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| **BIOSTATISTICS DEPARTMENT MASTER’S DEGREE PROGRAM - Courses – ECTS Credits (Biyoistatistik YL)** | | | | | | | | | | | | | |
| **FAAL SEMESTER** | | | | | | | | | | | | | |
| **Course Code** | | **Course Name** | | | | **ECTS** | | **T+P+L** | | **C/E** | | **Language** | |
| 522003201 | | [MODERN RESEARCH METHODS](#DERS522001201) | | | | 7.5 | | 3+0+0 | | ELECTIVE | | TURKISH | |
| 522003202 | | [SAMPLING METHODS IN MEDICINE](#SAMPLINGMETHODSINMEDICINE) | | | | 7.5 | | 3+0+0 | | ELECTIVE | | TURKISH | |
| 522003203 | | [PARAMETRIC AND NONPARAMETRIC TESTS](#DERS522003203) | | | | 7.5 | | 3+0+0 | | ELECTIVE | | TURKISH | |
| 522003204 | | [ADVANCED DATA ANALYSIS METHODS IN HEALTH SCIENCES I](#DERS522003204) | | | | 7.5 | | 3+0+0 | | ELECTIVE | | TURKISH | |
| [522005207](#DERS522005207) | | [WRITING PAPER AND THESIS IN COMPUTER](#DERS522001207) | | | | 5 | | 2+1+0 | | ELECTIVE | | TURKISH | |
| [522003208](#DERS522003208) | | [INTERNET IN MEDICINE AND WEB PAGE DESIGN](#INTERNETINMEDICINEANDWEBPAGEDESIGN) | | | | 7.5 | | 3+0+0 | | ELECTIVE | | TURKISH | |
| [**522003209**](#DERS522003209) | | [**FUNDAMENTALS OF BIOSTATISTICS I**](#FundamentalsofBiostatisticsI) | | | | **7.5** | | **3+0+0** | | **COMPULSORY** | | **TURKISH** | |
| 522005210 | | [HEALTH INFORMATION FOR BIOSTATISTICIANS](#DERS522001210) | | | | 5 | | 2+0+0 | | ELECTIVE | | TURKISH | |
| [522005211](#DERS522005211) | | [MEDICAL TERMINOLOGY FOR BIOSTATISTICIANS](#DERS522001211) | | | | 5 | | 2+0+0 | | ELECTIVE | | TURKISH | |
| 522003212 | | [INTRODUCTION TO SIMULATION](#INTRODUCTIONTOSIMULATION) | | | | 7.5 | | 3+0+0 | | ELECTIVE | | TURKISH | |
| [522003213](#DERS522003213) | | [LINEAR MODELS IN BIOSTATISTICS](#LINEARMODELSINBIOSTATISTICS) | | | | 7.5 | | 3+1+0 | | ELECTIVE | | TURKISH | |
| 522003214 | | [DATA ANALYSIS WITH STATISTICAL PACKAGES - I](#DATAANALYSISWITHSTATISTICALPACKAGESI) | | | | 7.5 | | 2+2+0 | | ELECTIVE | | TURKISH | |
| **522003400** | | **SEMINAR** | | | | **7.5** | | **0+1+0** | | **COMPULSORY** | | **TURKISH** | |
| **522001700** | | **SPECIALIZATION FIELD COURSE** | | | | **5** | | **3+0+0** | | **COMPULSORY** | | **TURKISH** | |
| **522001200** | | **MASTER'S THESIS** | | | | **25** | | **0+1+0** | | **COMPULSORY** | | **TURKISH** | |
| **520111103** | | **RESEARCH METHODS AND PUBLISHING ETHICS\*** | | | | **7.5** | | **3+0+0** | | **COMPULSORY** | | **TURKISH** | |
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| **BIOSTATISTICS DEPARTMENT MASTER’S DEGREE PROGRAM - Courses – ECTS Credits (Biyoistatistik YL)** | | | | | | | | | | | | | |
| **SPRING SEMESTER** | | | | | | | | | | | | | |
| **Course Code** | | **Course Name** | | | | **ECTS** | | **T+P+L** | | **C/E** | | **Language** | |
| [**522004201**](#DERS522004201) | | [**STATISTICAL METHODS SPECIAL TO HEALTH AREA**](#STATISTICALMETHODSSPECIALTOHEALTHAREA) | | | | **7,5** | | **3+0+0** | | **COMPULSORY** | | **TURKISH** | |
| [522004203](#DERS522004203) | | [INTRODUCTION TO MEDICAL INFORMATICS](#INTRODUCTIONTOMEDICALINFORMATICS) | | | | 7,5 | | 3+1+0 | | ELECTİVE | | TURKISH | |
| 522004204 | | [CATEGORICAL DATA ANALYSIS METHODS IN MEDICINE I](#CATEGORICALDATAANALYSISMETHODSINMEDI) | | | | 7,5 | | 3+0+0 | | ELECTİVE | | TURKISH | |
| [522004205](#DERS522004205) | | [EVALUATING OF BIOASSAYS](#EVALUATINGBIOASSAYS) | | | | 7,5 | | 3+0+0 | | ELECTİVE | | TURKISH | |
| [522004206](#DERS522004206) | | [INTRODUCTION TO MULTIVARIATE ANALYSIS](#IntroductiontoMultivariateAnalysis) | | | | 7,5 | | 3+0+0 | | ELECTİVE | | TURKISH | |
| 522004207 | | [ADVANCED DATA ANALYSIS METHODS IN HEALTH SCIENCES II](#ADVANCEDDATAANALYSISMETHODSINHEALTHII) | | | | 7,5 | | 3+0+0 | | ELECTİVE | | TURKISH | |
| [**522004208**](#DERS522004208) | | [**FUNDAMENTALS OF BIOSTATISTICS II**](#FundamentalsofBiostatisticsII) | | | | **7,5** | | **3+0+0** | | **COMPULSORY** | | **TURKISH** | |
| [522004209](#DERS522004209) | | [INTRODUCTION TO SAS AND APPLICATIONS](#INTRODUCTIONTOSASANDAPPLICATIONS) | | | | 7,5 | | 3+0+0 | | ELECTİVE | | TURKISH | |
| [522004210](#DERS522004210) | | [CLINICAL TRIALS I](#CLINICALTRIALSI) | | | | 7,5 | | 3+0+0 | | ELECTİVE | | TURKISH | |
| [522004211](#DERS522004211) | | [DATA ANALYSIS WITH STATISTICAL PACKAGES II](#DATAANALYSISWITHSTATISTICALPACKAGESII) | | | | 7,5 | | 2+2+0 | | ELECTİVE | | TURKISH | |
| **522003400** | | **SEMINAR** | | | | **7,5** | | **0+1+0** | | **COMPULSORY** | | **TURKISH** | |
| **522001700** | | **SPECIALIZATION FIELD COURSE** | | | | **5** | | **3+0+0** | | **COMPULSORY** | | **TURKISH** | |
| **522001200** | | **MASTER'S THESIS** | | | | **25** | | **0+1+0** | | **COMPULSORY** | | **TURKISH** | |
| **520111103** | | **RESEARCH METHODS AND PUBLISHING ETHICS\*** | | | | **7,5** | | **3+0+3** | | **COMPULSORY** | | **TURKISH** | |
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| **COURSE CODE** : | | **522003201** | | **DEPARTMENT:** BIOSTATISTICS | | | | | | | |
| **COURSE NAME:** MODERN RESEARCH METHODS | | | | | | | | | | | |
| **INSTRUCTOR NAME** | | | **COURSE LANGUAGE**  **Turkish** : **X**  **English** : | | | **COURSE CATAGORY** | | | | | |
| **Technical** | | **Medical** | | **Other(……)** | |
| PROF. DR. FEZAN MUTLU | | |  | | |  | | **X** | |  | |

**COURSE LEVEL**

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| **PROPAEDEUTIC** | **M.SC.** | **PH.D.** | **COURSE OF PROVINCE** |
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| **SEMESTER** | **WEEKLY COURSE PERIOD** | | | **COURSE OF** | | |
| **Theoretical** | **APPLICATION** | **Laboratory** | **Credit** | **ECTS** | **TYPE** |
| **Spring**  **Autumn** **X** | 3 | 0 | 0 | 3 | 7.5 | |  |  | | --- | --- | | COMPULSORY | ELECTIVE | |  | **X** | |

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| **EVALUATION CRITERIA** | | | |
| **SEMESTER ACTIVITIES** | **Type of activity** | **Number** | **Percentage (%)** |
| Midterm Exam | **1** | **50** |
| Quiz |  |  |
| Homework |  |  |
| Project |  |  |
| Oral examination |  |  |
| Other (………) |  |  |
| **Final Exam** | | **50** |
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| **PREREQUISITE(S)** | - | | |
| **SHORT COURSE CONTENT** | This course includes topics such as research planning, research topic selection, scanning of sources, scientific writing critique, determining research objectives, determining the research community and sample, determining data summarization techniques, preparing a research project, trial and main research application, scientific writing rules. | | |
| **COURSE AIMS** | This course aims to explain the planning, implementation, supervision of scientific research, data analysis methods, and scientific report, article and thesis writing techniques. | | |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | Conducting and publishing research using modern research techniques | | |
| **LEARNING OUTCOMES OF THE COURSE** | This course provides students with basic skills in planning and conducting scientific research. At the end of the course, students will be able to determine a research topic, conduct a literature review by scanning classical and current sources, define research variables and hypothesize, design a research project, and apply appropriate data collection and presentation methods. In addition, students will gain the ability to perform data analysis using statistical software programs, prepare scientific papers in accordance with academic writing rules (APA, TUBITAK, etc.), and understand the principles of research ethics. As a result, they will gain the competence to conduct and publish scientific studies using modern research methods. | | |
| **TEXTBOOK** | OZDAMAR, K. (2003). Modern Scientific Research Methods. Eskisehir: Kaan Bookstore. | | |
| **OTHER REFERENCES** | DAY, RA (1996). How to Write and Publish a Scientific Article? Ankara: Tübitak. | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | Computer or laptop. Statistical analysis software  Microsoft Word or similar text editing programs  Internet connection. Accessible academic databases (PubMed, Google Scholar, etc.) for literature searches  Scientific writing guides (APA, TUBITAK, IMRAD etc.)  Project planning and documentation tools (templates, forms, etc.) | | |

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| **WEEK** | **SUBJECTS/TOPICS** |
| **1** | Research Planning, |
| **2** | Selecting a Research Topic |
| **3** | Scanning Classical and Current Resources, Internet, Library resource scans, |
| **4** | Scientific writing critique, scientific article reading principles, reading, reviewing, evaluating and classifying scanned articles |
| **5** | Determining the research location, society of the time or the Community at Risk, its objectives, problems, variables and formulating research and statistical hypotheses. |
| **6** | Standard contents of the subsections of the research article according to the IMRAD Rule, APA and TUBITAK writing style (Title, Authors, Abstract, Introduction, Materials and Methods, Findings and Statistical Analysis, Discussion and Conclusion, References, Acknowledgements, Appendixes) |
| **7** | Research Community and Sample selection, Power analysis and sample size calculations and sampling methods |
| **8** | **Midterm Exam** |
| **9** | Data summarization and presentation techniques (Text, Table, Graph, Statistics and Mixed) |
| **10** | Preparation of research plan, project and protocol |
| **11** | Preparation of data collection and storage forms and styles (Survey, Research form and Scale/Questionnaire forms) |
| **12** | Plot research implementation, checking research conditions and preparations for the main implementation and implementation of the main research |
| **13** | Collecting research data, entering it into R, performing control operations, analyzing data with the help of R statistical procedures and making decisions according to test results. |
| **14** | Conducting a sample research application Writing the article of this research according to scientific writing rules (APA 6.0 and TUBITAK) |
| **15** | General Ethical Rules and Research Ethics |
| **16** | Final exam |

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| **CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAM LEARNING OUTCOMES** | | **Contribution Level** | | |
| **NO** | **LESSON OUTCOMES** | **1**  **Little** | **2**  **Middle** | **3**  **High** |
| LO 1 | Explain the basic concepts of research planning and develop a research plan. |  |  | X |
| LO 2 | Selects the appropriate research topic in scientific research. |  | X |  |
| LO 3 | Analyzes current and classical sources by conducting literature review. |  |  | X |
| LO 4 | Reads scientific articles, evaluates them critically and classifies them. |  | X |  |
| LO 5 | Defines and structures the research problem, purpose, variables and hypotheses. |  |  | X |
| LO 6 | Prepares article subheadings in accordance with IMRAD, APA and TUBITAK formats. |  | X |  |
| LO 7 | Selects the research universe and sample, performs power analysis and sample size calculations. |  |  | X |
| LO 8 | Uses data summarization techniques (text, tables, graphics) appropriately. |  | X |  |
| LO 9 | Prepares the research plan, project and protocol. |  | X |  |
| LO10 | Creates data collection tools (questionnaires, measurement forms, etc.). |  | X |  |
| LO11 | Evaluates and improves the research process by conducting pilot applications. |  |  | X |
| LO12 | Performs data analysis using R or similar software. |  |  | X |
| LO13 | Interprets statistical test results and makes scientific decisions. |  |  | X |
| LO14 | Reports scientific research results in accordance with academic writing rules. |  | X |  |
| LO15 | Acts in accordance with ethical principles in research and explains them. |  | X |  |
| LO16 | Independently plans, conducts and concludes scientific research. |  |  | X |

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| **INSTRUCTOR NAME**  **Signature**  PROF. DR. FEZAN MUTLU | | | | **DATE** | | | | |
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| **COURSE CODE:** | | **522003202** | | | **DEPARTMENT:** BIOSTATISTICS | | | | |
| **COURSE NAME:** SamplIng Methods In MedIcIne | | | | | | | | | |
| **INSTRUCTOR NAME**  PROF. DR. CENGİZ BAL | | | **COURSE LANGUAGE**  **Turkish: X**  **English:** | | | **COURSE CATAGORY** | | | |
| Technical | Medical | Other(……) | |
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**COURSE LEVEL**

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| **PROPAEDEUTIC** | **M.SC.** | **PH.D.** | **COURSE OF PROVINCE** |
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| **SEMESTER** | **WEEKLY COURSE PERIOD** | | | **COURSE OF** | | |
| **Theoretical** | **APPLICATION** | **Lab** | **Credit** | **ECTS** | **TYPE** |
| Spring  Fall **X** | 3 | 0 | 0 | 3 | 7.5 | |  |  | | --- | --- | | Z RUN | ELECTIVE | |  | **X** | |

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| **EVALUATION CRITERIA** | | | |
| **SEMESTER ACTIVITIES** | **Type of activity** | **Number** | **Percentage (%)** |
| Midterm Exam | **1** | **50** |
| Quiz |  |  |
| Homework |  |  |
| Project |  |  |
| Oral examination |  |  |
| Other (………) |  |  |
| **Final Exam** | | **50** |
| **PREREQUISITE(S)** | - | | |
| **SHORT COURSE CONTENT** | This course covers the requirements for successful sampling, Determination of Sample Size  It includes topics on sampling methods that are not based on probability rules, sampling methods that are based on probability rules, and sampling distributions. | | |
| **COURSE AIMS** | This course aims to teach students sampling methods. | | |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | The aim of this course is to bring students to a level where they can use sampling techniques effectively in the health field. | | |
| **LEARNING OUTCOMES OF THE COURSE** | In this course, students will be able to understand the basic concepts of sampling and sampling methods and understand the reasons for a successful sampling. They will learn how to calculate the sample size and classify different sampling techniques. They will distinguish the differences between non-probability sampling methods and quota and quota sampling. They will define field sampling and relate it to the monograph. They will explain sampling methods based on probability rules; they will compare simple random, systematic, stratified, cluster, stepwise and multi-phase sampling techniques and determine their appropriate usage areas. They will learn controlled and proportional to size sampling types and will be able to apply them in appropriate situations. They will relate mixed sampling methods to other methods. They will analyze sampling distributions and will be able to interpret these distributions graphically and numerically. Finally, they will gain the competence to select and apply the appropriate sampling approach in the context of scientific research by comparing all these methods. | | |
| **TEXTBOOK** | ÖZDAMAR, K.: Biostatistics with PASW, Kaan Bookstore, 2010, Eskişehir.  ÖZDAMAR, K.: Modern Scientific Research Methods, Kaan Bookstore, 2003, Eskişehir. | | |
| **OTHER REFERENCES** | ÖZDAMAR, K.: Statistical Data Analysis with Package Programs-1, Kaan Bookstore, 2011, Eskişehir.  ZAR, JH: Biostatistical Analysis, Prentice-Hall, Inc., USA, 1974.  SERPER, Ö.: Applied Statistics 2, Filiz Bookstore, Istanbul, 1986.  SUMBULOGLU V., SUMBULOGLU, K: Research Methods in Health Sciences, Hatiboglu Publishing House, 1998, Ankara.  DAY, RA: How to Write and Publish a Scientific Article? TUBITAK, 1996.  KARASAR N.: Scientific Research Methods, Science Publications, 1986, Ankara | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | Computer or laptop  R or similar statistical analysis software  Internet connection (for access to literature and sample data sources)  Sample datasets for data analysis  Lecture notes, formulas, and sample table/scatter templates  Access to academic resources (library or digital databases) | | |

