep Filiz | **Date:** | 5/5/2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **STATISTICS (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501402502 | **TITLE** | Computational Statictical Methods |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | | Calculator | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Calculations on data description, solutions of nonlinear equations, Monte-Carlo works in statistics, Statistical Computing in Matlab Software | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The purpose of this course is to teach alternative ways of obtaining estimators and test statistics which are not sensitive to outliers and non-normality. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Students will gain a different perspectives for analyzing data sets which are not satisfying usual statistical assumptions. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Please write minimum four learning outcomes for the course. | | | | | | | |
| **TEXTBOOK** | | | | | Arifoğlu, U. (2005) Matlab 7.04, Simulink ve Mühendislik Uygulamaları, Alfa Yayınları.Öztürk,F. (2008) Sayısal Analiz, http://80.251.40.59/science.ankara.edu.tr/ozturk/ist310.html | | | | | | | |
| **OTHER REFERENCES** | | | | | Several English and Turkish statistics books. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Calculation about descriptive of data |
| 2 | Graphical representation about descriptive of data |
| 3 | Matrix invers calculation, solving linear equation |
| 4 | Calculation of eigen value and eigen vector |
| 5 | Non linear equaiton solving |
| 6 | Midterm Examination 1 |
| 7 | Numerical Integration |
| 8 | Monte Carlo Integration |
| 9 | Monte Carlo study in statistic |
| 10 | Bootstrap Method |
| 11 | Midterm Examination 2 |
| 12 | Graphical representation in computational statistic |
| 13 | Matlab in computational statistics |
| 14 | Matlab in computational statistics |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **Prepared by :** | Assoc.Prof. Arzu Altın Yavuz | **Date:** | 28/05/2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **STATISTICS (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501402503 | **TITLE** | DATA ANALYSIS WITH STATISTICAL PACKAGE PROGRAMS |

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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 (√)]** | | | | | | |
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| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 30 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | | 1 | | 20 |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | SPSS, STATISTICA and Minitab statistical software | | | | | | | |
| **COURSE OBJECTIVES** | | | | | Decision-making models and numerical techniques of statistical analysis of the data can be analyzed with the computer environment. Ensure the effective use statistical software for statistical techniques. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Windows-based package SPSS programs, et al. software using the statistical techniques will be practiced. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | The ability to use statistical software for solving problems in real life situation. | | | | | | | |
| **TEXTBOOK** | | | | |  | | | | | | | |
| **OTHER REFERENCES** | | | | | -SPSS Professional Statistics 7.5(1997), SPSS Inc.Chicago.- Minitab 11.12 Electronial, Minitab Inc.,England- Landau S., Everitt, B.S.(2004). A handbook of statistical analyses using SPSS, Chapman & Hall/CRC Press LLC.-Electronic Statistics Textbook, http://www.statsoft.com/textbook/stathome.html. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | SPSS data entry |
| 2 | STATISTICA data entry |
| 3 | MINITAB data entry |
| 4 | SPSS, statistical graphs |
| 5 | STATISTICA, statistical graphics |
| 6 | Midterm Examination 1 |
| 7 | MINITAB, univariate statistical techniques |
| 8 | SPSS univariate statistical techniques |
| 9 | STATISTICA univariate statistical techniques |
| 10 | SPSS multivariate statistical techniques |
| 11 | Midterm Examination 2 |
| 12 | SPSS multivariate statistical techniques |
| 13 | STATISTICA statistical techniques çodeğişkenli |
| 14 | MINITAB multivariate statistical techniques |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **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 (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501402504 | **TITLE** | Probability Models II |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( x ) | 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 | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Binom, Negatif Binom, Multinomial, Normal, Exponential, Weibull ve Log-Normal Distributions | | | | | | | |
| **COURSE OBJECTIVES** | | | | | To teach the theory of statistical techniques in practice. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | To understand the core subjects of theoretical statistics. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | To teach the theory of statistical techniques in practice. | | | | | | | |
| **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 | Binom Distribution |
| 2 | Negatif Binom Distribution |
| 3 | Multinomial Distribution |
| 4 | Normal Distribution |
| 5 | Application |
| 6 | Midterm Examination 1 |
| 7 | Normal Distribution |
| 8 | Standart Normal Distribution |
| 9 | Exponential Distribution |
| 10 | Weibull Distribution |
| 11 | Midterm Examination 2 |
| 12 | Weibull Distribution |
| 13 | Log-Normal Distribution |
| 14 | Application |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **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 (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501402505 | **TITLE** | Experimental Design II |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) |  |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
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| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Two-factor factorial design, average effect of A and B, interaction effect AB, three-factor factorial design, analysis of covariance, confounding, fractional factorial and incomplete block designs. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | To introduce students to the standart concepts and methods of experimental design, modeling and to provide exercises in the application of simple experimental design to appropriate problems | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | To introduce students to the standart concepts and methods of experimental design, modeling and to provide exercises in the application of simple experimental design to appropriate problems | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Design and conduct experiments as well as to analyze and interpret data | | | | | | | |
| **TEXTBOOK** | | | | | Çömlekçi, N.(2003). DENEY TASARIMI İLKE VE TEKNİKLERİ. Alfa Yayınları | | | | | | | |
| **OTHER REFERENCES** | | | | | Montgomery, D.C.(1984). Design and analysis of experiments. John Wiley & SonsKempthorne, O (1967). Design and analysis of experiments. John Wiley & SonsMendelhall, W (1968). The design and analysis of experiments. Wadsworth publishing company | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Experiment and treatment concepts |
| 2 | Two-factor factorial design |
| 3 | Two-factor factorial design (Lsd, Duncan, Tukey and Dunnett test) |
| 4 | Two-factor factorial design regression and Orthogonal contrasts in two-factor factorial design |
| 5 | Two-factor factorial design and applications |
| 6 | Midterm Examination 1 |
| 7 | Three-factor factorial design |
| 8 | Three-factor factorial design (Lsd, Duncan, Tukey and Dunnett test) |
| 9 | Three-factor factorial design regression and Orthogonal contrasts in three-factor factorial design |
| 10 | Analysis of covariance |
| 11 | Midterm Examination 2 |
| 12 | Confounding |
| 13 | Fractional factorial |
| 14 | Incomplete block designs |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **Prepared by :** | Assoc. Prof. Zeynep Filiz | **Date:** | 5/5/2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **STATISTICS (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501402506 | **TITLE** | Advanced Regression Analysis II |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 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 (√)]** | | | | | | |
| x | |  | | | | 3 | | | | | | |
| **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** | | | | | Generalized and weighted least squares, Robust regression, Effect of measurement error in the independent variables, Generalized linear models, Nonlinear regression models. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | To introduce the concepts of regression analysis | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | To introduce the concepts of regression analysis and to provide exercises in the application of regression analysis to related problems. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1-To explain and application the principles of solution the generalized and weighted least squares.  2-To explain and application the principles of solution the Robust regression analysis.  3-To explain and application the principles of solution the generalized linear models analysis.  4-To explain and application the principles of solution the nonlinear regression models. | | | | | | | |
| **TEXTBOOK** | | | | | Introduction to Linear Regression Analysis | | | | | | | |
| **OTHER REFERENCES** | | | | | Statistical software | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Generalized and weighted least squares |
| 2 | Generalized and weighted least squares |
| 3 | Robust regression |
| 4 | Robust regression |
| 5 | Robust regression |
| 6 | Midterm Examination 1 |
| 7 | Effect of measurement error in the independent variables |
| 8 | Effect of measurement error in the independent variables |
