**Name of the Course :** ABE103 - Statistics Applications in Forensic Sciences

**Medium of the Course :** Turkish

**Aim of the Objective :** Forensic Statistics is as investigations and judicial proceedings. Emphasizing the understanding of uncertainty and sources of variability, this field of ​​statistics can add a lot to the fields that analyze forensic evidence.

In the Statistics Applications in Forensic Sciences graduate course, students will have knowledge about the implementions of the methods in forensic science studies by learning basic statistics calculations and analysis techniques for several evidence types such as fingerprints, shoe prints, firearms and tool marks, bloodstain analysis and handwritings.

**Level of the Course :** Master’s Degree

**Type/ Content of the Course :** Elective/ This course will make a difference in their fields by using existing statistical programmes in scientific research. Students in the department of forensic sciences will learn to use statistics effectively and efficiently in their studies. This course will introduce and teach the use of special statistical programmes.

**Credit of the Course :** 3

**Term / Weekly Hour :** Spring/3

**Name(s)/Surname(s) of Instructors :** Dr.Lec. Ramazan Arslan

**Contect Number of Insts. :** 0(507) 786 19 05

**Program Coordinator :** Prof.Dr.Lec. Gökhan İbrahim ÖĞÜNÇ

**Prerequisites :** None.

**Teaching Methods :** Seminar, debate, presentation, article

**Resources :**

1. Probability and Statistics 3.Edition. (2013), Semra Oral Erbaş, Gazi Bookshop.
2. Introduction to Probability and Statistics for Engineers and Scientist : Translation from the 4th Edition. (2012), Sheldon M.Roos, Academic Press Elsevier
3. Essential Mathematics and Statistics for Forensic Science, 1st Ed. (2011), Craig Adam, Wiley Publication
4. Probability and Forensic Evidence: Theory, Philosophy and Applications, 1st Ed. (2021), Ronald Meester, Klaas Slooten, Cambridge University Press
5. The Use of Statistics in Forensic Science, 1st Ed. (2002), C.G.G. Aitken, D.A. Stoney, New York : E. Horwood
6. Statistics and Probability in Forensic Anthropology, (2020), Zuzana Obertova, Alistair Stewart, Cristina Cattaneo, Academic Press Elsevier
7. Workshop on Statistics and Applied Mathematics in Forensic Science, (2016), Cedric Neumann, National Institute of Justice
8. Introduction to Statistics for Forensic Scientists, (2005), David Lucy, John Wiley & Sons

**WEEKLY TOPICS**

|  |  |
| --- | --- |
| **Weeks** | **Units** |
| **1** | **Introduction to Statistics and Basic Concepts**  a) Statistics and Parameters  b) Descriptive and Inferential Statistics |
| **2** | **The Concept of Data and Random Variables**  a) Data Types and Data Collection  b) Basic Concepts in Research  c) Discrete Random Variables  ç) Continuous Random Variables |
| **3** | **Frequency Distributions and Graphs**  a) Frequency Distributions in Quantitative and Qualitative Data  b) Chart Types for Quantitative and Qualitative Data |
| **4** | **Descriptive Statistics**  a) Measures of Central Tendency  b) Dispersion Measures |
| **5** | **Probability Distributions**  a) Discrete Probability Distributions  b) Continuous Probability Distributions |
| **6** | **Sampling and Sampling Distributions-I**  a) Sampling and Sample  b) Sample Selection |
| **7** | ***Midterm*** |
| **8** | **Sampling and Sampling Distributions-II**  c) Sampling Error  ç) Sampling Distribution |
| **9** | **Confidence Intervals** |
| **10** | **Sampling Strategies and Sample Size**  a) Non-probability Sampling Methods  b) Probabilistic Sampling Methods  c) Calculation of Sample Size |
| **11** | **Inferential Concepts and Hypothesis Testing**  a) Deductive Inference  b) Inductive Inference  c) Sampling Error |
| **12** | **p-Value, Hypothesis Testing and Measurement of Evidence-Based Data** |
| **13** | **Bayes Theorem** |
| **14** | **Error Rates** |
| **15** | ***Final*** |

**EVALUATION SYSTEM**

|  |  |  |
| --- | --- | --- |
| **Semester Studies** | **Number** | **Contribution Margin %** |
| **Attandence** | 1 | 10 |
| **Quiz** | - | - |
| **Midterm** | 1 | 20 |
| **Practice** | - | - |
| **Project** | - | - |
| **Assignment / Presentation** | 1 | 20 |
| **Final** | 1 | 50 |
| **Total** | 4 | 100 |

**ECTS / WORKLOAD TABLE**

|  |  |  |  |
| --- | --- | --- | --- |
| **ACTIVITES** | **NUMBER** | **DURATION**  **(Hour)** | **Total workload (Hour)** |
| **Theoretical Course (+Practice)** | 14 | 3 | 42 |
| **Duration of Out-of-Class Study** | 14 | 3 | 42 |
| **Presentation/Seminar Preparation** | 1 | 20 | 20 |
| **Project** | - | - | - |
| **Assignments** | 1 | 15 | 15 |
| **Midterm**   1. **Exam** 2. **Individual Study For The Exam** | 1 | 15 | 15 |
| **Final**   1. **Exam** 2. **Individual Study For The Exam** | 1 | 25 | 25 |
| **Total workload (hours)** | 32 | 81 | 159 |
| **ECTS Credit of The Course (Total workload (hours) / 25)** |  |  | **6** |