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| **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **SUBJECTS/TOPICS** |
| **1** | Introduction to sampling and sampling methods |
| **2** | Requirements for successful sampling |
| **3** | Determination of Sample Volume |
| **4** | Sampling methods that are not based on probability rules |
| **5** | Quota sampling, Quota sampling |
| **6** | Field sampling, Monograph |
| **7** | Sampling methods based on probability rules |
| **8** | **Midterm Exam** |
| **9** | Simple random sampling, Systematic sampling |
| **10** | Stratified sampling, Cluster sampling |
| **11** | Stepwise sampling, Multiphase sampling |
| **12** | Controlled sampling, Proportional to size sampling |
| **13** | Mixed sampling |
| **14** | Sampling distributions - I |
| **15** | Sampling distributions - II |
| **16** | End of semester exam |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE ELECTRICAL ELECTRONICS ENGINEERING MSC PROGRAM LEARNING OUTCOMES** | | **Contribution Level** | | |
| **NO** | **LESSON OUTCOMES** | **1**  **Little** | **2**  **Middle** | **3**  **High** |
| LO 1 | Defines the basic concepts of sampling and sampling methods. |  |  | X |
| LO 2 | Explains the scientific reasons for a successful sampling. |  | X |  |
| LO 3 | Calculates sample size in research and selects appropriate methods. |  |  | X |
| LO 4 | Classify non-probability sampling methods. |  | X |  |
| LO 5 | Define quota and quota sampling and explain their differences. |  | X |  |
| LO 6 | Relate the concepts of field sampling and monograph. | X |  |  |
| LO 7 | Define and classify probability-based sampling methods. |  |  | X |
| LO 8 | Compare simple random and systematic sampling techniques. |  | X |  |
| LO 9 | Explain stratified and cluster sampling methods with examples. |  | X |  |
| LO10 | Distinguish between stepwise and multiphase sampling techniques. |  | X |  |
| LO11 | Defines types of controlled sampling and applies them in appropriate scenarios. |  | X |  |
| LO12 | Explain proportional sampling and calculate with examples. |  |  | X |
| LO13 | Compare mixed sampling techniques with other methods. |  | X |  |
| LO14 | Analyze the basic properties of sampling distributions. |  |  | X |
| LO15 | Interpret sampling distributions graphically and numerically. |  | X |  |
| LO16 | Select and apply appropriate sampling methods in the context of a scientific research. |  |  | X |

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| **INSTRUCTOR NAME**  **Signature**  PROF. DR. CENGİZ BAL | **DATE** |

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| **COURSE CODE:** | | **522003203** | | **DEPARTMENT:** BIOSTATISTICS | | | |
| **COURSE NAME:** | | PARAMETRIC AND NONPARAMETRIC TESTS | | | | | |
| **INSTRUCTOR NAME**  PROF. DR. FEZAN MUTLU | | | **COURSE LANGUAGE**  **Turkish: X**  **English:** | | **COURSE CATAGORY** | | |
| Technical | Medical | Other(……) |
|  | | |  | |  | **X** |  |

**COURSE LEVEL**

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| **PROPAEDEUTIC** | **M.SC.** | **PH.D.** | **COURSE OF PROVINCE** |
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| **SEMESTER** | **WEEKLY COURSE PERIOD** | | | **COURSE OF** | | |
| **Theoretical** | **APPLICATION** | **Lab** | **Credit** | **ECTS** | **TYPE** |
| Spring  Fall **X** | 3 | 0 | 0 | 3 | 7.5 | |  |  | | --- | --- | | MANDATORY | ELECTIVE | |  | **X** | |

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| **EVALUATION CRITERIA** | | | |
| **SEMESTER ACTIVITIES** | **Type of activity** | **Number** | **Percentage (%)** |
| Midterm Exam | **1** | **50** |
| Quiz |  |  |
| Homework |  |  |
| Project |  |  |
| Oral examination |  |  |
| Other (………) |  |  |
| **Final Exam** | | **50** |
| **PREREQUISITE(S)** | - | | |
| **SHORT COURSE CONTENT** | This course includes measures of relationship and correlation, inference of statistical tests in factorial experiments, inference of dependent two and more sample statistical tests, inference of independent two and more sample statistical tests, inference of dependent two sample statistical tests, inference of independent two sample statistical tests, and inference of single sample statistical tests. | | |
| **COURSE AIMS** | To teach relationship and correlation measurements, statistical inference in factorial experiments, statistical inference tests with two and more dependent samples, two and more independent samples, two dependent samples, two independent samples and one sample. | | |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | To bring students to a good level where they can use parametric and non-parametric methods in the health field. | | |
| **LEARNING OUTCOMES OF THE COURSE** | At the end of this course, students will have theoretical knowledge about parametric and nonparametric statistical tests and will be able to apply these tests in health sciences research. Students will be able to interpret relationship and correlation analyses, and distinguish tests used in factorial experiments. They will be able to select and apply statistical analyses involving dependent and independent samples and more samples. They will also be able to distinguish single sample, dependent and independent sample tests, and will be able to select and interpret parametric or nonparametric tests in accordance with the distribution characteristics of the data. In this way, students will be able to direct their research by evaluating the analysis results they obtain with a scientific approach. | | |
| **TEXTBOOK** | Prof. Dr. Kazım ÖZDAMAR “Statistical Data Analysis with Package Programs I, Kaan Bookstore, 2011.David J. Sheskin “Handbook of parametric and nonparametric statistical procedures”, Chapman&Hall/CRC, 2000. | | |
| **OTHER REFERENCES** | Armitage, P., Berry, G., Matthews, J. N. S. (2002). Statistical Methods in Medical Research. Blackwell Science.Altman, D. G. (1991). Practical Statistics for Medical Research. Chapman & Hall/CRC. | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | Computer or laptopR, JAMOVI or similar statistical analysis programsInternet connection (for literature search and access to data sources)Lecture notes, formulas, and sample data setsGraph drawing tools (for sampling distribution and result display)Academic article access systems (PubMed, Google Scholar etc.) | | |

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| **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **SUBJECTS/TOPICS** |
| **1** | z test, t test, chi-square test for population variance, evaluating population skewness value, evaluating population kurtosis value |
| **2** | Wilcoxon signed-ranks test, Kolmogorov-Smirnov goodness-of-fit test, Chi-square goodness-of-fit test |
| **3** | Binomial sign test for single sample, runs test for single sample |
| **4** | Independent two-sample t-test, Mann Whiyney U test, independent two-sample Kolmogorov-Smirnov test |
| **5** | Siegel-Tukey test for equal variance, Moses test for equal variance, chi-square test in rxc tables |
| **6** | T-test for two independent samples, Wilcoxon signed ranks test for paired trials |
| **7** | Dependent two sample binomial test, Mcnemar test |
| **8** | **Midterm Exam** |
| **9** | Inter-factor single factor variance analysis |
| **10** | Kruskal Wallis sequential one-way analysis of variance |
| **11** | Van der Waerden test of normal scores for K independent samples |
| **12** | Within-factor single-factor analysis of variance, Friedman sequential two-way analysis of variance, Cochran Q test |
| **13** | Statistical inference in factorial experiment |
| **14** | Pearson product-moment Correlation coefficient, Spearman's Correlation coefficient |
| **15** | kendall's tau, kendall's coefficient of agreement, goodman and kruskal's gamma |
| **16** | **Final exam** |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE ELECTRICAL ELECTRONICS ENGINEERING MSC PROGRAM LEARNING OUTCOMES** | | **Contribution Level** | | |
| **NO** | **LESSON OUTCOMES** | **1**  **Little** | **2**  **Middle** | **3**  **High** |
| LO 1 | Explain the Z test, t test and variance tests and apply them when appropriate. |  |  | X |
| LO 2 | Distinguish between goodness of fit tests such as the chi-square test and the Kolmogorov-Smirnov test. |  | X |  |
| LO 3 | Selects appropriate parametric tests for dependent and independent samples. |  |  | X |
| LO 4 | Recognize and compare nonparametric tests (e.g., Mann Whitney U, Wilcoxon, McNemar). |  | X |  |
| LO 5 | Applies single sample, two sample and equality tests (Sign test, Moses test etc.). |  |  | X |
| LO 6 | Analyzes differences between two or more groups (Kruskal Wallis, ANOVA, Friedman, etc.). |  |  | X |
| LO 7 | Classify and apply the tests used in factorial experiments. |  | X |  |
| LO 8 | Is knowledgeable about correlation tests (Pearson, Spearman, Kendall) and selects the appropriate one. |  |  | X |
| LO 9 | Can choose the test appropriate to the distribution of the data. |  |  | X |
| LO10 | Uses R or other software to perform non-parametric tests. |  | X |  |
| LO11 | Evaluates test results and interprets their impact on research results. |  |  | X |
| LO12 | Compares parametric tests with nonparametric tests. |  | X |  |
| LO13 | Explains statistical significance and interpretation in a scientific context. |  |  | X |
| LO14 | Selects appropriate statistical tests in experimental research. |  |  | X |
| LO15 | Analyzes graphical, tabular and descriptive data. | X |  |  |
| LO16 | It determines the appropriate test combination for the research by evaluating all tests holistically. |  |  | X |

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| **INSTRUCTOR NAME**  **Signature**  PROF.DR. FEZAN MUTLU | **DATE** |

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| **COURSE CODE:** **522003204** | | | **DEPARTMENT:** BIOSTATISTICS | | | |
| **COURSE NAME:** ADVANCED DATA ANALYSIS METHODS IN HEALTH SCIENCES I | | | | | | |
| **INSTRUCTOR NAME** | | **COURSE LANGUAGE**  **Turkish: X**  **English:** | | **COURSE CATAGORY** | | |
| Technical | Medical | Other(……) |
| PROF. DR. K.SETENAY ÖNER | |  | |  | **X** |  |

**COURSE LEVEL**

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| **PROPAEDEUTIC** | **M.SC.** | **PH.D.** | **COURSE OF PROVINCE** |
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| **SEMESTER** | **WEEKLY COURSE PERIOD** | | | **COURSE OF** | | |
| **Theoretical** | **APPLICATION** | **Laboratory** | **Credit** | **ECTS** | **TYPE** |
| Spring  Fall **X** | 3 | 0 | 0 | 3 | 7.5 | |  |  | | --- | --- | | COMPULSORY | ELECTIVE | |  | **X** | |

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| **EVALUATION CRITERIA** | | | |
| **SEMESTER ACTIVITIES** | **Type of activity** | **Number** | **Percentage (%)** |
| Midterm Exam | **1** | **50** |
| Quiz |  |  |
| Homework |  |  |
| Project |  |  |
| Oral examination |  |  |
| Other (………) |  |  |
| **Final Exam** | | **50** |
| **PREREQUISITE(S)** | - | | |
| **SHORT COURSE CONTENT** | Introduction of Advanced Data Analysis Methods in Health Sciences, areas of use and their application are explained. | | |
| **COURSE AIMS** | Advanced Data Analysis Methods in scientific studies conducted by researchers in the field of health . | | |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | The use of Advanced Data Analysis Methods through the R Package Program is to bring it to a level that can be used in the analysis of scientific studies in the field of health. | | |
| **LEARNING OUTCOMES OF THE COURSE** | At the end of this course, students will have the knowledge and skills to perform advanced data analysis in health sciences by getting to know multivariate statistical analysis methods theoretically and practically. Students will be able to interpret techniques such as matrix and vector operations, Hotelling T² test, multivariate regression, factor analysis, discriminant analysis and inter-set correlation both theoretically and apply them through software such as R. In addition, they will gain the ability to interpret analysis results in scientific research and reach meaningful results with appropriate data analysis. In this way, students will be able to evaluate multivariate data in the field of health, prepare scientific reports and independently conduct advanced statistical analysis. | | |
| **TEXTBOOK** | Statistical Data Analysis with Package Programs II: Prof. Dr. Kazım ÖZDAMAR, Kaan Bookstore, 2010 | | |
| **OTHER REFERENCES** | 1- Applied Multivariate Statistical Analysis, RA Johnson and DW Wichern, Prentice Hall Inc., New Jersey, 1988.  2- SPSS Inc. Advanced Models, 11.0, SPSS Inc. Chicago, 2001  3- Cleophas, TJ, Zwinderman, AH, Cleophas, TF, Cleophas, Ep, (2009), Statistics Applied to Clinical Trials, 4th. Edt., Springer, Berlin. | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | Computer or laptop  Multivariate analysis programs  Excel or similar spreadsheet programs  Textbook and supporting resources  Internet connection for access to academic articles and datasets  Sample data files used in statistical analysis  Calculator or software supported tools for matrix and vector calculations  Projector or smart board (for instructor presentation) | | |

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| **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **SUBJECTS/TOPICS** |
| **1** | Matrix and Vector Operations in Multivariate Statistical Analysis |
| **2** | Two Sample Hotelling T 2 Test |
| **3** | Implementation of Two Sample Hotelling T2 Test in R |
| **4** | Multivariate Linear Regression Analysis |
| **5** | Application of Multivariate Linear Regression Analysis in R |
| **6** | Main Components Analysis |
| **7** | Application of Principal Component Analysis in R |
| **8** | **MIDTERM EXAM** |
| **9** | Factor Analysis I (Factor Models, Estimation of Factors and Finding the Appropriate Number of Factors) |
| **10** | Factor Analysis II (Factor Coefficients, Factor Scores, Factor Rotation) |
| **11** | Application of Factor Analysis in R |
| **12** | Discriminant Analysis |
| **13** | Implementation of Discriminant Analysis in R |
| **14** | Inter-Set Correlation Analysis |
| **15** | Implementation of Inter-Set Correlation Analysis in R |
| **16** | **FINAL EXAM** |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE ELECTRICAL ELECTRONICS ENGINEERING MSC PROGRAM LEARNING OUTCOMES** | | **Contribution Level** | | |
| **NO** | **LESSON OUTCOMES** | **1**  **Little** | **2**  **Middle** | **3**  **High** |
| LO 1 | Describes the concepts of multivariate analysis and the basic statistical building blocks. |  |  | X |
| LO 2 | Applies matrix and vector operations in data analysis. |  | X |  |
| LO 3 | Explain the concept of Hotelling's T² test and apply it on appropriate data sets. |  |  | X |
| LO 4 | Interpret multivariate linear regression analysis and evaluate its results. |  |  | X |
| LO 5 | Applies multivariate regression analysis with R software. |  | X |  |
| LO 6 | Explain the basic assumptions of the main component analysis. | X |  |  |
| LO 7 | Apply main component analysis with R and interpret the results. |  | X |  |
| LO 8 | Defines factor analysis models and determines the appropriate number of factors. |  |  | X |
| LO 9 | Analyzes by interpreting factor coefficients and scores. |  | X |  |
| LO10 | Applies factor analysis with R software. |  | X |  |
| LO11 | Classify discriminant analysis methods and explain their basic assumptions. |  |  | X |
| LO12 | Applies discriminant analysis with R software. |  | X |  |
| LO13 | Explains the theoretical structure of inter-set correlation analysis. |  |  | X |
| LO14 | Applies inter-set correlation analysis with R. |  | X |  |
| LO15 | It reports multivariate analysis results in the SPRSS environment with a scientific perspective. |  |  | X |
| LO16 | Integrates advanced statistical methods into original research in the field of health. |  |  | X |

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| **INSTRUCTOR NAME**  **Signature**  PROF. DR. K.SETENAY ÖNER | **DATE** |

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| **COURSE CODE:** | **522005207** | | **DEPARTMENT:** BIOSTATISTICS | | | |
| **COURSE NAME:** WRITING PAPER AND THESIS IN COMPUTER | | | | | | |
| **INSTRUCTOR NAME**  ASS. PROF. MUZAFFER BİLGİN | | **COURSE LANGUAGE**  **Turkish: X**  **English: ** | | **COURSE CATAGORY** | | |
| Technical | Medical | Other(……) |
|  | |  | |  | **X** |  |

**COURSE LEVEL**

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| **PROPAEDEUTIC** | **M.SC.** | **PH.D.** | **COURSE OF PROVINCE** |
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| **SEMESTER** | **WEEKLY COURSE PERIOD** | | | **COURSE OF** | | | |
| **Theoretical** | **APPLICATION** | **Lab** | **Credit** | **ECTS** | **TYPE** | |
| Spring ****  Fall **X** | 2 | 1 | 0 | 2.5 | 5 | MANDATORY ELECTIVE  ** X** | |
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| **EVALUATION CRITERIA** | | | | | | | |
| **SEMESTER ACTIVITIES** | | | **Type of activity** | | | **Number** | **Percentage (%)** |
| Midterm Exam | | | **1** | **40** |
| Quiz | | |  |  |
| Homework | | |  |  |
| Project | | |  |  |
| Oral examination | | |  |  |
| Other (………) | | |  |  |
| **Final Exam** | | | | **60** |
| **PREREQUISITE(S)** | | | - | | | | |
| **SHORT COURSE CONTENT** | | | In this course, the planning and implementation of scientific studies, which are important for the best evaluation and presentation of scientific studies, and the techniques of writing scientific reports, articles and thesis are explained with computer applications. | | | | |
| **COURSE AIMS** | | | It aims to teach the rules of article and thesis writing that researchers in the field of health must follow, such as the rules of organizations such as the American Medical Ass. (AMA), American Statistical Ass. (ASA), American Phyc. Ass. (APA), and Medical Research Council (MRC). | | | | |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | | | Explanation of article and thesis writing rules with applications. | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | At the end of this course, students will gain the knowledge and skills to effectively manage the process from planning a scientific study to reporting and writing. Students will learn computer-aided techniques to be used in writing theses and articles; they will recognize and apply scientific writing rules recommended by organizations such as the American Medical Association (AMA), American Statistical Association (ASA), and Medical Research Council (MRC). In addition, they will be able to create the title, abstract, introduction, method, findings, discussion and reference sections in accordance with academic writing rules, comply with ethical principles and reach a level where they can transform their work into a publishable form. | | | | |
| **TEXTBOOK** | | | Modern Scientific Research Methods: Prof. Dr. Kazım ÖZDAMAR, Kaan Bookstore,2003. | | | | |
| **OTHER REFERENCES** | | | SUMBULOGLU V., SUMBULOGLU, K: Research Methods in Health Sciences, Hatiboglu Publishing House, 1998, Ankara.  DAY, RA: How to Write and Publish a Scientific Article? TUBITAK, 1996.  KARASAR N.: Scientific Research Methods, Science Publications, 1986, Ankara  www.usuhs.mil/meh/howto.html | | | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | | | Computer or laptop  Microsoft Word, Google Docs or similar text editor software  Internet connection (for access to literature searches, referencing tools, and writing guides)  Referencing and reference management programs (EndNote, Mendeley, Zotero, etc.)  Academic writing guides (APA, AMA, MRC, Vancouver, etc.)  Writing templates and sample thesis/article documents  Electronic dictionaries and grammar checkers (Grammarly, TDK etc.)  Projector or smart board (for instructor presentation) | | | | |