| 9 | Generalized linear models |
| 10 | Generalized linear models |
| 11 | Midterm Examination 2 |
| 12 | Nonlinear regression models |
| 13 | Nonlinear regression models |
| 14 | Nonlinear regression models |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **Prepared by :** | Yrd.Doç.Dr.Cengiz Aktaş | **Date:** | 5/05/2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **STATISTICS (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501401507 | **TITLE** | Applied Econometrics II |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 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 (√)]** | | | | | | |
| x | |  | | | | 3 | | | | | | |
| **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** | | | | | Stationary, unit roots test, cointegration analysis, an autoregressive process, vector autoregression. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | To introduce the technics of econometrisc. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | To introduce the concepts of econometrisc analysis and to provide exercises in the application of econometrisc analysis to related problems. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1-To explain and application the principles of solution the stationary.  2-To explain and application the unit roots test.  3-To explain and application the .  4-To explain and application the principles of solution the vector autoregressions. | | | | | | | |
| **TEXTBOOK** | | | | | Basic Econometrics, Temel Ekonometri, Ekonometri I. | | | | | | | |
| **OTHER REFERENCES** | | | | | Statistical software | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Stationary |
| 2 | Unit roots test |
| 3 | Unit roots test |
| 4 | Unit roots test |
| 5 | Unit roots test |
| 6 | Midterm Examination 1 |
| 7 | Cointegration analysis |
| 8 | Cointegration analysis |
| 9 | An autoregressive process |
| 10 | An autoregressive process |
| 11 | Midterm Examination 2 |
| 12 | Vector autoregressions |
| 13 | Vector autoregression |
| 14 | Vector autoregression |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **Prepared by :** | Yrd.Doç.Dr.Cengiz Aktaş | **Date:** | 5/05/2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **STATISTICS (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501402510 | **TITLE** | Simulation Methodology |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( x ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | |  |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 20 |
| Project | | | | | 2 | | 30 |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | The aim of this course is to give our students a decision tool in order to design and analyze complicated real life discrete event systems. Emphasis is primarily on applications in the areas of terminating and steady state systems. Simulation methodology and model building. Modeling with ARENA. Random variate generation. Statistical analysis of simulation input and output data. Use of simulation for estimation and comparison of alternatives. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The two primary goals of the course are to learn how to plan, build and use simulation models and to develop an understanding of when simulation is an appropriate tool for analysis. Much of the work in the course will involve learning the mathematical and software tools for building simulation models, performing experiments with them, and interpreting the results. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course provides, modelling of real systems on computer environment and comparison of all alternative system designs | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Each student should be able:  1. to design simulation models and studies.  2. to collect and analyze input data.  3. to analyze simulation output.  5. to incorporate knowledge from other disciplines in simulation studies. | | | | | | | |
| **TEXTBOOK** | | | | | Banks, J., Carson, J., Nelson B., D.Nicol, (2001), Discrete-Event System Simulation, 3rd edition, Prentice Hall.Kelton, W. D., Randall P. S., and David T. S., (2003), Simulation with Arena, McGraw-Hill Higher Education, Boston. | | | | | | | |
| **OTHER REFERENCES** | | | | |  | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Fundamental Concepts of Simulation and Modeling. Types of Models and Simulation. Simulation clock. Application Areas.Advantages and disadvantages of Simulation. |
| 2 | Simulation methodology. Demonstration of Simulation Applications |
| 3 | Input data analysis |
| 4 | Generating Random Numbers |
| 5 | Generating Random Variates |
| 6 | Midterm Examination 1 |
| 7 | Monte Carlo simulation applications |
| 8 | Discrete system simulation-Queuing system (Manuel Simulation) |
| 9 | Discrete system simulation-Specific systems application (Manuel Simulation) |
| 10 | Guided Tour Through ARENA®/Simple Processing System. Modeling Basic Operations and Inputs |
| 11 | Midterm Examination 2 |
| 12 | Basic Concepts for Statistical Analysis of Output |
| 13 | Statistical Analysis of Terminating Systems |
| 14 | Statistical Analysis of Steady State systems |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **Prepared by :** | Prof. Dr. Şenol Erdoğmuş | **Date:** |  |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **STATISTICS (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501402511 | **TITLE** | ADVANCED TIME SERIES ANALYSIS I |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** |  | |  |  | | |  |  | COMPULSORY  (   ) | | ELECTIVE  ( X ) | TURKISH |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
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| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Time Series Analysis, Decompositon of time series, time series analysis techniques (trend analysis, moving averages, exponantial smoothing and ARIMA models), Seasonal models, smoothing models for seasonal data  (Regression, moving averages, X-11), Mevsimsel ARIMA Modelleri, time series models in the case of with heteroscedasticity (ARCH ve GARCH models). | | | | | | | |
| **COURSE OBJECTIVES** | | | | | To introduce the concepts and methods of time series analysis  To provide exercises in the application of forecasting to related problems. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | To provide information about the topics of Time Series, and Time Series Analysis to researchers and people who do academic studies  To determine how to do univariate time series analysis  Try to forecast to time series values in the future times | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Apply knowledge of Time series analysis  Apply knowledge the analyzing, evaluating of data  Identify, formulate and solve real life problems | | | | | | | |
| **TEXTBOOK** | | | | | 1- Gujarati D.N. (1999). Temel Ekonometri, Çevirenler: Ümit Şenesen, Gülay Günlük Şenesen, Literatür Yayıncılık, İstanbul.2. Enders Walter (2009),Applied Econometric Time Series, John Wiley and Sons, | | | | | | | |
| **OTHER REFERENCES** | | | | | 1. Kadılar C. (2000). Uygulamalı Çok Değişkenli Zaman Serileri Analizi, Ankara.2-Işığıçok E. (1994). Zaman Serilerinde Nedensellik Çözümlemesi, Bursa.3-Montgomery D. C., Johnson L. A. & Gardiner J. S.( 1994). Forecasting and Time Series Analysis, MCGraw-Hill, New York.4- Özmen, A. (1986). Zaman Serisi Analizinde Box-Jenkins Yöntemi ve Banka Mevduat Tahmininde Uygulama Denemesi, Anadolu Üniversitesi Yayınları, Eskişehir.5. Akgül, I. (2003). Zaman Serilerinin Analizi ve ARIMA Modelleri, DER Yayınları, İstanbul.6. Sevüktekin, M., Nargeleçekenler, M.(2005). Zaman Serileri Analizi, Nobel Yayınevi, Ankara.7.Sevüktekin, M., Nargeleçekenler, M.(2010). ekonometrik Zaman Serileri Analizi, Nobel Yayın Dağıtım, Ankara.8- Chatfield C., The Analysis of Time Series Analysis: An Introduction. Chapman &Hall Inc. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Maın time series analysis definitions and concepts |
| 2 | Univariate time series analysis techniques |
| 3 | Univariate time series analysis techniques (cont.) |
| 4 | Application |
| 5 | Seasonal Models |
| 6 | Midterm Examination 1 |
| 7 | Application |
| 8 | Seasonal smoothing techniques |
| 9 | Seasonal smoothing techniques (cont.) |
| 10 | Application |
| 11 | Midterm Examination 2 |
| 12 | Time series models in the case of with heteroscedasticity (ARCH, GARCH models) |
| 13 | Time series models in the case of with heteroscedasticity (ARCH, GARCH models) (cont.) |
| 14 | Application |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **Prepared by :** | Assist. Prof. Dr. Fatih Çemrek | **Date:** | 22.04.2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **STATISTICS (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501402513 | **TITLE** | Regression Models for Categorical Dependent Variables II |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | 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 | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 40 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Ordinal Logit and Probit models, Interpretation Ordinal Logit and Probit models, Multinomial Logit and Probit models, Interpretation Multinomial Logit and Probit models, Conditional Logit models, Interpretation Conditional Logit models, Poisson regression models, Interpretation Poisson regression models, Comparison of these models, Goodness of fit statistics, Estimation methods. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The main of the course is to introduce qualitative dependent variable models which are ordered, multinomial and count outcomes and explores the mathematical structure of these methods. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Evaluate, analyze the qualitative dependent variable models. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Understand the mathematical structure of qualitative dependent variable models which are ordered, multinomial, conditional and count outcomes as it is applied in the theory and practice of statistics,  2. Have acquired the necessary programs to calculate the estimation of model parameters of qualitative dependent variable,  3. Be conversant with estimation methods of parameters of regression model with ordered, multinomial, conditional and count dependent variable,  4. Evaluate the strengths and weaknesses different estimation methods,  5. Gain techniques, skills, computers and software knowledge to solve real life problems with qualitative dependent variable | | | | | | | |