**COURSE OUTCOMES**

|  |  |
| --- | --- |
| **No.** | **Explanation** |
| **O1** | To have information about the basic definitions and concepts of statistics in national and international sources. |
| **O2** | To have information about data related to a study and random variables. |
| **O3** | To have information about summarising the data of a research with tables and graphs. |
| **O4** | To have knowledge about location measures and dispersion measures, which are additional descriptive statistics in cases where location measures are insufficient |
| **O5** | To have knowledge about basic probability functions belonging to probability concepts, basic probability measures and probability distributions. |
| **O6** | To have information about heap and sample parameter estimations |
| **O7** | To have information about confidence intervals related to theory of prediction, which is an indicator of the precision of the measurement. |
| **O8** | To have information about sampling strategies and sample size |
| **O9** | To have knowledge about deductive and inductive methods of making inferences from a forensic case and creating and testing hypothesis tests to determine the accuracy of the claims or assumptions that are put forward about a study. |
| **O10** | To have knowledge about “P-Value”, comparison of statistical and forensic hypothesis tests, and measurement of evidence-based data |
| **O11** | To have information about Bayes' theorem, where evidence is interpreted regarding the presence of certain evidence at a crime scene or whether a suspect is guilty or innocent. |
| **O12** | To have information about error rates |

**PROGRAM QUALIFICATIONS**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | |
| **No.** | **Explanation** | **Contribution Level of the Course** | | | | | | |
| **0** | **1** | **2** | **3** | **4** | **5** |
| **P1** | To have a understanding of forensic science ethics and protection of personal data |  |  | X |  |  |  |
| **P2** | To have a knowledge of the principles and techniques of scientific research. |  |  |  |  | X |  |
| **P3** | To reach proficiency about the effects of forensic sciences on ensuring the rule of law. |  |  | X |  |  |  |
| **P4** | To have theoretical and practical knowledge in the fields of Forensic Science Investigation. |  |  |  | X |  |  |
| **P5** | To recognise the importance of using forensic science methods in criminal investigations. |  |  |  |  | X |  |
| **P6** | To have command of crime scene investigation techniques and forensic photography principles. | X |  |  |  |  |  |
| **P7** | To understand the importance of crime scene investigation process in criminal investigations |  | X |  |  |  |  |
| **P8** | To apply the developments in the fields of positive science to the fields of criminalistics. |  |  | X |  |  |  |
| **P9** | To know and apply the hierarchy of forensic sciences, which are multidisciplinary and interdisciplinary, and their relations with each other. |  |  | X |  |  |  |
| **P10** | To have basic theoretical and practical knowledge in at least one of the fields of criminalistics. | X |  |  |  |  |  |
| **P11** | To be able to relate the results of reports prepared by forensic science laboratories to the criminal investigation by reasoning. |  |  |  |  | X |  |
| **P12** | To recognise the legal responsibilities of the expert witness and to internalise the ethical rules. | X |  |  |  |  |  |

**CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAM PROFICIENCY**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **All** | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** | **P8** | **P9** | **P10** | **P11** | **P12** |
| **O1** | **1** | **4** | **1** | **4** | **5** | **0** | **1** | **2** | **3** | **2** | **5** | **0** |
| **O2** | **1** | **5** | **1** | **4** | **5** | **0** | **1** | **4** | **3** | **3** | **5** | **0** |
| **O3** | **1** | **5** | **1** | **4** | **5** | **0** | **1** | **4** | **3** | **3** | **4** | **0** |
| **O4** | **1** | **5** | **1** | **4** | **5** | **0** | **1** | **4** | **3** | **3** | **5** | **0** |
| **O5** | **1** | **4** | **1** | **5** | **4** | **0** | **1** | **4** | **3** | **3** | **4** | **0** |
| **O6** | **1** | **4** | **1** | **4** | **4** | **0** | **1** | **3** | **3** | **2** | **4** | **0** |
| **O7** | **1** | **4** | **1** | **4** | **4** | **0** | **1** | **2** | **3** | **2** | **4** | **0** |
| **O8** | **1** | **4** | **1** | **5** | **5** | **0** | **1** | **3** | **3** | **3** | **5** | **0** |
| **O9** | **1** | **4** | **1** | **5** | **5** | **0** | **1** | **4** | **3** | **4** | **5** | **0** |
| **O10** | **1** | **5** | **1** | **5** | **5** | **0** | **1** | **5** | **3** | **4** | **5** | **0** |
| **O11** | **1** | **5** | **2** | **5** | **5** | **0** | **1** | **5** | **3** | **4** | **5** | **0** |
| **O12** | **1** | **5** | **2** | **5** | **5** | **0** | **1** | **5** | **3** | **5** | **5** | **0** |

**0- None 1- Very Low 2- Low 3- Moderate 4- High 5- Very High**

Dr.Lec. Ramazan Arslan

**.../…/2024**

**Prof.Dr. Gökhan İbrahim ÖĞÜNÇ**

**Director of the Institute of Forensic Sciences**