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| **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **SUBJECTS/TOPICS** |
| 1 | What is a Scientific Study? |
| 2 | The Importance of Scientific Studies in the Field of Health |
| 3 | Research Planning |
| 4 | Selecting a Research Topic |
| 5 | Scanning of Resources |
| 6 | Determining Research Objectives |
| 7 | Determination of Research Variables |
| 8 | **Midterm Exam** |
| 9 | Scientific Writing Criticism |
| 10 | Scientific Writing Samples |
| 11 | International Scientific Writing Rules |
| 12 | APA STYLE, ASA STYLE |
| 13 | CHICAGO STYLE, CONSORT STYLE |
| 14 | HARVARD STYLE, MLA STYLE, IMRAD STYLE |
| 15 | Evaluation of Assignments |
| 16 | **End of semester exam** |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE ELECTRICAL ELECTRONICS ENGINEERING MSC PROGRAM LEARNING OUTCOMES** | | **Contribution Level** | | |
| **NO** | **LESSON OUTCOMES** | **1**  **Little** | **2**  **Middle** | **3**  **High** |
| LO 1 | Defines scientific study and explains its types and importance. |  |  | X |
| LO 2 | Interpret the planning process of scientific research in the field of health. |  | X |  |
| LO 3 | Explains the basic steps of research planning. |  | X |  |
| LO 4 | Explains the relationship between subject and title in the process of determining the research topic. |  | X |  |
| LO 5 | Conducts literature searches and uses resources in accordance with scientific ethical rules. |  |  | X |
| LO 6 | It establishes the purpose and objectives of the research. |  | X |  |
| LO 7 | Can develop hypotheses by determining research variables. |  |  | X |
| LO 8 | Criticizes scientific writing and distinguishes formal and content errors. | X |  |  |
| LO 9 | Evaluates structural differences by analyzing scientific writing samples. |  | X |  |
| LO10 | Recognize and compare international article writing rules (APA, ASA, IMRAD, etc.). |  |  | X |
| LO11 | Applies APA and ASA style in scientific article writing. |  |  | X |
| LO12 | Distinguish the features of different writing systems such as CHICAGO, CONSORT, HARVARD, MLA. |  | X |  |
| LO13 | Applies spelling rules correctly in a computer environment. |  |  | X |
| LO14 | Acts in accordance with ethical principles during the article and thesis writing process. |  | X |  |
| LO15 | Can write and compose the sections of a scientific text (title, abstract, introduction, method, conclusion, discussion, bibliography). |  |  | X |
| LO16 | Plans the thesis/article preparation process from beginning to end, implements it and makes it ready for presentation. |  |  | X |

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| **INSTRUCTOR NAME**  **Signature**  ASS. PROF. MUZAFFER BİLGİN | **DATE** |

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| **COURSE CODE:** | | **522003208** | | **DEPARTMENT:** BIOSTATISTICS | | | |
| **COURSE NAME:** INTERNET IN MEDICINE AND WEB PAGE DESIGN | | | | | | | |
| **INSTRUCTOR NAME** | | | **COURSE LANGUAGE**  **Turkish: X**  **English:** | | **COURSE CATAGORY** | | |
| Technical | Medical | Other(……) |
| ASS. PROF. MUZAFFER BİLGİN | | |  | |  | **X** |  |

**COURSE LEVEL**

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| **PROPAEDEUTIC** | **M.SC.** | **PH.D.** | **COURSE OF PROVINCE** |
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| **SEMESTER** | **WEEKLY COURSE PERIOD** | | | **COURSE OF** | | |
| **Theoretical** | **APPLICATION** | **Laboratory** | **Credit** | **ECTS** | **TYPE** |
| Spring  Fall **X** | 3 | 0 | - | 3 | 7.5 | |  |  | | --- | --- | | COMPULSORY | ELECTIVE | |  | **X** | |

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| **EVALUATION CRITERIA** | | | |
| **SEMESTER ACTIVITIES** | **Type of activity** | **Number** | **Percentage (%)** |
| Midterm Exam | **1** | **50** |
| Quiz |  |  |
| Homework |  |  |
| Project |  |  |
| Oral examination |  |  |
| Other (………) |  |  |
| **Final Exam** | | **50** |
| **PREREQUISITE(S)** | - | | |
| **SHORT COURSE CONTENT** | Internet and Web Fundamentals, Web Page Structure, Hyperlinking, Web Design Cascading Style Sheets (CSS), Web Graphics Design, Page Layout, Tables, Forms, Media and Interactivity, Web Publishing | | |
| **COURSE AIMS** | To actively teach students the basics of the Internet and the Web and to enable students to create web pages/sites. | | |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | To enable students to publish their own Web pages/sites on a subject on the Internet. | | |
| **LEARNING OUTCOMES OF THE COURSE** | Students who complete this course will have the knowledge and skills to comprehend the basic principles of the internet and web technologies and to create the structure of web pages. They can design simple and effective web pages with basic markup languages such as HTML and CSS, and apply basic web design components such as hyperlinking, graphic placement, table and form creation. They can integrate media elements into the website and publish content. Students also learn to create web structures that can present their own scientific studies or educational content online; they become able to apply basic design decisions on issues such as visual layout, user experience and accessibility. | | |
| **TEXTBOOK** | Moris, TF Basic Of Web Design HTML, XHTML, CSS, HTML 5 , CSS 3 , Pearson Education, Inc., Boston, 2012. | | |
| **OTHER REFERENCES** | Nierderst, J. Learning Web Page Design, Second Edition, O'relly & Associates, Inc. USA, 2003. | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | Computer or laptop. Internet connection  Web browsers (Google Chrome, Firefox, Edge, etc.)  Text editors that can edit HTML, CSS and JavaScript (Visual Studio Code, Notepad++, Sublime Text etc.)  Graphics editing tools (e.g. Canva, GIMP, Photoshop - optional)  USB stick or cloud storage (for storing and sharing work)  Projector or smart board (for instructor presentation)  Sample web page templates and ready-made code snippets for educational purposes | | |

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| **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **SUBJECTS/TOPICS** |
| **1** | Internet and Web Fundamentals: Internet and the Web, Web Standards and Accessibility, Information on the Web, Web Browsers and Service Providers, Internet Protocol, Uniform Resource Identifiers and Internet Domain Names, An Overview of HTML, Your First Web Page, Head, Body, Title, and Meta Elements |
| **2** | Web Page Structure Fundamentals: Heading and Paragraph Elements, Horizontal Line Breaks, Blockquote Element, Phrase Elements, Ordered and Unordered Lists, Description List, Special Entity Characters, Div Element, HTML Syntax Validation |
| **3** | Hyperlinking Basics: Anchor Element, Absolute and Relative Hyperlinks, Practicing with Hyperlinking, Email Hyperlinking, Section Identifiers |
| **4** | Web Design Fundamentals: Designing for Your Audience, Website Organization, Principles of Visual Design, Designing for Accessibility, Use of Text, Web Color Palette, Use of Colors, Use of Graphics and Multimedia, Navigation Design, Page Layout Design |
| **5** | Cascading Style Sheets (CSS) Fundamentals I: Overview of CSS, CSS Selectors and Declarations, CSS Syntax for Color Values, Configuring Embedded CSSs, Configuring External CSSs, CSS Class, ID, and Contextual Selectors, Span Elements, Parametrics with CSS, Validating CSS Syntax |
| **6** | Web Graphic Design Fundamentals: Web Graphics, Image Element, Optimizing an Image for the Web, Image Hyperlinking, Configuring Background Images, Positioning Background Images, Practicing with Background Images, Multiple Background Images with CSS3, Favorite Icons, List Markers with CSS |
| **7** | Cascading Style Sheets (CSS) Fundamentals II: Fonts with CSS, Text Properties with CSS, Editing Text with CSS, The Box Model, Margins and Padding with CSS, Borders with CSS, CSS3 Rounded Corners, Center Page Content with CSS, CSS3 Box and Text Shadows, CSS3 Opacity, CSS3 RGBA Colors, CSS3 Gradients |
| **8** | MIDTERM EXAM |
| **9** | Page Layout Basics: Normal Flow, Relative and Absolute Positioning, Float, Clearing a Float, Overflow, CSS Two-Column Page Layout, Hyperlinks in an Unordered List, Practicing CSS Two-Column Layout, Title a Shape, HTML5 Structural Elements, CSS for Output, CSS for the Mobile Web |
| **10** | Table Basics: Overview of a Table, Table Rows, Cells, and Headers, Span Rows and Columns, Table Configuration, Table Styles with CSS, Table Section Configuration |
| **11** | Form Basics: Overview of Forms, Text Boxes, Submit and Clear Buttons, Checkboxes and Radio Buttons, Hidden Fields and Password Boxes, Text Area Element, Laying Out a Form with a Table, Selection and Options Element, Label Element, Field Set and Indicator Element, Styling a Form with CSS, Server-Side Rendering, Practicing with Forms |
| **12** | Form Basics: HTML5 Text Form Controls, HTML5 Data List Element, HTML5 Slider and Twist Controls, HTML5 Date and Time Controls, Practicing with HTML5 Forms |
| **13** | Media and Interaction Fundamentals: Plugins and Codecs, Audio and Video Configuration, XHTML Audio Object Element, XHTML Video Element, Flash Multimedia Configuration |
| **14** | Media and Interaction Basics: HTML5 Embed Element, HTML5 Audio Element, HTML5 Video Element, Embed a YouTube Image, CSS Image Gallery, CSS3 Transform Property, CSS3 Transition Property, HTML5 Canvas Element |
| **15** | Web Publishing Basics: Domain Name Registration, Web Host Selection, Publishing via FTP, Submission to Search Engines, Optimization for Search Engines, Accessibility Testing, Usability Testing |
| **16** | FINAL |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE ELECTRICAL ELECTRONICS ENGINEERING MSC PROGRAM LEARNING OUTCOMES** | | **Contribution Level** | | |
| **NO** | **LESSON OUTCOMES** | **1**  **Little** | **2**  **Middle** | **3**  **High** |
| LO 1 | Defines the basic concepts of internet and web technologies. |  |  | X |
| LO 2 | Explains basic structures such as web browsers, IP, DNS, HTML. |  | X |  |
| LO 3 | Creates simple web pages using basic HTML tags (title, paragraph, link, list, etc.). |  |  | X |
| LO 4 | It implements hyperlinking operations and provides redirection between different pages. |  | X |  |
| LO 5 | It formats the page using basic CSS rules. |  |  | X |
| LO 6 | Applies CSS styles such as color, font, border, and alignment. |  | X |  |
| LO 7 | Places visual elements such as graphics, tables, and forms on a web page. |  | X |  |
| LO 8 | Explains the basic principles of responsive design on a web page. | X |  |  |
| LO 9 | Creates page layout with CSS and optimizes it for different screen sizes. |  |  | X |
| LO10 | Evaluates color scheme, background, and icon choices for web graphics. |  | X |  |
| LO11 | Creates interactive areas using HTML5 forms (text box, button, picklist, etc.). |  |  | X |
| LO12 | Integrates media (image, audio, video) elements into the web page. |  | X |  |
| LO13 | It tests for accessibility, usability and SEO before publishing. |  |  | X |
| LO14 | Defines the concepts of FTP, domain name and web host and prepares the website for publication. |  |  | X |
| LO15 | Follows and implements current trends in web design. |  | X |  |
| LO16 | Designs and publishes a simple website for his/her academic or professional work. |  |  | X |

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| **INSTRUCTOR NAME**  **Signature**  ASS. PROF. MUZAFFER BİLGİN | **DATE** |

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| **COURSE CODE:** **522003209** | | | **DEPARTMENT:** BIOSTATISTICS | | | |
| **COURSE NAME:** FUNDAMENTALS OF BIOSTATISTICS I | | | | | | |
| **INSTRUCTOR NAME** | | **COURSE LANGUAGE**  **Turkish: X**  **English:** | | **COURSE CATAGORY** | | |
| Technical | Medical | Other(……) |
| ASS. PROF. MUZAFFER BİLGİN | |  | |  | **X** |  |

**COURSE LEVEL**

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| **PROPAEDEUTIC** | **M.SC.** | **PH.D.** | **COURSE OF PROVINCE** |
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| **SEMESTER** | **WEEKLY COURSE PERIOD** | | | **COURSE OF** | | |
| **Theoretical** | **APPLICATION** | **Laboratory** | **Credit** | **ECTS** | **TYPE** |
| Spring  Fall **X** | 3 | 0 | 0 | 3 | 7.5 | |  |  | | --- | --- | | COMPULSORY | ELECTIVE | | **X** |  | |

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| **EVALUATION CRITERIA** | | | |
| **SEMESTER ACTIVITIES** | **Type of activity** | **Number** | **Percentage (%)** |
| Midterm Exam | **1** | **60** |
| Quiz |  |  |
| Homework |  |  |
| Project |  |  |
| Oral examination |  |  |
| Other (………) |  |  |
| **Final Exam** | | **40** |
| **PREREQUISITE(S)** | - | | |
| **SHORT COURSE CONTENT** | In this course, biostatistical analyses, advantages of biostatistics, necessity and definitions of biostatistics are explained. | | |
| **COURSE AIMS** | The aim of this course is to teach biostatistical analyses in the field of health in theory and practice. | | |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | The goal of this course is to bring students to a level where they can use biostatistical terms and analyses to apply their own theses and scientific research or scientific studies. | | |
| **LEARNING OUTCOMES OF THE COURSE** |  | | |
| **TEXTBOOK** | ÖZDAMAR, K.: Biostatistics with PASW, Renewed 8th Edition, Kaan Bookstore, 2010, Eskişehir | | |
| **OTHER REFERENCES** | BELLE GV, FISHER LD, HEAGERTY PJ, LUMLEY P. Biostatistics A Methodology for the Health Sciences, A JOHN WILEY & SONS INC., 2004 | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | Students who complete this course will be familiar with biostatistics concepts, basic statistical terms, and statistical methods used in the analysis of biological data. Students will be able to distinguish between types of variables, summarize data using appropriate data collection and classification techniques. They will be able to calculate and interpret measures of central tendency and dispersion; present data with frequency tables, graphs, and statistical tables. They will also be able to make statistical inferences using basic probability concepts and understand and apply basic parametric and nonparametric tests (e.g. t-test, chi-square test, etc.) used in the field of health sciences. In this way, students will gain proficiency to use biostatistics knowledge in scientific research. | | |

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| **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **SUBJECTS/TOPICS** |
| **1** | Statistics and Biostatistics |
| **2** | Point Estimation and Interval Estimation Methods |
| **3** | Frequency distributions and Theoretical distributions |
| **4** | Characterization of distributions Moment, Cumulants |
| **5** | Characteristics of distributions and areas of use in medicine |
| **6** | Possibility |
| **7** | Sampling methods, variance estimates in sampling |
| **8** | **Midterm Exam** |
| **9** | Assumptions of Parametric and Nonparametric tests |
| **10** | Hypothesis testing |
| **11** | Sequential tests, sequential test plans |
| **12** | Standardization, standardization methods |
| **13** | Regression methods, parameter estimates |
| **14** | Spatial statistical methods |
| **15** | Spatial distributions of variables and tests |
| **16** | End of semester exam |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE ELECTRICAL ELECTRONICS ENGINEERING MSC PROGRAM LEARNING OUTCOMES** | | **Contribution Level** | | |
| **NO** | **LESSON OUTCOMES** | **1**  **Little** | **2**  **Middle** | **3**  **High** |
| LO 1 | Defines biostatistics and explains its importance in health sciences. |  |  | X |
| LO 2 | Explains the concepts of point estimation and interval estimation and evaluates application examples. |  | X |  |
| LO 3 | Interpret frequency distributions and compare them with theoretical distributions. |  |  | X |
| LO 4 | Calculates and interprets distribution characteristics such as moments and skewness-kurtosis. |  | X |  |
| LO 5 | Defines the concept of probability and performs basic probability calculations. |  |  | X |
| LO 6 | Explains sampling methods, selects the appropriate method, and estimates sample size. |  |  | X |
| LO 7 | Compare the assumptions of parametric and nonparametric tests. |  | X |  |
| LO 8 | Explain the logic of hypothesis testing and apply it on sample data sets. |  |  | X |
| LO 9 | Explains cascading test plans and the uses of cascading tests. |  | X |  |
| LO10 | Defines standardization methods and applies them to different examples. |  | X |  |
| LO11 | Explains the basic assumptions of regression analysis and applies parametric regression. |  |  | X |
| LO12 | Explain what spatial statistical methods are and relate them to examples. | X |  |  |
| LO13 | It presents the spatial distribution of variables with graphics and tables. |  | X |  |
| LO14 | Calculates descriptive statistical measures and expresses them with appropriate presentation techniques. |  |  | X |
| LO15 | Contributes to the decision-making process by interpreting the results obtained in a scientific language. |  |  | X |
| LO16 | Manages the analysis process using basic statistical software. |  | X |  |

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| **INSTRUCTOR NAME**  **Signature**  ASS. PROF. MUZAFFER BİLGİN | **DATE** |

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| **COURSE CODE:** | **522005210** | | **DEPARTMENT:** BIOSTATISTICS | | | |
| **COURSE NAME:** HEALTH INFORMATION FOR BIOSTATISTICIANS | | | | | | |
| **INSTRUCTOR NAME**  ASSC. PROF. DR. ELİF PEHLİVANOĞLU | | **COURSE LANGUAGE**  **Turkish: X**  **English: ** | | **COURSE CATAGORY** | | |
| Technical | Medical | Other(……) |
|  | |  | |  | **X** |  |

**COURSE LEVEL**

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| **PROPAEDEUTIC** | **M.SC.** | **PH.D.** | **COURSE OF PROVINCE** |
| **** | **X** | **** | **** |