| **TEXTBOOK** | | | | | Long J.S.(1997). Regression Models for Categorical and Limited Dependent Variables. Thousand Oaks:Sage Publications | | | | | | | |
| **OTHER REFERENCES** | | | | | Powers, D.A.(2000). Statistical Methods for Categorical Data Analysis. Academic Press. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Ordinal Logit models |
| 2 | Ordinal Probit models |
| 3 | Applications |
| 4 | Multinomial Logit models |
| 5 | Multinomial Probit models |
| 6 | Midterm Examination 1 |
| 7 | Applications |
| 8 | Conditional Logit models |
| 9 | Applications |
| 10 | Poisson regression models |
| 11 | Midterm Examination 2 |
| 12 | Applications |
| 13 | Goodness of fit tests |
| 14 | Applications |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **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 (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501402514 | **TITLE** | THEORETICAL STATISTICS |

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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 (√)]** | | | | | | |
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| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 20 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | | 1 | | 30 |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Probability, conditional and marginal distribution, Statistical decision theory and risk, bets properties. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | To teach the theory of statistical techniques in practice. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | To understand the core subjects of theoretical statistics. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | To teach the theory of statistical techniques in practice. | | | | | | | |
| **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 | Decision Tree |
| 8 | Decision Tree |
| 9 | Risk function |
| 10 | Risk function |
| 11 | Midterm Examination 2 |
| 12 | Theoretical probability distributions of discrete and continuous random variables |
| 13 | Point estimation methods |
| 14 | Point estimators properties |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **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 (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501402515 | **TITLE** | Statistical inference II |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( x ) | 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 | | 40 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | | - | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Properties of a random sample, Principles of Data Reductions: Sufficiency principle, likelihood principle, invariance principle. Point Estimation: Methods of finding estimators, methods of evaluating estimators, other considerations. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The main of the course is to develop on basic level understanding and working knowledge of statistical inference. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | |  | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | By the end of the course students should be able to;  1. find sufficient statistics.  2. learn methods of finding estimators.  3. learn methods of finding appropriate statistical techniques and methods of  evaluating these techniques. | | | | | | | |
| **TEXTBOOK** | | | | | 1. Casella G. and Berger R.L. (1990). Statistical Inference. Wadsworth & Brooks, California. | | | | | | | |
| **OTHER REFERENCES** | | | | | 1. Rohatgi V.K. (1976). An Introduction to Probability Theory and Mathematical Statistics. John Wiley & Sons, New York.2.Hogg,R.V.,Mckean J.W., Craig, A.T. (2005)Introduction to Mathematical Statistics.3.Roussas, G.G. (2003). An Introduction to Probability and Statistical Inference, Academic Press. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Properties of a random sample: Basic concepts of random samples. Sums of variables from a random sample |
| 2 | Convergence concepts: Convergence in probability, almost sure convergence, convergence in distribution |
| 3 | Order statistics |
| 4 | Principles of data reduction: the sufficiency principle : Sufficient statistics, minimal sufficient statistics |
| 5 | Ancillary statistics, sufficient ancillary and complete statistics |
| 6 | Midterm Examination 1 |
| 7 | Principles of data reduction: the likelihood principle |
| 8 | Principles of data reduction: the invariance principle |
| 9 | Point estimation: Methods of finding estimators : methods of moments, maximum likelihood estimators, bayes estimators |
| 10 | Methods of evaluating estimators: mean squared error |
| 11 | Midterm Examination 2 |
| 12 | Methods of evaluating estimators: best unbiased estimators |
| 13 | Methods of evaluating estimators: sufficiency, unbiasedness, and consistency |
| 14 | Other considerations: asymptotic variance of maximum likelihood estimators, taylor series approximations |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **Prepared by :** | Assoc.Prof.Hatice Şamkar | **Date:** | 29/05/2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **STATISTICS (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501402517 | **TITLE** | Statistical Inference I |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( x ) | 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 | | 40 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | | - | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Probability Theory, Transformation and Expectations, Common Families of Distributions: Discrete distributions, continuous distributions, exponential families, location and scale families. Multiple Random Variables: Joint and marginal distributions, conditional distributions and independence, bivariate transformations, hierarchical models and mixture distribution, covariance and correlation. Multivariate distributions, Inequalities and identities: | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The main of the course is to built theoretical statistics from the first princeples of probability theory and to provide a solid and well-balanced introduction to mathematical statistics. This course can be the starting point for a course in statistical theory for students with some probability background | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Students have on a large scale information about probability, statistics, estimation theory and probability distrubutions. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | By the end of the course students should be able to:  1. learn basics of probability theory and introduce many fundamentals.  2. understand transitional (between probability and statistics). | | | | | | | |
| **TEXTBOOK** | | | | | Casella G. and Berger R.L. (1990). Statistical Inference. Wadsworth & Brooks, California. | | | | | | | |
| **OTHER REFERENCES** | | | | | 2. Rohatgi V.K. (1976). An Introduction to Probability Theory and Mathematical Statistics. John Wiley & Sons, New York.3.Hogg,R.V.,Mckean J.W., Craig, A.T. (2005)Introduction to Mathematical Statistics.4.Roussas, G.G. (2003). An Introduction to Probability and Statistical Inference, Academic Press. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Probability Theory: Conditional probability and independence, random variables, distribution functions, density and mass functions |
| 2 | Transformation and Expectations: Distributions of foundations of a random variable, expected values, moment and moment generating functions. |
| 3 | Common Families of Distributions: Discrete distributions, |
| 4 | Common Families of Distributions: continuous distributions, |
| 5 | Exponential families, location and scale families. |
| 6 | Midterm Examination 1 |
| 7 | Multiple Random Variables: Joint and marginal distributions, |
| 8 | Conditional distributions and independence, |
| 9 | Bivariate transformations, |
| 10 | Hierarchical models and mixture distributions |
| 11 | Midterm Examination 2 |
| 12 | Covariance and correlation. |
| 13 | Multivariate distributions |
| 14 | Inequalities and identities: numerical inequalities, functional inequalities, probability inequalities. Identities |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **Prepared by :** | Assoc.Prof.Hatice Şamkar | **Date:** | 29/05/2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **STATISTICS (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501402518 | **TITLE** | Linear Models II |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7.5 | COMPULSORY  (   ) | | ELECTIVE  ( x ) | 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 | | 40 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | | - | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Estimation in the Less Than Full Rank Model: introduction to conditional inverses, introduction to estimability, estimating in the less than full rank model, interval estimation in the less than full rank model. Hypothesis Testing in the Less Than Full Rank Model: reparameterization: one-way classification model, testing a hypothesis on a treatment contrast, two-factor design without interaction, randomized complete block design, two-factor design with interaction, Analysis of Covariance: one-way model with one covariate, two-way model with one covariate, one-way model with multiple covariates. Analysis of Variance Models: one-way analysis of variance, two-way analysis of variance, the cell means model for unbalanced data. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The main of the course is to improve the student's ability to apply the theory in exploratory data analysis and statistical modelling. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | This course should serve as a bridge to the more advanced texts on the subject. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | By the end of the course students should be able to:  1.analyse real data problems.  2.model any data.  3.familiar with the concepts of exploratory data analysis. | | | | | | | |