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| **SEMESTER** | **WEEKLY COURSE PERIOD** | | | **COURSE OF** | | | |
| **Theoretical** | **APPLICATION** | **Lab** | **Credit** | **ECTS** | **TYPE** | |
| Spring ****  Fall **X** | 2 | 0 | 0 | 2 | 5 | MANDATORY ELECTIVE  ** X** | |
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| **EVALUATION CRITERIA** | | | | | | | |
| **SEMESTER ACTIVITIES** | | | **Type of activity** | | | **Number** | **Percentage (%)** |
| Midterm Exam | | | **1** | **40** |
| Quiz | | |  |  |
| Homework | | |  |  |
| Project | | |  |  |
| Oral examination | | |  |  |
| Other (………) | | |  |  |
| **Final Exam** | | | | **60** |
| **PREREQUISITE(S)** | | | - | | | | |
| **SHORT COURSE CONTENT** | | | This course covers topics that a biostatistician needs to know about health, such as the health system, first aid, family planning, quality in health, pregnancy, birth, vaccines, and cancer. | | | | |
| **COURSE AIMS** | | | This course aims to teach students general information about health. | | | | |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | | | The aim of this course is to increase the knowledge level of students in the field of health in which they will conduct research. | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | At the end of this course, students will learn the basic concepts and terminology related to health and will be able to understand the structure and functioning of the health system. They will learn about common situations in the field of health; they will have basic information on topics such as infectious and chronic diseases, first aid, maternal and child health, family planning, nutrition, health education and service delivery. They will also have an idea about the planning, organization and quality management of health services. They will be able to make more effective analyses using health information in biostatistics research and will be able to interpret health concepts correctly in interdisciplinary studies. | | | | |
| **TEXTBOOK** | | | Ozturk Y, Gunay O: Family Health Handbook, Erciyes University Publications, No:83, Kayseri,1995. | | | | |
| **OTHER REFERENCES** | | | Bilgen N: Mother and Child Health, Güneş&Nobel Medical Bookstore, Istanbul, 1996.  First Aid Basic Life Support Handbook, Emergency Medicine Association-Public Life,1998.  Hackman JD, Rosenthal RE, Worsing RA, Mc Fee, AS: Emergency Care and Transportation of the Sick and Injured, 3rd Edition in Turkish, Mısırlı Press, Istanbul, 1999. | | | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | | | Computer or laptop  Internet connection (for access to up-to-date health data and resources)  Current statistical data sources related to health (TUIK, WHO, Ministry of Health of the Republic of Turkey, etc.)  First aid training materials (diagrams, posters, visuals, etc. for basic information) | | | | |

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| **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **SUBJECTS/TOPICS** |
| 1 | Definition of health |
| 2 | Health system in our country |
| 3 | Family medicine |
| 4 | First aid recognition and general principles |
| 5 | First aid practices |
| 6 | Family planning |
| 7 | Quality in healthcare |
| 8 | **Midterm Exam** |
| 9 | Heart diseases and prevention |
| 10 | Pregnancy, birth and baby health |
| 11 | Vaccines (infancy and childhood) |
| 12 | Vaccines (adulthood) |
| 13 | Psychiatric diseases |
| 14 | Cancer |
| 15 | General repetition |
| 16 | **End of semester exam** |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE ELECTRICAL ELECTRONICS ENGINEERING MSC PROGRAM LEARNING OUTCOMES** | | **Contribution Level** | | |
| **NO** | **LESSON OUTCOMES** | **1**  **Little** | **2**  **Middle** | **3**  **High** |
| LO 1 | Defines health and explains basic concepts related to health. |  |  | X |
| LO 2 | Explains the health system and service delivery stages in Türkiye. |  | X |  |
| LO 3 | Defines the family medicine model and explains its areas of application. |  |  | X |
| LO 4 | Defines first aid and lists basic first aid practices. |  |  | X |
| LO 5 | Explains the importance of family planning and describes applicable methods. |  | X |  |
| LO 6 | Defines the concept of quality and quality indicators in health services. |  | X |  |
| LO 7 | Explains basic prevention strategies for preventing heart diseases. |  | X |  |
| LO 8 | Summarizes basic information about pregnancy, birth and baby health. |  |  | X |
| LO 9 | Understands the importance of vaccinations (infancy and childhood) and explains calendar information. |  |  | X |
| LO10 | Knows the vaccines administered during adulthood and explains their place in preventive medicine. |  | X |  |
| LO11 | Defines psychiatric illnesses and discusses their social effects. |  | X |  |
| LO12 | Gain basic knowledge about cancer types and understand the importance of early diagnosis. |  |  | X |
| LO13 | Lists the general characteristics of diseases frequently encountered in the field of health. |  | X |  |
| LO14 | Explains preventive practices for public health with examples. |  |  | X |
| LO15 | Can make sense of health information by using it in interdisciplinary studies. |  |  | X |
| LO16 | Interprets and uses health information effectively in research and statistical analysis. |  |  | X |

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| **INSTRUCTOR NAME**  **Signature**  ASSC. PROF. DR. ELİF PEHLİVANOĞLU | **DATE** |

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| **COURSE CODE:** | **522005211** | | **DEPARTMENT:** BIOSTATISTICS | | | |
| **COURSE NAME:** MEDICAL TERMINOLOGY FOR BIOSTATISTICIANS | | | | | | |
| **INSTRUCTOR NAME**  ASSC. PROF. DR. ELİF PEHLİVANOĞLU | | **COURSE LANGUAGE**  **Turkish: X**  **English: ** | | **COURSE CATAGORY** | | |
| Technical | Medical | Other(……) |
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**COURSE LEVEL**

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| **PROPAEDEUTIC** | **M.SC.** | **PH.D.** | **COURSE OF PROVINCE** |
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| **SEMESTER** | **WEEKLY COURSE PERIOD** | | | **COURSE OF** | | | |
| **Theoretical** | **APPLICATION** | **Lab** | **Credit** | **ECTS** | **TYPE** | |
| Spring ****  Fall **X** | 2 | 0 | 0 | 2 | 5 | MANDATORY ELECTIVE  ** X** | |
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| **EVALUATION CRITERIA** | | | | | | | |
| **SEMESTER ACTIVITIES** | | | **Type of activity** | | | **Number** | **Percentage (%)** |
| Midterm Exam | | | **1** | **40** |
| Quiz | | |  |  |
| Homework | | |  |  |
| Project | | |  |  |
| Oral examination | | |  |  |
| Other (………) | | |  |  |
| **Final Exam** | | | | **60** |
| **PREREQUISITE(S)** | | |  | | | | |
| **SHORT COURSE CONTENT** | | | This course covers topics related to medical terminology, according to anatomical regions and systems. | | | | |
| **COURSE AIMS** | | | This course aims to teach students medical terminology. | | | | |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | | | The aim of this course is to enable students to use medical terminology effectively in their research. | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | Students who complete this course will learn the basic rules of medical terminology and will be able to analyze the roots, prefixes and suffixes that form the structure of medical terms. They will correctly recognize and use terms related to anatomical regions, systems, diseases, diagnosis and treatment processes. They will gain the ability to communicate in the professional language used in the health field by understanding medical terms of Latin and Greek origin. They will also be able to interpret medical documents (reports, prescriptions, epicrisis, etc.) and effectively maintain interdisciplinary communication by correctly interpreting medical terms in biostatistics studies. | | | | |
| **TEXTBOOK** | | | ARTUKOGLU MA: Medical Terminology, Hacettepe University School of Health Administration Publications no:1, Volume 1, 1997, Ankara. | | | | |
| **OTHER REFERENCES** | | | Hackman JD, Rosenthal RE, Worsing RA, Mc Fee, AS: Emergency Care and Transportation of the Sick and Injured, 3rd Edition in Turkish, Mısırlı Press, Istanbul, 1999. | | | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | | | Computer or laptop  Medical terminology dictionaries (print or digital)  Medical images and anatomical drawings (to support organ systems, structure and function)  Textbook and supporting resources  Practice materials showing word fragments of Latin and Greek origin  Internet connection (for case studies, online terminology databases, etc.) | | | | |

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| **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **SUBJECTS/TOPICS** |
| 1 | Introduction to terminology |
| 2 | Basic definitions and terms |
| 3 | General information about diseases |
| 4 | Classification of diseases |
| 5 | Roots of medical terms |
| 6 | Prefixes of medical terms |
| 7 | Terms related to bones |
| 8 | **Midterm Exam** |
| 9 | Terms related to muscles |
| 10 | Diagnostic terms |
| 11 | Terms related to surgery (1) |
| 12 | Terms related to surgery (2) |
| 13 | System related terms (1) |
| 14 | System related terms (2) |
| 15 | General repetition |
| 16 | **End of semester exam** |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE ELECTRICAL ELECTRONICS ENGINEERING MSC PROGRAM LEARNING OUTCOMES** | | **Contribution Level** | | |
| **NO** | **LESSON OUTCOMES** | **1**  **Little** | **2**  **Middle** | **3**  **High** |
| LO 1 | Defines the basic principles of medical terminology. |  |  | X |
| LO 2 | Explains basic medical concepts and definitions. |  | X |  |
| LO 3 | Recognize and classify general medical terms related to diseases. |  | X |  |
| LO 4 | Analyzes the root, prefix and suffix structures of medical terms. |  |  | X |
| LO 5 | Defines medical terms related to muscles, bones, organs and systems. |  |  | X |
| LO 6 | Explains the meaning of terminological expressions in medical documents. |  | X |  |
| LO 7 | Explains the terms used for surgical procedures (surgeries). |  |  | X |
| LO 8 | Explains the terminological structures specific to systems (respiration, circulation, etc.). |  |  | X |
| LO 9 | Distinguishes Latin and/or Greek origins of medical terms. | X |  |  |
| LO10 | Uses correct terminology by distinguishing between terms that have similar or confusing meanings. |  | X |  |
| LO11 | Explains with examples the basic medical terms used in diagnosis, treatment, monitoring and care processes. |  | X |  |
| LO12 | Uses medical terminology effectively in interdisciplinary studies. |  |  | X |
| LO13 | Reads and understands the terminology used in patient epicrisis and reports. |  |  | X |
| LO14 | Uses terminology used in clinical communication accurately and effectively. |  |  | X |
| LO15 | Recognizes English equivalents of medical terms and can translate when necessary. |  | X |  |
| LO16 | Understands medical terms used in biostatistics studies and makes correct interpretations. |  |  | X |

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| **INSTRUCTOR NAME**  **Signature**  ASSC. PROF. DR. ELİF PEHLİVANOĞLU | **DATE** |

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| **COURSE CODE: 522003212** | | | **DEPARTMENT:** BIOSTATISTICS | | | |
| **COURSE NAME:** INTRODUCTION TO SIMULATION | | | | | | |
| **INSTRUCTOR NAME** | | **COURSE LANGUAGE**  **Turkish: x**  **English:** | | **COURSE CATAGORY** | | |
| Technical | Medical | Other(……) |
| ASS. PROF. MUZAFFER BİLGİN | |  | |  | **X** |  |

**COURSE LEVEL**

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| **PROPAEDEUTIC** | **M.SC.** | **PH.D.** | **COURSE OF PROVINCE** |
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| **SEMESTER** | **WEEKLY COURSE PERIOD** | | | **COURSE OF** | | |
| **Theoretical** | **APPLICATION** | **Laboratory** | **Credit** | **ECTS** | **TYPE** |
| Spring  Fall **X** | 3 | 0 | 0 | 3 | 7.5 | |  |  | | --- | --- | | COMPULSORY | ELECTIVE | |  | **X** | |

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| **EVALUATION CRITERIA** | | | |
| **SEMESTER ACTIVITIES** | **Type of activity** | **Number** | **Percentage (%)** |
| Midterm Exam | **1** | **50** |
| Quiz |  |  |
| Homework |  |  |
| Project |  |  |
| Oral examination |  |  |
| Other (………) |  |  |
| **Final Exam** | | **50** |
| **PREREQUISITE(S)** | - | | |
| **SHORT COURSE CONTENT** | Modeling a defined system and performing simulation studies according to this model, the advantages and disadvantages of the models used in simulation are generally explained in this course. | | |
| **COURSE AIMS** | To teach students how to define the system based on available data, predictions and observations, model the system and conduct simulation studies according to this model. | | |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | To teach students how to obtain information about the structure without collecting real data through system definition and modeling in a scientific study. To teach how to simulate a real structure with a computer model. | | |
| **LEARNING OUTCOMES OF THE COURSE** | At the end of this course, students will learn the basic concepts of system modeling and simulation studies based on these models. Students will be able to construct simulation models to understand and predict the behavior of real systems using available data, and analyze the advantages and limitations of these models. In addition, they will be able to reveal the dynamic structure of a system by defining the variables used in the modeling process, the system structure, and the timing of events. Students who learn how to use simulation in decision-making processes related to real-life problems will be able to perform basic applications with computer-aided simulation tools. | | |
| **TEXTBOOK** | Ross, S. M. (2002). Simulation.London:Akademic Press. | | |
| **OTHER REFERENCES** | Pooch, U.W. (1980). Simulation: Principles and Methods. Cambridge:Winthrop Publishers. | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | Computer or laptop  Simulation software (for example: Arena, Simul8, AnyLogic, Excel-based simulation tools, etc.)  Programming/simulation language supported environments (e.g.: Python, R, MATLAB – optional)  Internet connection (for sample applications, online datasets and simulation models)  Textbook and supporting resources  Graph paper, pencil or diagramming software (example: draw.io, Lucidchart etc.) for modeling | | |

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| **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **SUBJECTS/TOPICS** |
| **1** | What is System, Model and Simulation? Basic concepts |
| **2** | Model types and simulation types |
| **3** | Definition and modeling of systems, examination of validity and reliability of the model |
| **4** | Modeling the functioning of systems in space and time, Interactions |
| **5** | Simplification of some aspects of real or theoretical systems |
| **6** | Examining the system dynamics according to the diversity, increase and change of parameters of the model inputs. |
| **7** | Manipulation of the model, summarizing its operation in space and time |
| **8** | Midterm Exam |
| **9** | Packages used in the simulation (GPSS, SLAM, SAS) |
| **10** | Discrete system simulation |
| **11** | Continuous System Simulation |
| **12** | Designing the structure of phenomena in the real system, predictions, data sources |
| **13** | Monitoring the behavior of the system according to increasing and changing the system and model parameters. |
| **14** | Benefits of Modeling and Simulation |
| **15** | Disadvantages, deficiencies and errors of Model and Simulation |
| **16** | Final Exam |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE ELECTRICAL ELECTRONICS ENGINEERING MSC PROGRAM LEARNING OUTCOMES** | | **Contribution Level** | | |
| **NO** | **LESSON OUTCOMES** | **1**  **Little** | **2**  **Middle** | **3**  **High** |
| LO 1 | Defines the concepts of system, model and simulation. |  |  | X |
| LO 2 | Classify different types of models and simulations. |  | X |  |
| LO 3 | Performs appropriate modeling to test the reality and reliability of a system. |  |  | X |
| LO 4 | Analyzes the input-output and time flow relationships of systems. |  | X |  |
| LO 5 | Creates models by comparing real systems with theoretical systems. |  |  | X |
| LO 6 | Interpret the effect of changing model parameters on system dynamics. |  |  | X |
| LO 7 | Explains processes involving time flow and randomness with the model. |  | X |  |
| LO 8 | Understands the basic logic of simulation software (e.g. GPSS, SLAM, SAS). |  | X |  |
| LO 9 | Explain the differences between discrete system simulation and continuous system simulation. |  |  | X |
| LO10 | It makes predictions and plans by modeling phenomena in real systems. |  |  | X |
| LO11 | Interprets model verification and validity tests. |  | X |  |
| LO12 | It analyzes the data sources of the real system and integrates them into the model design. |  | X |  |
| LO13 | It contributes to decision-making processes with the help of simulation outputs. |  |  | X |
| LO14 | Explains the benefits of modeling and simulation in areas such as healthcare, manufacturing, logistics, etc. |  | X |  |
| LO15 | Evaluates the shortcomings and limitations of simulation modeling. | X |  |  |
| LO16 | Develops a computer-aided simulation model for a real problem. |  |  | X |

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| **INSTRUCTOR NAME**  **Signature**  ASS. PROF. MUZAFFER BİLGİN | **DATE** |

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| **COURSE CODE:** **522003213** | | | **DEPARTMENT:** BIOSTATISTICS | | | | |
| **COURSE NAME:** LINEAR MODELS IN BIOSTATISTICS | | | | | | | |
| **INSTRUCTOR NAME** | | **COURSE LANGUAGE**  **Turkish: X**  **English:** | | **COURSE CATAGORY** | | | |
| Technical | Medical | Other(……) | |
| PROF. DR. CENGİZ BAL | |  | |  | **X** |  | |

**COURSE LEVEL**

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| **PROPAEDEUTIC** | **M.SC.** | **PH.D.** | **COURSE OF PROVINCE** |
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| **SEMESTER** | **WEEKLY COURSE PERIOD** | | | **COURSE OF** | | |
| **Theoretical** | **APPLICATION** | **Lab** | **Credit** | **ECTS** | **TYPE** |
| Spring  Fall **X** | 3 | 1 | 0 | 3.5 | 7.5 | |  |  | | --- | --- | | COMPULSORY | ELECTIVE | |  | **X** | |

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| **EVALUATION CRITERIA** | | | |
| **SEMESTER ACTIVITIES** | **Type of activity** | **Number** | **Percentage (%)** |
| Midterm Exam | **1** | **50** |
| Quiz |  |  |
| Homework |  |  |
| Project |  |  |
| Oral examination |  |  |
| Other (………) |  |  |
| Final Exam | | **50** |
| **PREREQUISITE(S)** | - | | |
| **SHORT COURSE CONTENT** | General linear models with univariate and multivariate, generalization of linear models with multivariate, linear mixed models, choosing the linear model structure for analysis, general theory of multivariate distributions, scalar, vector and matrix Gaussian distributions, univariate and multivariate quadratic structures, estimation for univariate and multivariate and weighted linear models, estimation of linear mixed models, tests for univariate and generalized multivariate linear models, tests for linear mixed models, calculating sample size for univariate and multivariate linear models. | | |
| **COURSE AIMS** | To teach the structure and theory of linear models used in the analysis of scientific studies in the field of health. | | |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | To bring students to a level where they can use linear models in the analysis of scientific studies in the field of health. | | |
| **LEARNING OUTCOMES OF THE COURSE** | Students who complete this course learn the basic concepts, assumptions and application areas of single and multivariate linear models. They can analyze the relationships between variables within the scope of regression analysis, establish parametric models and test model fit. Students understand how linear models can be used in health research; they learn to interpret data with general linear models, analysis of variance (ANOVA), analysis of covariance (ANCOVA), multiple regression and interaction models. In addition, they gain the ability to establish linear models, estimate parameters and evaluate the validity of the model with the help of appropriate software and become able to manage scientific data analysis processes. | | |
| **TEXTBOOK** | 1.ÖZDAMAR, K.: Statistical Data Analysis with Package Programs-1, Kaan Bookstore, 2011, Eskişehir.  2.ÖZDAMAR, K.: Statistical Data Analysis with Package Programs-2, Kaan Bookstore, 2010, Eskişehir.  3.Muller KE., Steward PW. (2006). Linear Model Theory Univariate, Multivariate, and Mixed Models, John Wiley & Sons, Inc. USA. | | |
| **OTHER REFERENCES** | 1.Clarke BR. (2008). Linear Models The Theory and Application of Analysis of Varaince, John Wiley & Sons, Inc. USA.  2.Myers RH., Montgomery DC., Vining GG. (2002). Generalized Linear Models With Applications in Engineering and the Sciences  3.Hancock GR., Mueller RO. (2006). Structural Equation Melling, IAP, USA.  4.Haredin JW., Hilbe JM. (2003). Generalized Estimating Equations, Chapman &Hall/CRC, USA. | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | Computer or laptop  Statistical analysis software (R, SAS, Stata or Python)  Online resources or sample data files to access datasets  Projector or smart board (for lectures and applications)  Textbook and supporting resources  Calculator for regression and variance analysis (when necessary)  Graph paper or drawing tools suitable for regression analysis (optional) | | |

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| **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **SUBJECTS/TOPICS** |
| **1** | Matrix Algebra for Linear Models, Single Variable Linear Model |
| **2** | Multivariate Linear Model |
| **3** | Linear Mixed Model, Selecting Linear Model Structure for Analysis |
| **4** | General Theory of Multivariate Distributions |
| **5** | Gaussian Distributions, |
| **6** | Single and Multivariate Quadratic Structures |
| **7** | Estimation of Univariate and Weighted Linear Models |
| **8** | **Midterm Exam** |
| **9** | Estimation of Multivariate Linear Models |
| **10** | Estimation of Multivariate Generalized Models |
| **11** | Estimation of Linear Mixed Models |
| **12** | Tests for Single and Multivariate Linear Models |
| **13** | Tests for Generalized Multivariate Linear Models and Linear Mixed Models |
| **14** | Calculating Sample Size for Single and Multivariate Linear Models |
| **15** | Calculating Sample Size for Generalized Multivariate and Linear Mixed Models |
| **16** | **End of semester exam** |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE ELECTRICAL ELECTRONICS ENGINEERING MSC PROGRAM LEARNING OUTCOMES** | | **Contribution Level** | | |
| **NO** | **LESSON OUTCOMES** | **1**  **Little** | **2**  **Middle** | **3**  **High** |
| LO 1 | Defines the matrix-based representation of linear models. |  |  | X |
| LO 2 | Sets up a univariate linear model and makes parameter estimates. |  |  | X |
| LO 3 | Describe the structure of multivariate linear models and make model selection. |  | X |  |
| LO 4 | Explain the basic components of linear mixed models. |  | X |  |
| LO 5 | Explain the distributional assumptions of linear models and evaluate their suitability. |  |  | X |
| LO 6 | Interprets models within the framework of Gaussian distribution and general theory. |  | X |  |
| LO 7 | Interpret the structure of single and multivariate sum of squares. |  | X |  |
| LO 8 | Applies weighting and parameter estimation methods in linear models. |  |  | X |
| LO 9 | Define and apply univariate and multivariate model tests. |  |  | X |
| LO10 | Describe generalized linear models and test statistics. |  | X |  |
| LO11 | Identify and interpret appropriate tests for linear mixed models. |  |  | X |
| LO12 | Learn to calculate sample size in linear models. |  | X |  |
| LO13 | Compares sample size calculation for generalized linear models and mixed models. | X |  |  |
| LO14 | Interpret the meaning of interactive models in regression analysis. |  | X |  |
| LO15 | Performs linear model analysis with the help of statistical software (R etc.). |  |  | X |
| LO16 | Analyzes by applying linear modeling to sample data in the healthcare field. |  |  | X |

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| **INSTRUCTOR NAME**  **Signature**  PROF. DR. CENGİZ BAL | **DATE** |

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| **COURSE CODE: 522003214** | | | **DEPARTMENT:** BIOSTATISTICS | | | |
| **COURSE NAME:** DATA ANALYSIS WITH STATISTICAL PACKAGES - I | | | | | | |
| **INSTRUCTOR NAME** | | **COURSE LANGUAGE**  **Turkish: X**  **English:** | | **COURSE CATAGORY** | | |
| Technical | Medical | Other(……) |
| PROF. DR. FEZAN MUTLU | |  | |  | **X** |  |

**COURSE LEVEL**

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| **PROPAEDEUTIC** | **M.SC.** | **PH.D.** | **COURSE OF PROVINCE** |
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| **SEMESTER** | **WEEKLY COURSE PERIOD** | | | **COURSE OF** | | |
| **Theoretical** | **APPLICATION** | **Laboratory** | **Credit** | **ECTS** | **TYPE** |
| Spring  Fall **X** | 2 | 2 | 0 | 3 | 7.5 | |  |  | | --- | --- | | COMPULSORY | ELECTIVE | |  | **X** | |

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| **EVALUATION CRITERIA** | | | |
| **SEMESTER ACTIVITIES** | **Type of activity** | **Number** | **Percentage (%)** |
| Midterm Exam | **1** | **50** |
| Quiz |  |  |
| Homework |  |  |
| Project |  |  |
| Oral examination |  |  |
| Other (………) |  |  |
| **Final Exam** | | **50** |
| **PREREQUISITE(S)** | - | | |
| **SHORT COURSE CONTENT** | In this course, statistical package programs are introduced, their areas of use and applications are explained. | | |
| **COURSE AIMS** | statistical package programs in the analysis of studies conducted in the field of health . | | |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | Statistical Package Programs . | | |
| **LEARNING OUTCOMES OF THE COURSE** | Students who successfully complete this course will learn the basic functions and areas of use of common package programs (SAS, R, etc.) used in statistical analysis. They will be able to perform descriptive statistics, hypothesis testing, variance analysis, regression, and multivariate analysis techniques in a computer environment by performing applied analysis on data sets in the health field. They will also learn how to carry out analysis processes such as data entry, data editing, graphic creation, output interpretation, and reporting with digital tools. Thus, students will gain technical competence to conduct statistical analysis accurately and effectively. | | |
| **TEXTBOOK** | Statistical Data Analysis with Package Programs I: Prof. Dr. Kazım ÖZDAMAR, Kaan Bookstore, 2011 | | |
| **OTHER REFERENCES** | 1- Applied Multivariate Statistical Analysis, RA Johnson and DW Wichern, Prentice Hall Inc., New Jersey, 1988.  2- SPSS Inc. Advanced Models, 11.0, SPSS Inc. Chicago, 2001 | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | Personal computer or laptop  R, SAS or similar statistical analysis software  Sample data files in CSV, Excel or R format ready for accessing datasets  Projector or smart board (for hands-on demonstrations)  Textbook and supporting source documents  Internet connection (for software updates, data sharing, and access to online resources) | | |

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| **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **SUBJECTS/TOPICS** |
| **1** | Introduction of Package Programs and Menus Used in Package Programs |
| **2** | Input and Saving of Data Sets to Package Programs, Data Transfer from External Sources to Package Programs |
| **3** | Drawing Histogram, Line, Circle, Relationship, Box and Confidence Interval Graphs Related to Data Set in Package Programs |
| **4** | Calculating Descriptive Statistics on Data Sets in Package Programs, Creating Frequency Tables and Cross Tables |
| **5** | Parametric Tests in Package Programs: Normality Tests, z Tests, t Tests, One and Two Way Variance Analysis |
| **6** | Parametric Tests in Package Programs: Analysis of Variance in Repeated Measures, Nested Factor Analysis of Variance |
| **7** | Parametric Tests in Package Programs: Split Plots Variance Analysis, Latin Square Experiments Variance Analysis |
| **8** | Midterm Exam |
| **9** | Nonparametric Tests in Software Packages: Chi-Square Goodness of Fit and Chi-Square Independence Tests, McNemar Chi-Square Test |
| **10** | Nonparametric Tests in Package Programs: Binomial Test, Sequence Test, Sign Test, Kolmogorov-Smirnov One and Two Sample Test, Moses Overreactions Test, Wald-Wolfowitz Sequence Test |
| **11** | Nonparametric Tests in Package Programs: Mann-Whitney U Test, Wilcoxon T Test, Kruskal-Wallis Test, Friedman Test |
| **12** | Linear Regression and Correlation Analysis in Package Programs: Simple Linear Regression Analysis, Simple Binary Correlation Analysis, Multiple Linear Regression Analysis |
| **13** | Loglinear Analysis in Package Programs: Loglinear Analysis of Two-Way, Three-Way and Multi-Way Tables |
| **14** | Logistic Regression Analysis in Package Programs: Binary, Ordinal and Nominal Logistic Regression Analysis |
| **15** | Reliability Analysis in Package Programs: Question Analysis Methods, Cronbach Alpha Coefficient, Kuder-Richardson Coefficient, Split Method |
| **16** | End of semester exam |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE ELECTRICAL ELECTRONICS ENGINEERING MSC PROGRAM LEARNING OUTCOMES** | | **Contribution Level** | | |
| **NO** | **LESSON OUTCOMES** | **1**  **Little** | **2**  **Middle** | **3**  **High** |
| LO 1 | Defines the basic usage menus of statistical package programs. |  | X |  |
| LO 2 | Performs data entry into package programs, recording and management of data sets. |  | X |  |
| LO 3 | Applies graphical data presentation techniques (histogram, bar chart, circle, etc.). |  |  | X |
| LO 4 | Performs descriptive statistical analyses (mean, median, standard deviation, frequency, etc.). |  |  | X |
| LO 5 | Applies basic parametric tests (t-tests, analysis of variance, etc.) to appropriate data sets. |  |  | X |
| LO 6 | Performs multiple comparisons and analysis of variance subtests. |  | X |  |
| LO 7 | Checks the necessary assumptions for parametric tests. | X |  |  |
| LO 8 | Applies non-parametric tests (Chi-Square, McNemar, Binomial, etc.). |  | X |  |
| LO 9 | Select and interpret appropriate hypothesis tests for independent and dependent groups. |  |  | X |
| LO10 | Interprets relationships by performing correlation and regression analyses. |  |  | X |
| LO11 | Performs data analysis with multi-way tables and logistic regression analysis. |  |  | X |
| LO12 | Performs measurements and interpretations in reliability analyses (Cronbach's Alpha, Kuder-Richardson, etc.). |  | X |  |
| LO13 | Performs scientific reporting of analysis outputs. |  |  | X |
| LO14 | Can distinguish possible errors and incompatibilities in package program outputs. |  | X |  |
| LO15 | Explains the usage areas of package programs in health sciences with examples. |  | X |  |
| LO16 | Gains applied analysis skills through statistical package programs. |  |  | X |

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| **INSTRUCTOR NAME**  **Signature**  PROF. DR. FEZAN MUTLU | **DATE** |

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| **COURSE CODE:** **522004201** | | | **DEPARTMENT:** BIOSTATISTICS | | | |
| **COURSE NAME:** STATISTICAL METHODS SPECIAL TO HEALTH AREA | | | | | | |
| **INSTRUCTOR NAME** | | **COURSE LANGUAGE**  **Turkish: X**  **English:** | | **COURSE CATAGORY** | | |
| Technical | Medical | Other(……) |
| PROF. DR. K.SETENAY ÖNER | |  | |  | **X** |  |

**COURSE LEVEL**

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| **PROPAEDEUTIC** | **M.SC.** | **PH.D.** | **COURSE OF PROVINCE** |
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| **SEMESTER** | **WEEKLY COURSE PERIOD** | | | **COURSE OF** | | |
| **Theoretical** | **APPLICATION** | **Laboratory** | **Credit** | **ECTS** | **TYPE** |
| Spring **X**  Autumn | 3 | 0 | 0 | 3 | 7.5 | |  |  | | --- | --- | | COMPULSORY | ELECTIVE | | **X** |  | |

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| **EVALUATION CRITERIA** | | | |
| **SEMESTER ACTIVITIES** | **Type of activity** | **Number** | **Percentage (%)** |
| Midterm Exam | **1** | **50** |
| Quiz |  |  |
| Homework |  |  |
| Project |  |  |
| Oral examination |  |  |
| Other (………) |  |  |
| **Final Exam** | | **50** |
| **PREREQUISITE(S)** | - | | |
| **SHORT COURSE CONTENT** | Statistical Methods Specific to the Health Field will be introduced, and ratio, speed and risk calculation methods will be explained with computer applications. | | |
| **COURSE AIMS** | Health Field Specific Statistical Methods through Computer Programs in the studies conducted by researchers in the field of health . | | |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | Application of Statistical Methods Specific to the Health Field | | |
| **LEARNING OUTCOMES OF THE COURSE** | Students who complete this course will understand the basics of statistical methods specific to the health field, and techniques for calculating rates, speeds, and risks. They will be able to perform applied analysis on specific health data, calculate epidemiological rates, and measures such as incidence/prevalence. They will also be able to perform advanced analyses on health data using statistical software such as R, and interpret the results in a scientific and applied context. Students will be able to take an active role in research and evaluation processes by transferring the methodological knowledge required by specific statistical techniques in the health field to the application level. | | |
| **TEXTBOOK** | Statistical Data Analysis with Package Programs II: Prof. Dr. Kazım ÖZDAMAR, Kaan Bookstore, 2010 | | |
| **OTHER REFERENCES** | 1- Applied Multivariate Statistical Analysis, RA Johnson and DW Wichern, Prentice Hall Inc., New Jersey, 1988.  2- SPSS Inc. Advanced Models, 11.0, SPSS Inc. Chicago, 2001 | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | Personal computer or laptop  R or similar statistical analysis programs  Ready-made health data sets (for sample calculations and analysis applications)  Internet connection (for software updates and access to online resources)  Textbook and supporting source documents  PDF reader or printed material for scientific article reviews | | |

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| **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **SUBJECTS/TOPICS** |
| **1** | Population Statistics |
| **2** | Birth Statistics |
| **3** | Death Statistics |
| **4** | Disease-Related Statistics |
| **5** | Methods of Standardizing Speeds and Rates |
| **6** | Life Table Methods and Life Expectancy Calculation |
| **7** | Comparison of Health Levels of Countries |
| **8** | **MIDTERM EXAM** |
| **9** | Reliability of Medical Diagnostic Tests |
| **10** | Rates Related to Disease Causes (Odds and Relative Risk Ratio) |
| **11** | Calculating Odds and Relative Risk Ratios in R |
| **12** | Determination of Cut-off Points with ROC Curve Method |
| **13** | Application of ROC Curve Method in R |
| **14** | Application I |
| **15** | Application II |
| **16** | **FINAL EXAM** |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE ELECTRICAL ELECTRONICS ENGINEERING MSC PROGRAM LEARNING OUTCOMES** | | **Contribution Level** | | |
| **NO** | **LESSON OUTCOMES** | **1**  **Little** | **2**  **Middle** | **3**  **High** |
| LO 1 | Explains basic statistical concepts related to population. |  |  | X |
| LO 2 | Calculates and interprets birth-related health statistics. |  |  | X |
| LO 3 | Interpret statistical indicators of mortality rates. |  | X |  |
| LO 4 | Explain and apply rates related to disease frequency (prevalence, incidence). |  |  | X |
| LO 5 | Implements standardization of speeds and rates. |  |  | X |
| LO 6 | Creates life tables and performs life span analyses. |  | X |  |
| LO 7 | Compares health level indicators between countries. | X |  |  |
| LO 8 | Evaluates the reliability of medical diagnostic tests. |  | X |  |
| LO 9 | Defines risk ratios (relative risk, odds ratio, etc.) and explains with examples. |  | X |  |
| LO10 | Calculates risk ratios with R and interprets statistical results. |  |  | X |
| LO11 | Explain the concepts of sensitivity and specificity in ROC curve analysis. |  | X |  |
| LO12 | Determines the cut-off points on the ROC curve (cut-off, AUC, Youden index). |  |  | X |
| LO13 | Applies ROC curve analysis with R. |  |  | X |
| LO14 | Interpret the results obtained with R applications in a scientific context. |  | X |  |
| LO15 | Integrates health statistics into applied analysis processes. |  | X |  |
| LO16 | Explains the choice of statistical method in data analysis in the field of health with justification. |  |  | X |

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| **INSTRUCTOR NAME**  **Signature**  PROF. DR. K.SETENAY ÖNER | **DATE** |

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| **COURSE CODE:** **522004203** | | **DEPARTMENT:** BIOSTATISTICS | | | |
| **COURSE NAME:** IntroductIon to MedIcal InformatIcs | | | | | |
| **INSTRUCTOR NAME** | **COURSE LANGUAGE**  **Turkish: X**  **English:** | | **COURSE CATAGORY** | | |
| Technical | Medical | Other(……) |
| PROF. DR. CENGİZ BAL |  | |  | **X** |  |