| **TEXTBOOK** | | | | | 1.Myers, R.H. and Milton, J.S. (1991). “A First Course in the Theory of Linear Statistical Models”. PWS KENT Publish Company. | | | | | | | |
| **OTHER REFERENCES** | | | | | 1.Öztürk, F. (1996). “Lineer Modeller ”. Ankara Üniversitesi Yayınları. 2.Rencher, A.C. (2007). “Linear Models in Statistics”. Wiley & Sons Inc. New York.3.Muller, K.E. and Stewart, P.W. (2006). “Linear Model Theory: Univariate, Multivariate, and Mixed Models”. Wiley & Sons Inc. New Jersey. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Estimation in the Less Than Full Rank Model: introduction to conditional inverses, introduction to estimability, some estimability theorems |
| 2 | Estimating of variance in the less than full rank model |
| 3 | Interval estimation in the less than full rank model |
| 4 | Hypothesis Testing in the Less Than Full Rank Model |
| 5 | Reparameterization: one-way classification model, |
| 6 | Midterm Examination 1 |
| 7 | Testing a hypothesis on a treatment contrast, |
| 8 | Two-factor design without interaction |
| 9 | Randomized complete block design, |
| 10 | Two-factor design with interaction |
| 11 | Midterm Examination 2 |
| 12 | Analysis of Covariance: one-way model with one covariate, two-way model with one covariate, one-way model with multiple covariates. |
| 13 | Analysis of Variance Models: one-way analysis of variance: balanced case, two-way analysis of variance: balanced case, |
| 14 | Analysis of variance: the cell means model for unbalanced data. |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **Prepared by :** | Assoc.Prof.Hatice Şamkar | **Date:** | 29/05/2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **STATISTICS (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501402519 | **TITLE** | System Reliability |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | Türkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Reliability and system safety measures. Life distributions and their applications in reliability. System reliability models. Design by reliability and probabilistic design. Reliability estimation and measurement by testing for binomial, exponential, and Weibull distributions. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | To understand the theory and practice system reliability concepts and statistical methods in the area. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | To develop and promote research interest in applying system reliability concepts. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. To define and develop measures for reliability and safety  2. To model reliability by various life distributions  3. To be able to compute system reliability  4. To understand design and management of reliability programs | | | | | | | |
| **TEXTBOOK** | | | | | E. E. Lewis, Introduction to Reliability Engineering, John Wiley & Sons, 1994 | | | | | | | |
| **OTHER REFERENCES** | | | | |  | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Discrete random variables |
| 2 | Continuous random variables |
| 3 | Reliability and rates of failure |
| 4 | Time-dependent failure rates |
| 5 | Redundancy |
| 6 | Midterm Examination 1 |
| 7 | High- and low-level redundancy |
| 8 | Maintained systems |
| 9 | Data and distributions |
| 10 | Failure Interactions |
| 11 | Midterm Examination 2 |
| 12 | Markov analysis |
| 13 | Probabilistic Risk Assessment of Complex Systems |
| 14 | Probabilistic Risk Assessment of Complex Systems |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **Prepared by :** | Assoc. Prof. Dr. H. Kıvanç Aksoy | **Date:** | 6/5/2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **STATISTICS (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501402520 | **TITLE** | Multivariate Data Analysis II |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( \* ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
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| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Multivariate data analysis and its application areas, classification of multivariate statistical methods, discriminant analysis, cluster analysis, logistic regression analysis, canonical correlation. | | | | | | | |
| **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** | | | | | apply knowledge of Multivariate Statistics  design and conduct experiments as well as to analyze and interpret data  identify, formulate and solve real life problems  get an understanding of professional and ethical responsibility | | | | | | | |
| **TEXTBOOK** | | | | | 1-Tatlıdil, H.(1992). Uygulamalı çok Değişkenli İstatistiksel Analiz, Ankara.2-Jobson, J, D.(1991). Applied Multivariate Data Analysis, Volume I-II, Springer- Verlag, New York.3-Özdamar, K.( 1999). Paket Programlar ile İstatistiksel Veri Analizi, Kaan Kitabevi, Eskişehir.Multivariate data analysis and its application areas | | | | | | | |
| **OTHER REFERENCES** | | | | |  | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Multivariate data analysis and its application areas |
| 2 | classification of multivariate statistical methods, |
| 3 | Evaluation of method |
| 4 | discriminant analysis |
| 5 | discriminant analysis |
| 6 | Midterm Examination 1 |
| 7 | cluster analysis |
| 8 | cluster analysis |
| 9 | canonical correlation |
| 10 | canonical correlation |
| 11 | Midterm Examination 2 |
| 12 | logistic regression analysis |
| 13 | Applications |
| 14 | Applications |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **Prepared by :** | Prof.Dr.Zeki YILDIZ | **Date:** | 5th. May 2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **STATISTICS (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501402522 | **TITLE** | Nonlinear Programming |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | Türkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | This course is interested in nonlinear optimization problems. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | This course aims that solving the nonlinear optimization problems and introduces algorithms for solving this type of problems | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Many real life problems cannot be modeled with linear models sufficiently. This course targeting the nonlinear programming optimization problems which frequently emerged in Operations Research area | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Understand the fundamentals of the convex analysis.  2. Duality and sensitivity analysis.  3. Nonlinear programming analysis.  4. Constraint and unconstrained optimization analysis. | | | | | | | |
| **TEXTBOOK** | | | | | Mokhtar S. Bazaraa, Shetty C. M. and Sherali H. D., Nonlinear Programming: Theory and Algorithms, Wiley, 1993. | | | | | | | |
| **OTHER REFERENCES** | | | | |  | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Convex sets |
| 2 | Convex functions and optimization |
| 3 | Unconstrained problems |
| 4 | Karush-Kuhn-Tucker optimality conditions |
| 5 | Karush-Kuhn-Tucker optimality conditions |
| 6 | Midterm Examination 1 |
| 7 | Lagrangian duality and saddle point |
| 8 | Penalty functions |
| 9 | Barrier functions |
| 10 | Gradient projection method |
| 11 | Midterm Examination 2 |
| 12 | Reduced gradient method |
| 13 | Separable programming |
| 14 | Geometric programming |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **Prepared by :** | Assoc. Prof. Dr. H. Kıvanç Aksoy | **Date:** | 6/5/2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **STATISTICS (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501402523 | **TITLE** | ADVANCED TIME SERIES ANALYSIS II |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | TURKISH |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | To introduce, Stationarity intime series, analysis of stationarity, difference stationary and trend stationary process, Unit root tests (Dickey-Fuller,Augmented Dickey- Fuller, Phillps Perron), Spurious regression, Cointegration analysis, (two stage Engle-Granger Contegration tests, Jhonsen method), VAR models, Error-Correction Method and Vector Error Correction models. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | Understanding of the concept of stationary time series  Learnig of unit root tests are used to determine the stationarity  Learning of investigate between two or more time series whether there is a long-term relationship | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Investigation of the stationary time series  An ability to identify a causal relationship between time series  The determination of a long-term relationship between the stationary time series | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Apply Knowledge of econometric time series analysis.  Design and Couduct experiments as well as to analyze and interprete data. Identify, formulate and solve real life problems. | | | | | | | |
| **TEXTBOOK** | | | | | 1- Gujarati D.N. (1999). Temel Ekonometri, Çevirenler: Ümit Şenesen, Gülay Günlük Şenesen, Literatür Yayıncılık, İstanbul.2. Enders Walter (2009),Applied Econometric Time Series, John Wiley and Sons, | | | | | | | |