**COURSE LEVEL**

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| **PROPAEDEUTIC** | **M.SC.** | **PH.D.** | **COURSE OF PROVINCE** |
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| **SEMESTER** | **WEEKLY COURSE PERIOD** | | | **COURSE OF** | | |
| **Theoretical** | **APPLICATION** | **Lab** | **Credit** | **ECTS** | **TYPE** |
| Spring **X**  Autumn | 3 | 1 | 0 | 3.5 | 7.5 | |  |  | | --- | --- | | COMPULSORY | ELECTIVE | |  | **X** | |

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| **EVALUATION CRITERIA** | | | |
| **SEMESTER ACTIVITIES** | **Type of activity** | **Number** | **Percentage (%)** |
| Midterm Exam | **1** | **50** |
| Quiz |  |  |
| Homework |  |  |
| Project |  |  |
| Oral examination |  |  |
| Other (………) |  |  |
| **Final Exam** | | **50** |
| **PREREQUISITE(S)** |  | | |
| **SHORT COURSE CONTENT** | This course includes topics such as Data, information, Coding systems, Data processing, Database management systems, Telecommunication systems, Medical classification systems, Patient record systems, electronic patient records, Medical Imaging systems, Image processing and analysis methods, Clinical information systems, Community medicine information systems, Nursing information systems, Decision support systems, Health information systems, Hospital information systems, Information systems security. | | |
| **COURSE AIMS** | This course aims to teach medical informatics to students. | | |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | The goal of this course is to bring students to a level where they can use medical informatics effectively in the health field. | | |
| **LEARNING OUTCOMES OF THE COURSE** | Students who successfully complete this course will be able to define the concepts of medical informatics, explain the operation of data, information and information systems; distinguish the structure and areas of use of health informatics systems. They will have information about medical decision support systems, electronic patient record systems, imaging and patient monitoring systems. They will also be able to define clinical information systems, nursing and pharmacy information systems, analyze the basic ethical and security problems encountered in health informatics and offer solutions. Students will gain the ability to use medical information technologies effectively and correctly in health field studies. | | |
| **TEXTBOOK** | SUMBULOGLU V., SUMBULOGLU, K: Health Information Systems, Somgür Publishing, 1998, Ankara. | | |
| **OTHER REFERENCES** | 1.Winter A., Haux R., Ammenwerth E., BrIgl B., Hellrung N., Jahn F .: Health Information Systems: Architectures and Strategies, Springer-Verlag Limited, 2011, London. 2.SUMBULOGLU V., SUMBULOGLU, K: Research Methods in Health Sciences, Hatiboglu Publishing House, 1998, Ankara.  3.SUMBULOGLU, K: Statistical Methods Specific to the Health Field, Somgür Publishing, 2000, Ankara.  4.ÖZDAMAR, K: Modern Scientific Research Methods, Kaan Bookstore, 2003, Eskişehir. | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | Computer,Internet Connection,Health Informatics Software,Current Health Datasets,Patient Information Management System (HIS)Sample Interfaces, | | |

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| **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **SUBJECTS/TOPICS** |
| **1** | Data, information, coding systems |
| **2** | Data processing, database management systems |
| **3** | Telecommunication systems |
| **4** | Medical classification systems |
| **5** | Patient record systems, electronic patient records |
| **6** | Biosignal analysis |
| **7** | Medical Imaging systems |
| **8** | **Midterm Exam** |
| **9** | Image processing and analysis methods |
| **10** | Clinical information systems |
| **11** | Community medicine information systems |
| **12** | Nursing information systems |
| **13** | Decision support systems |
| **14** | Health information systems |
| **15** | Hospital information systems |
| **16** | End of semester exam |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE ELECTRICAL ELECTRONICS ENGINEERING MSC PROGRAM LEARNING OUTCOMES** | | **Contribution Level** | | |
| **NO** | **LESSON OUTCOMES** | **1**  **Little** | **2**  **Middle** | **3**  **High** |
| LO 1 | Explains medical informatics and its basic concepts. |  |  | X |
| LO 2 | Define the difference between data, information and information systems. |  |  | X |
| LO 3 | List the basic components of health information systems. |  |  | X |
| LO 4 | Explain the structure of electronic health records systems. |  |  | X |
| LO 5 | Defines the areas of use of clinical information systems. |  | X |  |
| LO 6 | Analyzes patient record systems. |  |  | X |
| LO 7 | Explains the operating logic of medical imaging systems. | X |  |  |
| LO 8 | Evaluates the integration of telecommunications systems into healthcare services. |  | X |  |
| LO 9 | Defines the application areas of nursing, community medicine and decision support systems. |  |  | X |
| LO 10 | Explains the purpose of using hospital information systems. |  | X |  |
| LO 11 | Evaluates security and privacy issues in health information systems. |  |  | X |
| LO 12 | Explains the integration of biostatistical analyses with health information systems. |  |  | X |
| LO 13 | Performs applications using sample software tools on information systems. |  | X |  |
| LO 14 | Defines national and international standards for health information systems. |  | X |  |
| LO 15 | Discusses the effects of information technologies on health services. |  |  | X |
| LO 16 | Develops analysis and interpretation skills using information systems in the health field. |  |  | X |

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| **INSTRUCTOR NAME**  **Signature**  PROF. DR. CENGİZ BAL | **DATE** |

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| **COURSE CODE: 522004204** | | | **DEPARTMENT:** BIOSTATISTICS | | | |
| **COURSE NAME:** CATEGORICAL DATA ANALYSIS METHODS IN MEDICINE I | | | | | | |
| **INSTRUCTOR NAME** | | **COURSE LANGUAGE**  **Turkish: X**  **English:** | | **COURSE CATAGORY** | | |
| Technical | Medical | Other(……) |
| PROF. DR. ERTUĞRUL ÇOLAK | |  | |  | **X** |  |

**COURSE LEVEL**

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| **PROPAEDEUTIC** | **M.SC.** | **PH.D.** | **COURSE OF PROVINCE** |
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| **SEMESTER** | **WEEKLY COURSE PERIOD** | | | **COURSE OF** | | |
| **Theoretical** | **APPLICATION** | **Laboratory** | **Credit** | **ECTS** | **TYPE** |
| Spring **X**  Autumn | 3 | 0 | - | 3 | 7.5 | |  |  | | --- | --- | | COMPULSORY | ELECTIVE | |  | **X** | |

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| **EVALUATION CRITERIA** | | | |
| **SEMESTER ACTIVITIES** | **Type of activity** | **Number** | **Percentage (%)** |
| Midterm Exam | **1** | **50** |
| Quiz |  |  |
| Homework |  |  |
| Project |  |  |
| Oral examination |  |  |
| Other (………) |  |  |
| **Final Exam** | | **50** |
| **PREREQUISITE(S)** | - | | |
| **SHORT COURSE CONTENT** | Distributions and Inferences for Categorical Data, Probability Structure in Contingency Tables and Comparison of Proportions, Inferences for Contingency Tables, Introduction to Generalized Linear Models, Logistic Regression Models, Logit Models for Multi-Category Response Variables | | |
| **COURSE AIMS** | To teach students the basic analysis methods used in the analysis of categorical data sets and to ensure that students use these analyses effectively in biostatistical and medical studies. | | |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | To ensure that students learn and apply basic categorical data analysis methods frequently used in scientific studies in the field of health. | | |
| **LEARNING OUTCOMES OF THE COURSE** | In this course, students gain basic knowledge and skills on the distribution and inference of categorical data sets. They can learn categorical data analysis methods such as contingency tables, probability structures, ratio comparisons, generalized linear models and logistic regression and apply these methods in biostatistical and medical studies. In addition, students become familiar with the models used in the analysis of multi-category response variables and gain the competence to select and interpret appropriate statistical approaches when working with categorical data. In this way, they can effectively analyze categorical data, which is frequently encountered in scientific research in the field of health. | | |
| **TEXTBOOK** | Agresti, A. Categorical Data Analysis, Second Edition, John Wiley & Sons, Inc., USA, 2002. | | |
| **OTHER REFERENCES** | Özdamar, K. Biostatistics with PASW, 8th Edition, Kaan Bookstore, Eskişehir, 2010.  Özdamar, K. Statistical Data Analysis with Package Programs I, 8th Edition, Kitabevi, Eskişehir, 2011.  Özdamar, K. Statistical Data Analysis with Package Programs II, 7th Edition, Kitabevi, Eskişehir, 2010. | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | Computer (personal or lab access)  R or similar statistical analysis software  Internet connection (for access to datasets and resources)  Course notes and supplementary books  Basic stationery items such as worksheets, calculator, pen etc.  Sample datasets (for applied analysis) | | |

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| **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **SUBJECTS/TOPICS** |
| **1** | Distributions and Statistical Inferences for Categorical Data |
| **2** | Introduction to Contingency Tables: Probability Structure for Contingency Tables, Comparing Two Ratios, Relative Risk, Odds Ratio |
| **3** | Introduction to Contingency Tables: Partial Association in *2x2 Stratified Tables,* Generalizations for *IxJ Tables* |
| **4** | Inferences for Contingency Tables: Confidence Intervals for Parameters in Contingency Tables, Independence Tests in Two-Way Contingency Tables, Two-Way Tables in Ordinal Classifications |
| **5** | Inferences for Contingency Tables: Tests of Independence in Small Samples, Confidence Intervals in Small Samples in *2x2 Tables* |
| **6** | Introduction to Generalized Linear Models: Generalized Linear Models for Binary Data |
| **7** | Introduction to Generalized Linear Models: Generalized Linear Models for Frequency Data |
| **8** | MIDTERM EXAM |
| **9** | Logistic Regression: Interpretation of Parameters in Logistic Regression Analysis, Implications for Logistic Regression |
| **10** | Logistic Regression: Logit Models for Categorical Independent Variables |
| **11** | Logistic Regression: Multiple Logistic Regression |
| **12** | Logit Models for Multi-Category Response Variables: Logit Models for Nominal Responses |
| **13** | Logit Models for Multicategory Response Variables: Cumulative Logit Models for Ordinal Responses |
| **14** | Logit Models for Multicategory Response Variables: Cumulative Link Models for Ordinal Responses |
| **15** | Conditional Independence Test in *IxJxK Tables* |
| **16** | FINAL |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE ELECTRICAL ELECTRONICS ENGINEERING MSC PROGRAM LEARNING OUTCOMES** | | **Contribution Level** | | |
| **NO** | **LESSON OUTCOMES** | **1**  **Little** | **2**  **Middle** | **3**  **High** |
| LO 1 | Defines the concepts of categorical data. |  |  | X |
| LO 2 | Reads and interprets contingency tables. |  |  | X |
| LO 3 | Calculates metrics such as odds ratio and risk ratio. |  |  | X |
| LO 4 | Performs chi-square analysis with 2x2 tables. |  |  | X |
| LO 5 | Explains the tests to be applied on small samples. |  |  | X |
| LO 6 | Describe the basic structures of extended linear models. |  |  | X |
| LO 7 | Explains the logic of logistic regression models. |  |  | X |
| LO 8 | Constructs logistic models with categorical independent variables. |  |  | X |
| LO 9 | Applies multiple logistic regression models. |  |  | X |
| LO10 | Determines the appropriate model type for multi-category response variables. |  |  | X |
| LO11 | Explain and construct ordered logit models for ordinal response variables. |  |  | X |
| LO12 | Performs parameter estimation and interpretation. |  |  | X |
| LO13 | Evaluates the validity and suitability of the model. |  |  | X |
| LO14 | Can implement logistic models in relevant software (e.g. R). |  |  | X |
| LO15 | Tests the suitability of models with X² tests. |  |  | X |
| LO16 | Reaches conclusions by using categorical data analysis methods in applied research. |  |  | X |

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| **INSTRUCTOR NAME**  **Signature**  PROF. DR. ERTUĞRUL ÇOLAK | **DATE** |

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| **COURSE OF** **CODE** : **522004205** | | | **DEPARTMENT** **BRANCH** : BIOSTATISTICS | | | | |
| **COURSE OF** **NAME** : EVALUATING OF BIOASSAYS | | | | | | | |
| **LESSON** **GIVER** **TEACHING** | | **COURSE OF** **LANGUAGE**  **Turkish** : x  **English** : | | **Your lesson** **Category** | | | |
| **Technical** | **Medical** | **Other(……)** | |
| PROF. DR. K.SETENAY ÖNER | |  | |  | **X** |  | |

**COURSE OF** **LEVEL**

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| **PROPAEDEUTIC** | **HIGH** **LICENCE** | **PH.D.** | **COURSE OF PROVINCE** |
|  | **X** |  |  |

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| **SEMESTER** | **WEEKLY COURSE PERIOD** | | | **COURSE OF** | | |
| **Theoretical** | **APPLICATION** | **Laboratory** | **Credit** | **ECTS** | **TYPE** |
| **Spring** **X**  **Autumn** | 3 | 0 | 0 | 3 | 7.5 | |  |  | | --- | --- | | COMPULSORY | ELECTIVE | |  | **X** | |

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| **EVALUATION CRITERIA** | | | |
| **SEMESTER ACTIVITIES** | **Type of activity** | **Number** | **Percentage (%)** |
| Midterm Exam | **1** | **50** |
| Quiz |  |  |
| Homework |  |  |
| Project |  |  |
| Oral examination |  |  |
| Other (………) |  |  |
| **Final Exam** | | **50** |
| **PREREQUISITE(S)** | - | | |
| **SHORT COURSE CONTENT** | This course covers the design, evaluation, and use of biological experiments. | | |
| **COURSE AIMS** | The aim of this course is to explain the definition, importance and necessity of biological experiments. | | |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | Statistical evaluations of biological experiments and findings | | |
| **LEARNING OUTCOMES OF THE COURSE** | At the end of this course, students will have learned how to design, evaluate and interpret biological experiments statistically. By understanding the importance and necessity of experiments, they will be able to analyze the findings obtained from biological experiments with appropriate statistical methods, collect data in accordance with the principles of experimental design and have the ability to evaluate these data. In addition, they will gain basic knowledge and skills for the statistically valid and reliable interpretation of biological data. | | |
| **TEXTBOOK** | Ozdamar, K. (2010). Evaluation of bioassays, Lecture Notes., Eskisehir. | | |
| **OTHER REFERENCES** | **l-** Finney, D. (2009). Probit Analysis, Second Ed., London: Cambridge Pres.  2 **-** ASHTON, W.D. (1972). Logit Transformation. USA: Hafner Publ.Comp., | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | Computer (for individual use)  Statistical analysis software (R, Minitab etc.)  Ready-made datasets (for applied analysis)  Internet access (for research and access to resources)  USB memory or external storage (for data transfer purposes)  Printer (for required printouts, optional) | | |

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| **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **SUBJECTS/TOPICS** |
| **1** | Biological Assay Principles |
| **2** | Direct Essays |
| **3** | Multiple Direct Trials |
| **4** | Kantal Answers |
| **5** | Probit Method |
| **6** | Logit Method |
| **7** | Angle Transformation Method |
| **8** | Midterm Exam |
| **9** | Comparison of Methods |
| **10** | Indirect Trials |
| **11** | Parallel Line Experiments |
| **12** | Quant Experiments with Probit Analysis |
| **13** | Quantitative Essays |
| **14** | Use of Cross-Over Patterns |
| **15** | Using Missing Blocks Patterns |
| **16** | Final exam |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE ELECTRICAL ELECTRONICS ENGINEERING MSC PROGRAM LEARNING OUTCOMES** | | **Contribution Level** | | |
| **NO** | **LESSON OUTCOMES** | **1**  **Little** | **2**  **Middle** | **3**  **High** |
| LO 1 | Explains the basic principles of biological experiments. |  |  | X |
| LO 2 | Can distinguish between direct and indirect experiments. |  | X |  |
| LO 3 | Explain multiple direct experimental designs with examples. |  |  | X |
| LO 4 | Applies experimental analysis on quantitative answers. |  | X |  |
| LO 5 | Explain and apply the probit analysis method. |  |  | X |
| LO 6 | Evaluates the data with the logit method. |  | X |  |
| LO 7 | Applies angle transformation methods to various data types. | X |  |  |
| LO 8 | Can make comparative analysis between experiments. |  | X |  |
| LO 9 | Comment on indirect experimental methods. |  | X |  |
| LO10 | Explains parallel line test analysis. | X |  |  |
| LO11 | Evaluates the regression relationship with probit analysis and quantitative responses. |  |  | X |
| LO12 | Determines the sample size in quantitative experiments. |  | X |  |
| LO13 | Describe the design principles of cross-over experiments. |  | X |  |
| LO14 | Performs analysis in experiments using missing blocks. | X |  |  |
| LO15 | Identifies experimental design errors and develops corrective approaches. |  | X |  |
| LO16 | Analyzes experimental approaches holistically with final applications. |  |  | X |

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| **INSTRUCTOR NAME**  **Signature**  PROF. DR. K.SETENAY ÖNER | **DATE** |

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| **COURSE CODE:** **522004206** | | | **DEPARTMENT:** BIOSTATISTICS | | | |
| **COURSE NAME:** INTRODUCTION TO MULTIVARIATE ANALYSIS | | | | | | |
| **INSTRUCTOR NAME** | | **COURSE LANGUAGE**  **Turkish: X**  **English:** | | **COURSE CATAGORY** | | |
| Technical | Medical | Other(……) |
| PROF. DR. FEZAN MUTLU | |  | |  | **X** |  |

**COURSE LEVEL**

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| **PROPAEDEUTIC** | **M.SC.** | **PH.D.** | **COURSE OF PROVINCE** |
|  | **X** |  |  |

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| **SEMESTER** | **WEEKLY COURSE PERIOD** | | | **COURSE OF** | | |
| **Theoretical** | **APPLICATION** | **Lab** | **Credit** | **ECTS** | **TYPE** |
| Spring **X**  Autumn | 3 | 0 | 0 | 3 | 7.5 | |  |  | | --- | --- | | COMPULSORY | ELECTIVE | |  | **X** | |

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| **EVALUATION CRITERIA** | | | |
| **SEMESTER ACTIVITIES** | **Type of activity** | **Number** | **Percentage (%)** |
| Midterm Exam | **1** | **50** |
| Quiz |  |  |
| Homework |  |  |
| Project |  |  |
| Oral examination |  |  |
| Other (………) |  |  |
| **Final Exam** | | **50** |
| **PREREQUISITE(S)** | - | | |
| **SHORT COURSE CONTENT** | This course includes distance and similarity measures, missing data and its examination, normality transformations, multivariate extreme observations, multivariate normal distribution and its properties, graphs, data matrix and descriptive statistics, matrix operations, concept of geometry and introduction to multivariate analysis. | | |
| **COURSE AIMS** | to teach distance and similarity measurements, graphics, multivariate normal distribution and its properties, correlation matrix, variance, variance-covariance matrix, mean vector, sample geometry and measurement types. | | |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | To bring students to the best level in multivariate normal distribution and its properties, data processing basics and matrix operations. | | |
| **LEARNING OUTCOMES OF THE COURSE** | The learning outcomes of this course are aimed at students understanding the basic concepts of multivariate analysis methods, recognizing the properties of multivariate normal distribution, being able to apply distance and similarity measurements between data, and being able to evaluate multivariate data structures with covariance, correlation and matrix operations. In addition, students will recognize the structure of multivariate data from graphical representations to summary statistics, and will reach a level where they can interpret multi-dimensional statistical analyses by comprehending missing data analyses, factor analysis and dimensionality reduction techniques. | | |
| **TEXTBOOK** | Prof. Dr. Kazım ÖZDAMAR “Statistical Data Analysis with Package Programs, Kaan Bookstore II, 2011. Alvin C. Rencher “Methods of Multivariate Analysis **”** a John Wiley & Sons, Inc. publication. Printed in the United States of America 2002 Prof. Dr. Reha ALPAR “Multivariate Statistical Methods”, Detay Publishing, Ankara, 2011. | | |
| **OTHER REFERENCES** | Richard A. Johnson, Dean W. Wichern “Applied Multivariate statistical Analysis, Printed in the United States of America, 2002.Subhash Sharma “Applied Multivariate Techniques, John Wiley & Sons, Inc. New York, Printed in the United States of America, 1996. | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | Statistical packages (R, Python etc.)Internet connectionProjectorTextbook and supporting resourcesDatasets (for application examples)USB stick or cloud storage (for data and file sharing) | | |

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| **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **SUBJECTS/TOPICS** |
| **1** | Basic Matrix Information (Types of Matrices, trace of a matrix, addition, subtraction and multiplication in matrices, inverse of a matrix) |
| **2** | Basic Matrix Knowledge ( |
| **3** | Latent class in cluster analysis |
| **4** | Some examples and extensions of latent budget analysis |
| **5** | Organizing classes |
| **6** | Analysis of discrete data by latent class in scaling models. |
| **7** | Three-parameter linear latent class analysis |
| **8** | **Midterm Exam** |
| **9** | Using continuous and categorical covariates in latent class analysis |
| **10** | Linear loglinear models with latent variables, |
| **11** | Latent class models in longitudinal data. |
| **12** | Measuring the suitability of statistical model with latent class approach |
| **13** | Mixed regression models |
| **14** | Unobserved general latent class approach |
| **15** | Latent class models for contingency tables |
| **16** | End of semester exam |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE ELECTRICAL ELECTRONICS ENGINEERING MSC PROGRAM LEARNING OUTCOMES** | | **Contribution Level** | | |
| **NO** | **LESSON OUTCOMES** | **1**  **Little** | **2**  **Middle** | **3**  **High** |
| LO 1 | Explains basic matrix knowledge and applies it in analysis. |  |  | X |
| LO 2 | Defines the concepts of multivariate analysis. |  | X |  |
| LO 3 | Evaluate the assumptions of the multivariate normal distribution. |  |  | X |
| LO 4 | Compares distance and similarity measures and selects the appropriate one. |  | X |  |
| LO 5 | Interpret multivariate data structures with graphs. |  |  | X |
| LO 6 | Explains variable relationships by analyzing correlation matrices. |  |  | X |
| LO 7 | Interprets operations such as determinant, inverse matrix, etc., especially in analyses based on matrix structure. | X |  |  |
| LO 8 | Explains cluster analysis and applies it with sample data. |  | X |  |
| LO 9 | Determines the appropriate data structure for factor analysis and performs analysis. |  |  | X |
| LO10 | Explain the principal components analysis method and interpret the results. |  | X |  |
| LO11 | Describe and analyze multivariate regression models. |  |  | X |
| LO12 | Explains the basic concepts of discriminant analysis. | X |  |  |
| LO13 | Establishes and interprets the MANOVA (Multivariate analysis of variance) model. |  |  | X |
| LO14 | Makes decisions by interpreting the results of multivariate analysis in scientific research. |  | X |  |
| LO15 | Applies multivariate analysis with R or similar programs. |  |  | X |
| LO16 | Apply and interpret multivariate analyses on data sets in the health field. |  |  | X |

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| **INSTRUCTOR NAME**  **Signature**  PROF. DR. FEZAN MUTLU | | | **DATE** | | | | |
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| **COURSE CODE: 522004207** | | | | **DEPARTMENT:** BIOSTATISTICS | | | |
| **COURSE NAME:** ADVANCED DATA ANALYSIS METHODS IN HEALTH SCIENCES II | | | | | | | |
| **INSTRUCTOR NAME** | | **COURSE LANGUAGE**  **Turkish: X**  **English:** | | | **COURSE CATAGORY** | | |
| Technical | Medical | Other(……) |
| PROF. DR. K.SETENAY ÖNER | |  | | |  | **X** |  |

**COURSE LEVEL**

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| **PROPAEDEUTIC** | **M.SC.** | **PH.D.** | **COURSE OF PROVINCE** |
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| **SEMESTER** | **WEEKLY COURSE PERIOD** | | | **COURSE OF** | | |
| **Theoretical** | **APPLICATION** | **Laboratory** | **Credit** | **ECTS** | **TYPE** |
| Spring **X**  Autumn | 3 | 0 | 0 | 3 | 7.5 | |  |  | | --- | --- | | COMPULSORY | ELECTIVE | |  | **X** | |

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| **EVALUATION CRITERIA** | | | |
| **SEMESTER ACTIVITIES** | **Type of activity** | **Number** | **Percentage (%)** |
| Midterm Exam | **1** | **50** |
| Quiz |  |  |
| Homework |  |  |
| Project |  |  |
| Oral examination |  |  |
| Other (………) |  |  |
| **Final Exam** | | **50** |
| **PREREQUISITE(S)** | Having taken Advanced Data Analysis Methods in Health Sciences I | | |
| **SHORT COURSE CONTENT** | The areas where Advanced Data Analysis Methods are used in Health Sciences and their application are explained. | | |
| **COURSE AIMS** | Advanced Data Analysis Methods in scientific studies conducted by researchers in the field of health . | | |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | The use of Advanced Data Analysis Methods through the R Package Program is to bring it to a level that can be used in the analysis of scientific studies in the field of health. | | |
| **LEARNING OUTCOMES OF THE COURSE** | At the end of this course, students will be able to recognize advanced multivariate statistical analysis methods applied in health sciences, select appropriate analysis techniques and apply them with the help of R program, and interpret the obtained findings in scientific format. In addition, students will be competent in model selection against different data structures and will gain decision-making skills based on advanced statistical knowledge. | | |
| **TEXTBOOK** | Statistical Data Analysis with Package Programs II: Prof. Dr. Kazım ÖZDAMAR, Kaan Bookstore, 2010 | | |
| **OTHER REFERENCES** | 1- Applied Multivariate Statistical Analysis, RA Johnson and DW Wichern, Prentice Hall Inc., New Jersey, 1988.  2- SPSS Inc. Advanced Models, 11.0, SPSS Inc. Chicago, 2001  3- Cleophas, TJ, Zwinderman, AH, Cleophas, TF, Cleophas, Ep, (2009), Statistics Applied to Clinical Trials, 4th. Edt., Springer, Berlin. | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | Lecture slides / lecture notes  Application datasets  Access to scientific articles (online / print)  Statistical formula and calculation guide  Internet connection for literature search  Text editor (Word, LaTeX etc.) where data analysis results can be reported  Supplementary reference books  Model comparison tables  Presentation tools suitable for discussion/comment sessions | | |

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| **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **SUBJECTS/TOPICS** |
| **1** | One-Way Multivariate Analysis of Variance |
| **2** | Application of One-Way Multivariate Analysis of Variance in R |
| **3** | Two-Way Multivariate Analysis of Variance |
| **4** | Two-Way Multivariate Analysis of Variance Application in R |
| **5** | Aggregative Progressive Clustering Methods |
| **6** | Application of Aggregative Progressive Clustering Methods in R |
| **7** | Discriminative Stage Clustering Methods |
| **8** | **MIDTERM EXAM** |
| **9** | Implementation of Separative Stage Clustering Methods in R |
| **10** | Non-Stage Clustering Methods |
| **11** | Implementation of Non-Stepwise Clustering Methods in R |
| **12** | Compatibility Analysis |
| **13** | Application of Correspondence Analysis in R |
| **14** | Multidimensional Scaling |
| **15** | Implementation of Multidimensional Scaling in R |
| **16** | **FINAL EXAM** |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE ELECTRICAL ELECTRONICS ENGINEERING MSC PROGRAM LEARNING OUTCOMES** | | **Contribution Level** | | |
| **NO** | **LESSON OUTCOMES** | **1**  **Little** | **2**  **Middle** | **3**  **High** |
| LO 1 | Describes advanced statistical analysis methods. |  |  | X |
| LO 2 | Applies advanced analysis using R software. |  | X |  |
| LO 3 | Selects the appropriate analysis method in multivariate data structures. |  |  | X |
| LO 4 | Distinguishes advanced methods such as regression, discriminant, and factor. |  | X |  |
| LO 5 | Explain and interpret the modeling process appropriate to the data. |  |  | X |
| LO 6 | Reports analysis results in scientific format. |  |  | X |
| LO 7 | It prepares the data before analysis by preprocessing it. | X |  |  |
| LO 8 | Interpret significance levels and confidence intervals. |  | X |  |
| LO 9 | Gain practice interpreting analysis outputs with R. |  |  | X |
| LO10 | Integrates hypothesis testing with advanced analysis. |  | X |  |
| LO11 | Compares analyzes in accordance with the literature. | X |  |  |
| LO12 | Evaluates sources of error in further analysis. |  | X |  |
| LO13 | Creates a data analysis plan for solving a scientific problem. |  |  | X |
| LO14 | Have general knowledge about alternative analysis methods other than R. |  | X |  |
| LO15 | Supports research results with statistical findings. |  |  | X |
| LO16 | Can apply advanced analysis to data sets in the health sciences field. |  |  | X |

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| **INSTRUCTOR NAME**  **Signature**  PROF. DR. K.SETENAY ÖNER | **DATE** |

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| **COURSE CODE:** **522004208** | | |  | **DEPARTMENT:** BIOSTATISTICS | | | |
| **COURSE NAME:** FUNDAMENTALS OF BIOSTATISTICS II | | | | | | | |
| **INSTRUCTOR NAME** | | **COURSE LANGUAGE**  **Turkish: x**  **English:** | | | **COURSE CATAGORY** | | |
| Technical | Medical | Other(……) |
| ASS. PROF. MUZAFFER BİLGİN | |  | | |  | **X** |  |

**COURSE LEVEL**

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| **PROPAEDEUTIC** | **M.SC.** | **PH.D.** | **COURSE OF PROVINCE** |
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| **SEMESTER** | **WEEKLY COURSE PERIOD** | | | **COURSE OF** | | |
| **Theoretical** | **APPLICATION** | **Laboratory** | **Credit** | **ECTS** | **TYPE** |
| Spring **X**  Autumn | 3 | 0 | 0 | 3 | 7.5 | |  |  | | --- | --- | | COMPULSORY | ELECTIVE | | **X** |  | |

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| **EVALUATION CRITERIA** | | | |
| **SEMESTER ACTIVITIES** | **Type of activity** | **Number** | **Percentage (%)** |
| Midterm Exam | **1** | **60** |
| Quiz |  |  |
| Homework |  |  |
| Project |  |  |
| Oral examination |  |  |
| Other (………) |  |  |
| **Final Exam** | | **40** |
| **PREREQUISITE(S)** | Having taken the Basic Biostatistics I Course | | |
| **SHORT COURSE CONTENT** | In this course, biostatistical analyses, advantages of biostatistics, necessity and definitions of biostatistics are explained. | | |
| **COURSE AIMS** | The aim of this course is to teach biostatistical analyses in the field of health in theory and practice. | | |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | The goal of this course is to bring students to a level where they can use biostatistical terms and analyses to apply their own theses and scientific research or scientific studies. | | |
| **LEARNING OUTCOMES OF THE COURSE** | At the end of this course, students will understand the logic of advanced biostatistical analyses, learn how to apply these analyses in the context of health sciences, and be able to explain the basic concepts of biostatistics in a more comprehensive manner. By developing their technical knowledge of numerical data analyses, students will reach a level of knowledge that will enable them to apply biostatistical terms used in health research. | | |
| **TEXTBOOK** | ÖZDAMAR, K.: Biostatistics with PASW, Renewed 8th Edition, Kaan Bookstore, 2010, Eskişehir | | |
| **OTHER REFERENCES** | BELLE GV, FISHER LD, HEAGERTY PJ, LUMLEY P. Biostatistics A Methodology for the Health Sciences, A JOHN WILEY & SONS INC., 2004 | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | Computer or laptop  R (or equivalent statistical software)  Excel program  Applied datasets  Academic reference books  Pen & notepad  Formula and term cards  Graphing tools for data analysis  Access to academic databases for literature searches  PowerPoint / presentation programs for project presentations  Quizzes and sample solutions suitable for the course process  Glossary of statistical terms | | |

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| **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **SUBJECTS/TOPICS** |
| **1** | Analysis of variance of multifactorial experiments |
| **2** | MANOVA |
| **3** | Applications of MANOVA and Analysis of Variance in Multifactor Experiments |
| **4** | Regression and Correlation analysis |
| **5** | Simple Linear Regression Analysis |
| **6** | Multiple Regression Analysis |
| **7** | Regression analysis applications |
| **8** | **Midterm Exam** |
| **9** | Nonparametric tests |
| **10** | Independent single and two sample nonparametric tests |
| **11** | Dependent one and two sample nonparametric tests |
| **12** | Statistical methods specific to the health field |
| **13** | Reliability of Medical Diagnostic Tests, ROC Curve Method |
| **14** | Life Analysis |
| **15** | Applications |
| **16** | End of semester exam |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE ELECTRICAL ELECTRONICS ENGINEERING MSC PROGRAM LEARNING OUTCOMES** | | **Contribution Level** | | |
| **NO** | **LESSON OUTCOMES** | **1**  **Little** | **2**  **Middle** | **3**  **High** |
| LO 1 | Explains the basic concepts of advanced biostatistical analyses. |  |  | X |
| LO 2 | Interpret the role of biostatistics in health science applications. |  |  | X |
| LO 3 | Selects the necessary statistical methods to analyze numerical data. |  | X |  |
| LO 4 | Performs data entry and basic analysis using software such as R. |  |  | X |
| LO 5 | Be able to interpret descriptive statistical results. |  | X |  |
| LO 6 | Can apply hypothesis tests to certain sample types. |  | X |  |
| LO 7 | Determines statistical analyses that can be used in health research. |  |  | X |
| LO 8 | Explains significance test results in scientific language. |  | X |  |
| LO 9 | Interprets graphical data and relates it to analysis. |  | X |  |
| LO10 | Recommends appropriate statistical methods for the type of research. |  |  | X |
| LO11 | Converts biostatistical analysis results into academic reports. |  |  | X |
| LO12 | Identifies sources of error in interpreting R output. | X |  |  |
| LO13 | Distinguishes different types of tests (parametric / nonparametric). |  | X |  |
| LO14 | Applies advanced analysis techniques in health field research. |  |  | X |
| LO15 | Evaluates the effect of study sample size on analysis results. |  | X |  |
| LO16 | Knows the basic principles of ethical use of statistical analysis. | X |  |  |

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| **INSTRUCTOR NAME**  **Signature**  ASS. PROF. MUZAFFER BİLGİN | **DATE** |

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| **COURSE CODE:** **522004209** | | | **DEPARTMENT:** BIOSTATISTICS | | | |
| **COURSE NAME:** INTRODUCTION TO SAS AND APPLICATIONS | | | | | | |
| **INSTRUCTOR NAME** | | **COURSE LANGUAGE**  **Turkish: X**  **English:** | | **COURSE CATAGORY** | | |
| Technical | Medical | Other(……) |
| PROF. DR. ERTUĞRUL ÇOLAK | |  | |  | **X** |  |

**COURSE LEVEL**

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| **PROPAEDEUTIC** | **M.SC.** | **PH.D.** | **COURSE OF PROVINCE** |
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| **SEMESTER** | **WEEKLY COURSE PERIOD** | | | **COURSE OF** | | |
| **Theoretical** | **APPLICATION** | **Laboratory** | **Credit** | **ECTS** | **TYPE** |
| Spring **X**  Autumn | 3 | 0 | - | 3 | 7.5 | |  |  | | --- | --- | | COMPULSORY | ELECTIVE | |  | **X** | |