| **OTHER REFERENCES** | | | | | 1. Kadılar C. (2000). Uygulamalı Çok Değişkenli Zaman Serileri Analizi, Ankara.2-Işığıçok E. (1994). Zaman Serilerinde Nedensellik Çözümlemesi, Bursa.3-Montgomery D. C., Johnson L. A. & Gardiner J. S.( 1994). Forecasting and Time Series Analysis, MCGraw-Hill, New York.4- Özmen, A. (1986). Zaman Serisi Analizinde Box-Jenkins Yöntemi ve Banka Mevduat Tahmininde Uygulama Denemesi, Anadolu Üniversitesi Yayınları, Eskişehir.5. Akgül, I. (2003). Zaman Serilerinin Analizi ve ARIMA Modelleri, DER Yayınları, İstanbul.6. Sevüktekin, M., Nargeleçekenler, M.(2005). Zaman Serileri Analizi, Nobel Yayınevi, Ankara.7.Sevüktekin, M., Nargeleçekenler, M.(2010). ekonometrik Zaman Serileri Analizi, Nobel Yayın Dağıtım, Ankara.8- Chatfield C., The Analysis of Time Series Analysis: An Introduction. Chapman &Hall Inc. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Stationarity concept and analysis of stationarity |
| 2 | Difference staionary and trend stationary series |
| 3 | Unit Root Tests (Dickey- Fuller, Augmented Dickey- Fuller, Phillps Perron) |
| 4 | Unit Root Tests (Dickey- Fuller, Augmented Dickey- Fuller, Phillps Perron) (cont.) |
| 5 | Application |
| 6 | Midterm Examination 1 |
| 7 | Cointegration Analysis |
| 8 | Cointegration Analysis (cont.) |
| 9 | Application |
| 10 | Vector Autoregressive (VAR) Models |
| 11 | Midterm Examination 2 |
| 12 | Vector Autoregressive (VAR) Models (cont.) |
| 13 | Error Correction Methods and Vector Error Correction ModelsE |
| 14 | Error Correction Methods and Vector Error Correction Models (cont.) |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **Prepared by :** | Assist. Prof. Dr. Fatih Çemrek | **Date:** | 22.04.2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **STATISTICS (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501402525 | **TITLE** | Panel Data Analysis II |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( x ) | 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 | | 40 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Panel unit root tests and panel cointegration tests, Panel data models with qualitative dependent variable : Classic panel dta models, Fixed effect panel data models, Random effect panel data models and estimation. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | Research of nonstationary panels and Panel data models with qualitative dependent variable . | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | |  | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Applying cointegration and unit root tests on panel data structure acquiring skill in estimating panel data models with qualitative dependent variables using them on economic data by the help on statistical packet programmes. | | | | | | | |
| **TEXTBOOK** | | | | | Ferda Yerdelen Tatoğlu, "İleri Panel Veri Analizi", Beta, İstanbul (2012). | | | | | | | |
| **OTHER REFERENCES** | | | | | Baltagi, B. H., “Econometric Analysis of Panel Data 2th Edt.”, John Wiley and Sons, New York, 451-462 (2001).Gujarati, D.N., “Temel Ekonometri”, Şenesen, Ü., Şenesen, G.G., Literatür, İstanbul (1999).Gujarati, D.N., “Basic Econometrics 4th Edt.”, McGraw Hill, New York (2003).Guilkey David K. and J.L. Murphy, Estimation and Testing in the Random Effects Probit Model, Journal of Econometrics, 59, (1993).Heckman J., “Statistical Models for Discrete Panel Data, in Structural Analysis of Discrete Data With Econometric Applications”, Edt. By Manski, C. and McFadden The MIT pres., London, (1981).Matyas L. and P. Sevestre, “The Econometrics of Panel Data”, Kluwer Academic Pu blishers, (2006).Woolridge, J.,”Econometric Analysis of Cross-Section and Panel Data”, MIT Press, (2002).Pedroni, P., “Panel Cointegration: Asymptotic and Finite Sample Properties of Pooled Time Series Tests with An Application to the ppp Hypothesis”, Econometric Theory, Cambridge UniversityPress., 20(3), (2004). | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Unbalanced and the other panels |
| 2 | Heterogeneus panels |
| 3 | Pseudo panels |
| 4 | Seemingly unrelated regression |
| 5 | Computer exercises |
| 6 | Midterm Examination 1 |
| 7 | Estimation methods of the Dynamic Panel Data models |
| 8 | Tests on the Dynamic Panel Data models |
| 9 | Computer exercises |
| 10 | Computer exercises |
| 11 | Midterm Examination 2 |
| 12 | Panel unit root tests |
| 13 | Nonstationary panel data models |
| 14 | Computer exercises |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **Prepared by :** | Assist. Prof. Dr. Gaye KARPAT ÇATALBAŞ | **Date:** | 21.05.2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **STATISTICS (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501402526 | **TITLE** | STATISTICAL ANALYSIS WITH SOFTWARES II |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( x ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
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| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | |  |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | | 1 | | 30 |
| Report | | | | | 1 | | 30 |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 40 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Making multivariate statistical analysis in the softwares. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | In this course, students throughout the under graduate they intended to teach theoretical issues inmaking the software available. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | The student, ready to provide solutions to statistical problems will face when they graduate will learn to use software. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Multivariate statistical analysis of what should be done in statistical softwares before they are ready to learn. | | | | | | | |
| **TEXTBOOK** | | | | | Özdamar, K., Paket Programlar ile İstatistiksel Veri Analizi I, 9. Basım, Nisan Kitabevi, ESKİŞEHİR, 2013.Özdamar, K., Paket Programlar ile İstatistiksel Veri Analizi II, 9. Basım, Nisan Kitabevi, ESKİŞEHİR, 2013.Kalaycı, Ş. (Ed.), SPSS Uygulamalı Çok Değişkenli İstatistik Teknikleri, Asil Yayın Dağıtım, Ankara, 2005. | | | | | | | |
| **OTHER REFERENCES** | | | | | EROL, H., SPSS Paket Programı ile İstatistiksel Veri Analizi, Nobel Kitabevi, ADANA, 2010.Tekin, V. N., SPSS Uygulamalı İstatistik Teknikleri, Seçkin Yayınevi, 2. Baskı, Ankara, 2009.Gürsakal, N., (1997), Bilgisayar Uygulamalı İstatistik I, Marmara Yayınları, Bursa.Gürsakal, N., (1997), Bilgisayar Uygulamalı İstatistik II, Marmara Yayınları, Bursa.Gamgam, H., Altunkaynak, B., (2008), Parametrik Olmayan Yöntemler SPSS Uygulamalı, Gazi Kitabevi, Ankara.Akgül, A., Çevik, O., (2005), İstatistiksel Analiz Teknikleri - SPSS'de İşletme Yönetimi Uygulamaları, Emek OfsetSAS User’s Guide.SPSS User’s GuideMinitab User’s GuideMatlab User’s GuideStatistica User’s Guide | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | MANOVA Software Application |
| 2 | Cluster Analysis Software Application |
| 3 | Discriminant Analysis Software Application |
| 4 | Factor Analysis Software Application |
| 5 | Correspondence Analysis Software Application |
| 6 | Midterm Examination 1 |
| 7 | Multidimensional Scaling Analysis Software Application |
| 8 | Conjoint Analysis Software Application |
| 9 | Canonik Corelation Software Application |
| 10 | Logistic Regression Analysis Software Application |
| 11 | Midterm Examination 2 |
| 12 | General Repetition |
| 13 | General Repetition |
| 14 | General Repetition |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **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 (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501402604 | **TITLE** | Multi-criteria Decision Making |

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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 (√)]** | | | | | | |
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| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | |  |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 20 |
| Project | | | | | 1 | | 30 |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | This course includes topics such as single person or group decision making under multi-criteria decision making (MCDM).and applications on real world problems. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The major goal of this course is to enable MCDM framework and to learn where and how to apply and use the techniques for the best solutions of real-life multi criteria problems. Students will get problem solving skill about the types of decision making problems. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Students will be able to apply MCDM techniques for solution of real word decision problems. This course helps students to improve the quality of the decisions they make in managerial and personal decisions. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | By the end of the course, the student should be able to  1. Understand and explain the basic concepts of multi criteria decision making,  2. to formulate real-world problems from management and science as multicriteria problems,  3. to discuss diﬀerent solution concepts, their advantages and their limitations in practice, | | | | | | | |
| **TEXTBOOK** | | | | | Milan Zeley, Multicriteria Decision Making, McGraw- Hill Book Company, 1982, Boston. | | | | | | | |
| **OTHER REFERENCES** | | | | | Thomas L. Saaty, Fundementals of Decision Making And Priority Theory with The Analytic Hierarchy Process, vol VI, RWS Publications, 2000, Pittsburg. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | What is multi-criteria decision making (MCDM)? |
| 2 | Basic Concepts and Definitions. |
| 3 | Types of MCDM problems |
| 4 | Decision Making Methods according to types of problems |
| 5 | Evaluation Methods for MCDM problems |
| 6 | Midterm Examination 1 |
| 7 | TOPSIS |