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| **EVALUATION CRITERIA** | | | |
| **SEMESTER ACTIVITIES** | **Type of activity** | **Number** | **Percentage (%)** |
| Midterm Exam | **1** | **50** |
| Quiz |  |  |
| Homework |  |  |
| Project |  |  |
| Oral examination |  |  |
| Other (………) |  |  |
| **Final Exam** | | **50** |
| **PREREQUISITE(S)** | - | | |
| **SHORT COURSE CONTENT** | Introduction to SAS Package Program, SAS Workspace, Defining SAS Data Sets and Entering Data into SAS Environment, Working with SAS Data Sets, Calculating Descriptive Statistics in SAS, Analyses of Single Variable Parametric and Nonparametric Methods in SAS | | |
| **COURSE AIMS** | To actively teach students how to use the SAS package program and to ensure that students can effectively analyze biostatistical analyses with the SAS package. | | |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | To teach students the SAS package program and enable them to analyze biostatistical analyses. | | |
| **LEARNING OUTCOMES OF THE COURSE** | At the end of this course, students will have mastered the SAS programming language and environment; they will be able to use SAS effectively in the processes of defining, organizing and analyzing data sets. They will develop knowledge and skills on how to apply parametric and nonparametric analyses on SAS, and they will understand the function of SAS in health sciences research. They will also develop a comparative understanding that analyses can also be done via the R program. | | |
| **TEXTBOOK** | O'Rourke N., Hatcher L., Stepanski EJ. (2005). A Step-by-Step Approach to Using SAS for Univariate and Multivariate Statistics, Second edition, SAS Institute Inc., USA. | | |
| **OTHER REFERENCES** | 1. Schlotzhauer SD., Littell RC. (1997). SAS System for Elementary Statistical Analysis, Second Edition, SAS Institute Inc., USA.  2. Delwiche LD., Slaughter SJ. (1998). The Little SAS Book, SAS Institute Inc., USA.  3.SAS Publishing. (2004). SAS/STAT 9.1 User's Guide, SAS Institute Inc., USA. | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | SAS software (or similar open source programs)  R program and RStudio interface  Computer or laptop  Dataset examples for SAS and R  Lecture slides and sample codes  Graphical data interpretation tools  Note-taking materials (notebook, pen)  Internet connection  Guides with coding examples  Annotated SAS procedure table  Data manipulation and cleansing tools  Practical homework and quiz documents  Healthcare specific datasets  Academic access to literature review  Graphics programs for output analysis  SAS and R help documents (Help, Guide, Cheat Sheet) | | |

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| **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **SUBJECTS/TOPICS** |
| **1** | Introduction to SAS, SAS File Types, SAS Workspace, Explorer, Results, Editor, Log and Output Windows, Libraries in SAS and Defining a New Library |
| **2** | Data Entry Methods in SAS, INPUT, INFILE, DATALINES Statements, Retrieving Data from External Environment to SAS Environment, Sending Data from SAS Environment to External Environment |
| **3** | Operations on Variables and Observations in SAS Datasets, Combining Datasets, Creating Sub-Datasets, SORT Procedure |
| **4** | Calculating Descriptive Statistics in SAS with MEANS, FREQ, UNIVARIATE and PRINT Procedures |
| **5** | Calculating Correlations Between Variables, Drawing Relationship Graphs, Performing Chi-Square Analysis with GPLOT, CORR and FREQ Procedures |
| **6** | T-test in Independent and Dependent Samples with MEANS, UNIVARIATE and TTEST Procedures |
| **7** | Mann-Whitney U test with INSIGHT and NPAR1WAY procedures |
| **8** | MIDTERM EXAM |
| **9** | INSIGHT and UNIVARIATE Procedures Wilcoxon Signed Rank Test |
| **10** | One-Way Analysis of Variance with GLM and ANOVA Procedures |
| **11** | Two-Way Analysis of Variance with GLM Procedure |
| **12** | Factorial ANOVA with GLM Procedure |
| **13** | One-Way Nonparametric Kruskal-Wallis Test with NPAR1WAY Procedure |
| **14** | Two-Way Nonparametric Friedman Test with FREQ Procedure |
| **15** | Simple and Multiple Regression Analysis with REG Procedure |
| **16** | FINAL |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE ELECTRICAL ELECTRONICS ENGINEERING MSC PROGRAM LEARNING OUTCOMES** | | **Contribution Level** | | |
| **NO** | **LESSON OUTCOMES** | **1**  **Little** | **2**  **Middle** | **3**  **High** |
| LO 1 | Can introduce SAS program and explain basic environment structure. |  | X |  |
| LO 2 | Can define and edit data sets via SAS. |  |  | X |
| LO 3 | Can implement variable creation and data management operations in SAS environment. |  | X |  |
| LO 4 | Can calculate descriptive statistics (mean, SD, frequency, etc.) with SAS. |  |  | X |
| LO 5 | Can compare R program and SAS outputs. |  | X |  |
| LO 6 | Can correctly perform parametric tests on SAS. |  | X |  |
| LO 7 | Recognize nonparametric methods and analyze them with SAS. |  | X |  |
| LO 8 | Can interpret graphical analysis using SAS. |  |  | X |
| LO 9 | Identifies sources of error in data analysis. | X |  |  |
| LO10 | Can run advanced analysis commands with SAS procedures. |  |  | X |
| LO11 | Explains SAS analyses specific to health research with examples. |  | X |  |
| LO12 | Compares software by performing similar analyses with the R program. |  | X |  |
| LO13 | Provides interpretation of coding-based analysis outputs. |  |  | X |
| LO14 | It can clean and transform data in a way that suits the analysis process. |  | X |  |
| LO15 | Applies scientific writing rules when reporting SAS output. |  |  | X |
| LO16 | Gains the ability to analyze data using SAS and R programs. |  |  | X |

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| **INSTRUCTOR NAME**  **Signature**  PROF. DR. ERTUĞRUL ÇOLAK | **DATE** |

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| **COURSE CODE:** **522004210** | | | **DEPARTMENT:** BIOSTATISTICS | | | |
| **COURSE NAME:** CLINICAL TRIALS I | | | | | | |
| **INSTRUCTOR NAME** | | **COURSE LANGUAGE**  **Turkish: X**  **English:** | | **COURSE CATAGORY** | | |
| Technical | Medical | Other(……) |
| PROF. DR. FEZAN MUTLU | |  | |  | **X** |  |

**COURSE LEVEL**

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| **PROPAEDEUTIC** | **M.SC.** | **PH.D.** | **COURSE OF PROVINCE** |
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| **SEMESTER** | **WEEKLY COURSE PERIOD** | | | **COURSE OF** | | |
| **Theoretical** | **APPLICATION** | **Laboratory** | **Credit** | **ECTS** | **TYPE** |
| Spring **X**  Autumn | 3 | 0 | 0 | 3 | 7.5 | |  |  | | --- | --- | | COMPULSORY | ELECTIVE | |  | **X** | |

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| **EVALUATION CRITERIA** | | | | |
| **SEMESTER ACTIVITIES** | | **Type of activity** | **Number** | **Percentage (%)** |
| Midterm Exam | **1** | **50** |
| Quiz |  |  |
| Homework |  |  |
| Project |  |  |
| Oral examination |  |  |
| Other (………) |  |  |
| **Final Exam** | | **50** |
| **PREREQUISITE(S)** | | - | | |
| **SHORT COURSE CONTENT** | | Definition of clinical trials, basic statistical concepts, basic design issues, randomization and blinding, clinical trial designs. | | |
| **COURSE AIMS** | | To teach the structure of clinical trials and trial designs used in scientific studies in the field of health and the biostatistical analyses to be used in the analysis of these clinical trials. | | |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | | To bring students to a level where they can understand the structure of clinical trials and effectively apply the methods used in clinical trials. | | |
| **LEARNING OUTCOMES OF THE COURSE** | | Students who complete this course will understand the statistical approaches, randomization methods, blinding techniques and study designs that form the basis of clinical trials. They will gain data collection, analysis and interpretation skills during the research process by analyzing the structure of clinical trials. They will develop application competence in clinical data analysis using the R program. They will gain awareness of scientific ethical rules and methodological accuracy in the planning of clinical trials. | | |
| **TEXTBOOK** | | Chow SC., Liu JP. (2004). Design and Analysis of Clinical Trials, Second edition, John Wiley & Sons, Inc. USA.  Cleophas, TJ, Zwinderman, AH, Cleophas, TF, Cleophas, Ep, (2009), Statistics Applied to Clinical Trials, 4th. Edt., Springer, Berlin. | | |
| **OTHER REFERENCES** | | Armitage P. (1975). Sequential Medical Trials, Second edition, Blackwell Scientific, Oxford.  Wang, D., Bakhai, A., (2006), Clinical Trials, Remedica. | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | | R program and RStudio installation. Computer (portable or desktop)  Clinical trial datasets (sample data tables). Lecture slides and case scenarios  Randomization schemes and design tables  Ethics committee application templates (sample)  Midterm exam and practice guides  Source books and articles. Internet connection  Online clinical data analysis simulations  Graphical data presentation tools  PDF and interactive worksheets  Data validation forms for health research | | |
| **WEEKLY PLAN OF THE COURSE** | | | | |
| **WEEK** | **SUBJECTS/TOPICS** | | | |
| **1** | Definition of Clinical Trials, Experimental Unit, Trial, DATE of Clinical Trials, Objectives of Clinical Trials, Target Population and Patient Selection, Selection of Controls | | | |
| **2** | Regulatory Process and Requirements for Clinical Trials, Food and Drug Administration (FDA), FDA Regulations for Clinical Trials, Definition of Clinical Trial Phases (Phase-I, II, III, IV, V), Investigational New Drug Application, Definition, Structure and Content of Clinical Trial Protocol | | | |
| **3** | New Drug Application, Clinical Development and Implementation, Clinical Development Plan, Good Clinical Practice, Randomization | | | |
| **4** | Assessing Efficacy and Safety in Clinical Trials, Estimating Sample Size, Interim Analyses and Monitoring Data, Statistical Tests and Clinical Inferences | | | |
| **5** | Clinical trial designs, Uncertainty and Probability, Bias and Variability, Confounding variables and Interaction, Analysis of Validity of Qualitative and Quantitative Diagnostic Tests | | | |
| **6** | Randomization Methods and Models, Stratification | | | |
| **7** | Cross patterns, Titration Patterns, Enrichment Patterns and analysis | | | |
| **8** | Midterm Exam | | | |
| **9** | Sequential group designs, Pleasabe-Reinforced Trial designs and analyses | | | |
| **10** | Applications of regression and trend analysis in the analysis of clinical trial data | | | |
| **11** | Applications of logistic regression | | | |
| **12** | Repeated measures models and analyses | | | |
| **13** | Examples and solutions from clinical applications | | | |
| **14** | Randomized Controlled Clinical Trials and Analysis | | | |
| **15** | Covariate qualitative and quantitative experimental designs and data analyses | | | |
| **16** | Sample applications, solutions and medical interpretations | | | |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE ELECTRICAL ELECTRONICS ENGINEERING MSC PROGRAM LEARNING OUTCOMES** | | **Contribution Level** | | |
| **NO** | **LESSON OUTCOMES** | **1**  **Little** | **2**  **Middle** | **3**  **High** |
| LO 1 | Be able to define clinical trials. |  | X |  |
| LO 2 | Distinguish basic clinical trial designs. |  |  | X |
| LO 3 | Be able to classify and apply randomization methods. |  | X |  |
| LO 4 | Explain the types of blinding methods. |  | X |  |
| LO 5 | Be able to determine statistical tests used in clinical trials. |  |  | X |
| LO 6 | Summarize the processes of preparing a clinical research protocol. |  | X |  |
| LO 7 | Can analyze clinical trial data with R program. |  | X |  |
| LO 8 | Be able to calculate clinical trial sample size at a basic level. |  | X |  |
| LO 9 | Discuss the advantages and disadvantages of different types of clinical trials. |  | X |  |
| LO10 | Explain the necessity of applying ethical principles in clinical trials. |  |  | X |
| LO11 | Distinguish the differences between observational and intervention studies. |  | X |  |
| LO12 | Classify sources of error and types of bias in clinical research. |  | X |  |
| LO13 | Can choose appropriate statistical analysis methods according to research designs. |  |  | X |
| LO14 | List the steps of planning, conducting and evaluating the clinical trial process. |  | X |  |
| LO15 | Be able to interpret the outputs obtained with the R program. |  | X |  |
| LO16 | Pays attention to methodological integrity and scientific validity in clinical data analysis. |  |  | X |

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| **INSTRUCTOR NAME**  **Signature**  PROF. DR. FEZAN MUTLU | **DATE** |

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| **COURSE OF** **CODE** : **522004211** | | | **DEPARTMENT** **BRANCH** : BIOSTATISTICS | | | |
| **COURSE OF** **NAME** : DATA ANALYSIS WITH STATISTICAL PACKAGES II | | | | | | |
| **LESSON** **GIVER** **TEACHING** | | **COURSE OF** **LANGUAGE**  **Turkish** : **X**  **English** : | | **Your lesson** **Category** | | |
| **Technical** | **Medical** | **Other(……)** |
| PROF. DR. FEZAN MUTLU | |  | |  | **X** |  |

**COURSE LEVEL**

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| **PROPAEDEUTIC** | **M.SC.** | **PH.D.** | **COURSE OF PROVINCE** |
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| **SEMESTER** | **WEEKLY COURSE PERIOD** | | | **COURSE OF** | | |
| **Theoretical** | **APPLICATION** | **Laboratory** | **Credit** | **ECTS** | **TYPE** |
| **Spring** **X**  **Autumn** | 2 | 2 | 0 | 3 | 7.5 | |  |  | | --- | --- | | COMPULSORY | ELECTIVE | |  | **X** | |

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| **EVALUATION CRITERIA** | | | |
| **SEMESTER ACTIVITIES** | **Type of activity** | **Number** | **Percentage (%)** |
| Midterm Exam | **1** | **50** |
| Quiz |  |  |
| Homework |  |  |
| Project |  |  |
| Oral examination |  |  |
| Other (………) |  |  |
| **Final Exam** | | **50** |
| **PREREQUISITE(S)** | Having taken the Data Analysis with Package Programs-I course | | |
| **SHORT COURSE CONTENT** | In this course, the areas and applications where Advanced Statistical Tests are used in Package Programs are explained. | | |
| **COURSE AIMS** | Package of advanced statistical tests in studies conducted in the field of health  It is aimed to be implemented and taught in programs . | | |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | Advanced Analysis in Statistical Packages . | | |
| **LEARNING OUTCOMES OF THE COURSE** | In this course, students learn how to apply advanced statistical analysis in research conducted in the field of health. Students learn to manage the data analysis process, interpret it, and report their results in scientific language by applying parametric and nonparametric tests through the R program. They also gain application competence in various graphical presentations and modeling techniques. | | |
| **TEXTBOOK** | Statistical Data Analysis with Package Programs II: Prof. Dr. Kazım ÖZDAMAR, Kaan Bookstore, 2010 | | |
| **OTHER REFERENCES** | 1- Johnson, RA, Wichern DW, (1988), Applied Multivariate Statistical Analysis, Prentice Hall Inc., New Jersey, 1988.  2- IBM SPSS Inc. (2012), IBM SPSS Advanced Statistics 20, ibm.com  3- Lu, Y., Fang, JQ, (2003),Advanced Medical Statistics, World Scientific. | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | R Program and RStudio (installed)  Health datasets (csv, xlsx) for educational purposes  Internet connection  Graphical drawing tools (R packages such as ggplot2)  Application slides and sample code files  Case studies and research examples  Computer or laptop device  Package installation documentation (R packages)  Coding guide  Student-application guidelines  Online resources and video training content  Regression, ANOVA and hypothesis testing modules with R  Practical exam and assessment templates  Scientific report preparation templates  Data cleaning and visualization tools | | |

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|  | **WEEKLY PLAN OF THE COURSE** |
| **WEEK** | **SUBJECTS/TOPICS** |
| **1** | Introduction to Multivariate Statistical Analysis |
| **2** | Matrix and Vector Operations in Package Programs |
| **3** | Matrices and Vectors Used in Multivariate Statistics |
| **4** | Data Generation from Multivariate Normal Distribution in Package Programs |
| **5** | Hotelling T 2 Test in package programs |
| **6** | MANOVA in package programs |
| **7** | Multivariate Linear Regression Analysis in package programs |
| **8** | Midterm Exam |
| **9** | Main Components Analysis in Package Programs |
| **10** | Factor Analysis in package programs |
| **11** | Cluster Analysis in package programs |
| **12** | Discriminant Analysis in package programs |
| **13** | Inter-Set Correlation Analysis in Package Programs |
| **14** | Compatibility Analysis in package programs |
| **15** | Multidimensional Scaling in packaged programs |
| **16** | End of semester exam |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE ELECTRICAL ELECTRONICS ENGINEERING MSC PROGRAM LEARNING OUTCOMES** | | **Contribution Level** | | |
| **NO** | **LESSON OUTCOMES** | **1**  **Little** | **2**  **Middle** | **3**  **High** |
| LO 1 | Describes advanced statistical tests. |  | X |  |
| LO 2 | Can select appropriate test for data. |  |  | X |
| LO 3 | Can apply parametric tests with R program. |  | X |  |
| LO 4 | Can analyze non-parametric tests with R program. |  | X |  |
| LO 5 | Can transform and clean data in the R environment. | X | X |  |
| LO 6 | Conducts hypothesis testing on the dataset. |  |  | X |
| LO 7 | Interpret test results statistically. |  |  | X |
| LO 8 | Can write statistical analysis reports. |  | X |  |
| LO 9 | Applies data visualization techniques. |  | X |  |
| LO10 | Prepares an effective graphical presentation. | X | X |  |
| LO11 | Determine the appropriate multivariate analysis technique. |  | X |  |
| LO12 | Can create multivariate analysis models with R. |  | X |  |
| LO13 | Can calculate confidence intervals and significance levels in health data. |  |  | X |
| LO14 | Can use theoretical knowledge practically in the application exam. |  | X |  |
| LO15 | Be able to provide written interpretation of statistical model outputs. |  |  | X |
| LO16 | Acquires the hardware to carry out advanced data analysis processes with the R program. |  |  | X |

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| **INSTRUCTOR NAME**  **Signature**  PROF. DR. FEZAN MUTLU | **DATE** |