| 8 | PROMETEE |
| 9 | SMART |
| 10 | ELECTRE |
| 11 | Midterm Examination 2 |
| 12 | Analytical Hierarachy Process (AHP) |
| 13 | Analytical Network Process (ANP) |
| 14 | Using software for AHP and ANP applications |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **Prepared by :** | Prof. Dr. Şenol Erdoğmuş | **Date:** |  |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **STATISTICS (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501411602 | **TITLE** | Statistical Analysis Methods I |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 |  | COMPULSORY  (   ) | | ELECTIVE  ( \* ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
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| **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** | | | | | Variables, measurement scales, Data collection and statistical inference, univariate data analysis, parametric and nonparametric tests. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aim of the course is to introduce the concepts and methods of statistical analysis and to provide exercises in the application of related problems. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Evaluate and analyze the statistical data | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1)apply knowledge of statistical analysis  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** | | | | | 1-Tatlıdil, H.(1992). Uygulamalı çok Değişkenli İstatistiksel Analiz, Ankara.2-Jobson, J, D.(1991). Applied Multivariate Data Analysis, Volume I-II, Springer- Verlag, New York.3-Özdamar, K.( 1999). Paket Programlar ile İstatistiksel Veri Analizi, Kaan Kitabevi, Eskişehir. | | | | | | | |
| **OTHER REFERENCES** | | | | |  | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Variables |
| 2 | measurement scales |
| 3 | Data collection |
| 4 | statistical inference |
| 5 | statistical inference |
| 6 | Midterm Examination 1 |
| 7 | univariate data analysis |
| 8 | univariate data analysis |
| 9 | Parametric tests |
| 10 | Parametric tests |
| 11 | Midterm Examination 2 |
| 12 | nonparametric tests |
| 13 | nonparametric tests |
| 14 | Applications |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **Prepared by :** | Prof.Dr.Zeki YILDIZ | **Date:** | 5th. May, 2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **STATISTICS (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 501412601 | **TITLE** | Statistical Analysis Methods II |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 |  | COMPULSORY  (   ) | | ELECTIVE  ( \* ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
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| **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** | | | | | Regression and correlation in a multivariate setting, Analysis of variance and Experimental design, Nonparametric ANOVA, Ordinal regression analysis, applied multivariate data analysis. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aim of the course is to introduce the concepts and methods of statistical analysis and to provide exercises in the application of related problems. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Evaluate and analyze the statistical data | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1)apply knowledge of statistical analysis  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** | | | | | 1-Tatlıdil, H.(1992). Uygulamalı çok Değişkenli İstatistiksel Analiz, Ankara.2-Jobson, J, D.(1991). Applied Multivariate Data Analysis, Volume I-II, Springer- Verlag, New York.3-Özdamar, K.( 1999). Paket Programlar ile İstatistiksel Veri Analizi, Kaan Kitabevi, Eskişehir. | | | | | | | |
| **OTHER REFERENCES** | | | | |  | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Regression and correlation in a multivariate setting |
| 2 | Analysis of variance |
| 3 | Analysis of variance |
| 4 | Experimental design, |
| 5 | Experimental design, |
| 6 | Midterm Examination 1 |
| 7 | Nonparametric ANOVA, |
| 8 | Nonparametric ANOVA, |
| 9 | Ordinal regression analysis, |
| 10 | Ordinal regression analysis, |
| 11 | Midterm Examination 2 |
| 12 | applied multivariate data analysis. |
| 13 | applied multivariate data analysis. |
| 14 | Applications |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **Prepared by :** | Prof.Dr.Zeki YILDIZ | **Date:** | 5th. May, 2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **STATISTICS (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** |  | **TITLE** | Knowledge Discovery in Databases and Data Mining |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | |  |  | | | 3 |  | 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 | | 20 |
| Quiz | | | | |  | |  |
| Homework | | | | | 3 | | 15 |
| Project | | | | | 2 | | 20 |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 45 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Data Mining and Knowledge Discovery, Data Preprocessing, Exploratory Data Analysis, Prediction and Classification, Clustering, Association Rules, Model Evaluation Techniques | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The aims of this course are to discuss data mining concepts and to teach implementations of data mining techniques (classification, clustering, etc.) in Database | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Suggest appropriate solutions to real world problems  Build up team spirit in solving challenging data mining problems | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Students will be able to explain and use the mining process for descriptive and predictive analytics.  Students will be able to explore data using various visualization techniques.  Students will be able to understand and apply the core data mining methods of • Classification • Association Analysis • Cluster Analysis  Students will be able to conduct a complete data mining project including data preparation and documentation of the results. | | | | | | | |
| **TEXTBOOK** | | | | | Daniel T. Larose, Discovering Knowledge in Data: An Introduction to Data Mining, John Wiley & Sons, Inc. 2005.J. W. Han and M. Kamber, Data Mining: Concepts and Techniques, Morgan Kaufmann, 2000. | | | | | | | |
| **OTHER REFERENCES** | | | | | Data Mining and Business Analytics with R, Johannes LedolterAll Data Mining Books | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Introduction to Data Mining: Basic Concepts |
| 2 | Data Preprocessing: Basic Approximations |
| 3 | Exploratory Data Analysis |
| 4 | Supervised Learning versus Unsupervised Learning |
| 5 | Prediction and Classification |
| 6 | Midterm Examination 1 |
| 7 | Classification Techniques and Algorithms |
| 8 | Classification Techniques and Algorithms: R Implementation |
| 9 | Classification Techniques and Algorithms: R Implementation |
| 10 | Project 1 presentation |
| 11 | Midterm Examination 2 |
| 12 | Clustering: R Implementation |
| 13 | Association Rules: R Implementation |
| 14 | Model Evaluation and Comparative Studies:Project 2 presentation |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **Prepared by :** | Assistant Prof. Dr. Sevgi AYHAN | **Date:** | 16.11.2015 |

**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 (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** |  | **TITLE** | Business Model |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | |  |  | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( x ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | | x | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 20 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | | 1 | | 30 |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 50 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | This course introduces a systematic approach to identify and communicate the nine key elements of a business model: Customer Segments, Value Proposition, Channels, Customer Relationships, Key Resources, Key Activities, Key Partners, Revenue Streams, and Cost Structure. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | to develop A Tool for Entrepreneurs and Innovators | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | By the end of the course students should be able to:  Having understood how to identify the business model and implement them successfully. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1) identify a business model canvas  2) analysis well-known business models  3) present their business models  4) analyses a business model statistically | | | | | | | |
| **TEXTBOOK** | | | | | course notes | | | | | | | |
| **OTHER REFERENCES** | | | | | Several English and Turkish business model books. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | The Business Model Canvas: A Tool for Entrepreneurs and Innovators |
| 2 | The Customer Segments |
| 3 | The Value Propositions |
| 4 | Channels and Customer Relationships |
| 5 | Revenue Streams-transactional and recurring  Key Resources-physical, intellectual, human, and financial. |
| 6 | Midterm Examination 1 |
| 7 | Key Activities  Key Partnerships |
| 8 | The Cost Structure- fixed costs and variable costs |
| 9 | Presenting the Business Model |
| 10 | Examples of Well-Known Business Models |
| 11 | Midterm Examination 2 |
| 12 | Evaluation of Well-Known Business Models |
| 13 | Creative thinking techniques |
| 14 | Statistical techniques in the Business Models |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **Prepared by :** | Prof.Dr. Şenol ERDOĞMUŞ | **Date:** | 07.04.2017 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **STATISTICS (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** |  | **TITLE** | FINANCIAL MARKET RISK AND MANAGEMENT |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | TURKISH |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | The introduction of financial markets, introduction of market data sets, introduction and measurement of types of market risk (Volatility, Value-at-Risk, Expected Shortfall , Conditional Value-at-Risk and Extreme Value Theorem), controls of these (Backtesting and Stress Testing) and applications of financial risk management | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The introduction, calculation, control of risk types in financial markets and teach the use of necessary tools for managing these risks | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | The introduction, calculation, control and managing of risk in financial market | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Having knowledge about financial markets.  Recognizing the different risk concepts in financial markets.  Recognizing risk measures and analyzes in financial markets.  Having experience the application of the risk management process in financial markets. | | | | | | | |
| **TEXTBOOK** | | | | | Danielsson, J., Financial Risk Forecasting: The Theory and Practice of Forecasting Market Risk with Implementation in R and Matlab, Wiley,2011. | | | | | | | |
| **OTHER REFERENCES** | | | | | Mcneil, A. J., Frey, R., Embrechts, P., Quantitative Risk Management: Concepts, Techniques and Tools, Princeton University Press, 2005.Christoffersen, P.F., Elements of Financial Risk Management, Academic Press, 2003. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Introduction of Financial Markets |
| 2 | Importance of Calculation and Management of Risk in Financial Markets |
| 3 | Introduction of Types of Risk in Financial Markets |
| 4 | Introduction of Data Sets and Their Features in Financial Markets |
| 5 | General Introduction and Application of Risk Measurement Techniques |
| 6 | Midterm Examination 1 |
| 7 | Description and Application of Value-at-Risk |
| 8 | Description and Application of Conditional Value-at-Risk |
| 9 | Description and Application of Expected Shortfall |
| 10 | Description and Application of Extreme Value Theory |
| 11 | Midterm Examination 2 |
| 12 | Description and Application of Backtesting and Stress Testing |
| 13 | Applications of Risk Management in Financial Markets I |
| 14 | Applications of Risk Management in Financial Markets II |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **Prepared by :** | Assist. Prof. Dr. Serdar NESLİHANOĞLU | **Date:** | 04/05/2017 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **STATISTICS (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** |  | **TITLE** | Problem Solving and decision making techniques |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | |  |  | | | 3 | 7,5 | COMPULSORY  ( x ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | | x | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | |  |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 10 |
| Project | | | | | 1 | | 30 |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | The aim of this course is to cover techniques used in solving real-life problems, including the identification of root causes, generating and evaluating alternative solutions, and making appropriate decisions This course will provide insights and techniques for solving problems and making decisions process. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | Explain problem solving and decision making techniques and use them | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | By the end of the course students should be able to:  Having understood how to identify real life problems, generate solutions and implement them successfully. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1) Use a range of problem-solving tools  2) Confidently solve problems  3) improve processes in their workplace | | | | | | | |
| **TEXTBOOK** | | | | | course notes | | | | | | | |
| **OTHER REFERENCES** | | | | | Several English and Turkish problem solving, optimization and decision making books. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Introduction:  • problems identification,  • ill-structural and well strucrural problems  • Simple and Complex Problems  • Static and dinamic problems  • Examples of each type |
| 2 | Problems and variables  Problem sources  How to identify clues to problems  Systems, models, and optimization |
| 3 | Decision making environments |
| 4 | Decision making process |
| 5 | Root cause analysis of problems  Brainstorming technique |
| 6 | Midterm Examination 1 |
| 7 | Five Whys  Pareto analysis |
| 8 | Fishbone Diagram  The Five W's and One H Approach |
| 9 | Mind map  Six Thinking Hats technique |
| 10 | Analytical Hierarchy Process-AHP |
| 11 | Midterm Examination 2 |
| 12 | Group Decision Making-AHP |
| 13 | Decision Tree Analysis |
| 14 | SWOT Analysis |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. | | |  | |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. | | |  | |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. | | |  | |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. | | |  | |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. | | |  | |  |  |
| **LO 6** | Ability to use Statistical softwares. | | |  | |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. | | |  | |  |  |
| **LO 9** | Ability to design and develop a research project. | | |  | |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. | | |  | |  |  |
| **Prepared by :** | | Prof.Dr. Şenol ERDOĞMUŞ | **Date:** | | 07.04.2017 | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **STATISTICS (MSc)** | **SEMESTER** | spring |

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| **COURSE** | | | |
| **CODE** | 501401510 | **TITLE** | Managarial Decision Making |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | | x | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | |  |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | | 1 | | 40 |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | The aim of this course is to study the use of a scientific approach to managerial problems to assist managerial decision making. As business problems become increasingly complex, managers need to approach decision making systematically. The methods covered in this course provide such a useful framework and techniques for structuring and solving a variety of decision problems in Business. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | To create the basic concepts of Managerial decision tools | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | 1) summarize the basic methods of managerial decision theory  2) Students will be able to methods of estimation and comparision of them.  3) Students be able to use the methods and can test building. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | By the end of the course students should be able to:  Having learned and used the fundamentals of managerial decision making in business and use of them | | | | | | | |
| **TEXTBOOK** | | | | | course notes | | | | | | | |
| **OTHER REFERENCES** | | | | | Several English and Turkish management decision books. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | what is a business model and how to structure it. |
| 2 | a few common types of business models, value creation model, profit model, and logic of the business. examples of each type. |
| 3 | the concept of network effects, which underlies the logic of many technology-based business models in technology markets |
| 4 | we introduce the logic of many business models |
| 5 | Steps in preparing and presenting a business model |
| 6 | Business Process Modeling Techniques with Examples |
| 7 | techniques for problem solving and decision making-1 |
| 8 | techniques for problem solving and decision making-2 |
| 9 | Analyze the different component of a business model-1 |
| 10 | Analyze the different component of a business model-2 |
| 11 | Customer relationship management |
| 12 | Cost–benefit analysis |
| 13 | project presentations |
| 14 | project presentations |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Business methods. |  |  |  |
| **LO 2** | Ability to develop skills in analytical thinking and problem solving related to business decision-making |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Business |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Business and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Business and to develop methods to solve such problems in Manegerial decision process. |  |  |  |
| **LO 6** | Ability to use Decision tools and softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to devolop convey the method and algorithms |  |  |  |

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| **Prepared by :** | Şenol Erdoğmuş | **Date:** | 11/24/2016 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | | **STATISTICS (MSc)** | | | **SEMESTER** |  |
| **COURSE** | | | | | | |
| **CODE** |  | | **TITLE** | FINANCIAL PORTFOLIO MANAGEMENT | | |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | Türkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | The introduction of financial markets, introduction of market data sets, introduction of portfolio, modelling portfolio data with Capital Asset Pricing Model (CAPM), Fama-French Models and Arbitrage Pricing Models, risk perception of individual and institutional investors, portfolio and risk management subjects | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The introduction of the concept portfolio in the financial markets, the introduction of necessary tools for managing and modeling of portfolio data | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Deciding and managing investment decisions in financial markets | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Obtaining information about investments in financial markets.  Recognizing the criteria for the forming a portfolio in financial markets.  Recognizing the portfolio risk measurements and their features in financial markets.  Understanding the importance of portfolio management for individual and institutional investors. | | | | | | | |
| **TEXTBOOK** | | | | | [Reilly](https://www.google.com.tr/search?tbo=p&tbm=bks&q=inauthor:%22Frank+K.+Reilly%22) F.K., [Brown](https://www.google.com.tr/search?tbo=p&tbm=bks&q=inauthor:%22Keith+C.+Brown%22), K.C., *Investment Analysis and Portfolio Management*, Cengage Learning, 2011. | | | | | | | |
| **OTHER REFERENCES** | | | | | Danielsson, J., *Financial Risk Forecasting: The Theory and Practice of Forecasting Market Risk with Implementation in R and Matlab,* Wiley,2011. | | | | | | | |

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| **COURSE SCHEDULE** | |
| **WEEK** | **TOPICS** |
| 1 | Introduction of Financial Markets |
| 2 | Importance of Portfolio Management |
| 3 | The Method of Modelling Financial Market Portfolio Data I (CAPM Models) |
| 4 | The Method of Modelling Financial Market Portfolio Data II (Fama-French Models) |
| 5 | The Method of Modelling Financial Market Portfolio Data III (APT Models) |
| 6 | Midterm Examination I |
| 7 | Applications of Portfolio Management in Financial Markets I |
| 8 | Applications of Portfolio Management in Financial Markets II |
| 9 | Importance of Risk Management in Financial Markets |
| 10 | Portfolio Risk Calculation Techniques I (Value-at-Risk) in Financial Markets |
| 11 | Midterm Examination II |
| 12 | Portfolio Risk Calculation Techniques II (Conditional Value-at-Risk) in Financial Markets |
| 13 | Portfolio Risk Calculation Techniques III (Expected Shortfall) in Financial Markets |
| 14 | Applications of Portfolio Management in Financial Markets III |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **Prepared by :** | Assist. Prof. Dr.Serdar Neslihanoğlu | **Date:** | 05/04/2017 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **STATISTICS (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** |  | **TITLE** | MATRIX THEORY |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | TURKISH |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Basic knowledge about matrices, eigenvalues and eigenvectors, generalized inverses, linear equation systems, special matrices, determinants, matrix differentiation, Kronecker products, vec and vech operators | | | | | | | |
| **COURSE OBJECTIVES** | | | | | Teaching matrices and matrices calculations related to the multivariate statistical techniques | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Having the ability of using matrices in statistics. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Having knowledge about matrices.  Having the ability of using matrices in statistics | | | | | | | |
| **TEXTBOOK** | | | | | Harville, D. A., Matrix Algebra From a Statistician's Perspective, Springer, 1997. | | | | | | | |
| **OTHER REFERENCES** | | | | | Graybill, F. A., Matrices with applications in Statistics, Thomson Learining, 1983. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Basic knowladge about matrices |
| 2 | Basic knowladge about matrices |
| 3 | Generalized inverses |
| 4 | Generalized inverses |
| 5 | Linear equation systems |
| 6 | Midterm Examination 1 |
| 7 | Eigenvalues and eigenvectors |
| 8 | Special matrices |
| 9 | Determinants |
| 10 | Kronecker products, vec and vech operators |
| 11 | Midterm Examination 2 |
| 12 | Linear, bilinear and quadratic forms |
| 13 | Matrix differentiation |
| 14 | Matrix differentiation |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **Prepared by :** | Assist. Prof. Dr. Y. Murat BULUT | **Date:** | 27/03/2018 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **STATISTICS (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** |  | **TITLE** | Explanatory Data Analysis and Visualization |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | TURKISH |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| X | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 2 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | It involves the creation and study of the visual representation of data. To communicate information clearly and efficiently, data visualization uses statistical analysis, graphics, plots, information graphics and other tools. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The information about exploring, manipulating, summarizing, visualizing and analyzing data set are in all areas. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | The information about explanatory data analysis and data visualization in all area data set are provided. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Having knowledge about data set properities in all areas.  Recognizing data visualization in all areas.  Recognizing explanatory data analysis in all areas.  Having experience explanatory data analysis and data visualization in all areas. | | | | | | | |
| **TEXTBOOK** | | | | | Cleveland, W.S. , Visualizing Data, At&T Bell Laboratories, 1993. | | | | | | | |
| **OTHER REFERENCES** | | | | | Rodriguez, J. and Kaczmarek, P., Visualizing Financial Data, Wiley, 2016.ggplot2:Elegant Graphics for Data Analysis, Springer, Second Edition, 2016. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Information gains through explanatory data analysis and visualizations |
| 2 | Information about data object type and structure |
| 3 | Exploring and cleaning dataframes |
| 4 | Manipulating dataframes |
| 5 | Grouping and summarizing tables |
| 6 | Midterm Examination 1 |
| 7 | Tidying and reshaping tables |
| 8 | Visualizing univariate data |
| 9 | Comparing univariate data distributions |
| 10 | Re-expressing univariate data distributions |
| 11 | Midterm Examination 2 |
| 12 | Bivariate analysis |
| 13 | Detecting discontinuities in the data |
| 14 | Two-way tables analysis |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **Prepared by :** | Dr. Serdar NESLİHANOĞLU | **Date:** | 13/11/2018 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **STATISTICS (MSc)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** |  | **TITLE** | Statistical Methods in Machine Learning |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **MSc** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( x ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | | x | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Machine learning concepts and algorithms, selecting the appropriate machine learning algorithm, comparing the algorithm performance. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | It is aimed to provide information on the basic concept, methods and approaches in the Machine Learning field and to gain the ability to implement the students' machine learning methods to practical problems. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Learns the place of statistical methods in machine learning. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. The basic concepts in the field of machine learning is the knowledge of the algorithms.  2. Gain the ability to model and solve practical problems using machine learning methods.  3. It decides which machine learning method to the given data set is appropriate.  4. Can make evaluation and comparison using machine learning algorithms. | | | | | | | |
| **TEXTBOOK** | | | | | 1. Introduction to Machine Learning (Adaptive Computation and Machine Learning) by Ethem Alpaydin, 1st Edition, The MIT Press, October 2004.2. Chris Bishop, Pattern Recognition and Machine Learning, Springer 2006. | | | | | | | |
| **OTHER REFERENCES** | | | | | 1. Ian Goodfellow , Yoshua Bengio , Aaron Courville, Deep Learning, The MIT Press, 2016 | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Introduction to machine learning, basic terms, learning types, anomali detection, preparation of data. |
| 2 | Based on distance-based grouping, similarity and distance criteria. |
| 3 | K-Means Clustering, K-NN Classifier and Applications |
| 4 | Decision Trees, Regression Trees and Applications |
| 5 | Random Forest and Naive Bayes Algoritm |
| 6 | Model Selection Criteria And Cross Validation |
| 7 | Midterm |
| 8 | Linear Regression for High and Low Dimensional Data, Polynomial Regression |
| 9 | Classification Methods |
| 10 | Discriminant Analysis, Logistic Regression |
| 11 | Artificial Neural Networks, Single and Multilayer ANN |
| 12 | Introduction to Support Vector Machines |
| 13 | Kernel Functions |
| 14 | Linear and Nonlinear Support Vector Machines Applications |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE STATISTICS MSc PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to apply Statistical methods. |  |  |  |
| **LO 2** | Ability to access information in the are of Statistics in a scientific manner in depth and in width as well as to assess, interpret and use the information obtained. |  |  |  |
| **LO 3** | Ability to problem definition, data collection, modelling and analysis in Statistics and relevant area. |  |  |  |
| **LO 4** | Awareness of the new and developing practices in Statistics and ability to study and learn such practices whenever needed. |  |  |  |
| **LO 5** | Ability to recognize and formulate problems in Statistics and to develop methods to solve such problems in a Statistical decision process. |  |  |  |
| **LO 6** | Ability to use Statistical softwares. |  |  |  |
| **LO 7** | 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 8** | Ability to develop new or original ideas, to design complex systems or processes, and to come up with innovative/alternative solutions. |  |  |  |
| **LO 9** | Ability to design and develop a research project. |  |  |  |
| **LO 10** | Ability to convey the method and appropriate algorithms and writing a computer code. |  |  |  |

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| **Prepared by :** | Prof. Dr. Arzu ALTIN YAVUZ | **Date:** | 5.11.2021 |

**Signature**: