**Name of the Course :** ADB209 - Forensic Chemistry Investigations and Applications

**Medium of the Course :** Turkish

**Aim of the Objective :** The aim of the course is for the student to learn how to identify and/or compare material evidence at both micro and macro levels through laboratory analyses and examinations, based primarily on the fundamentals of chemistry and secondarily on the principles of positive sciences such as physics, biology, and geology. This involves determining the relevance of these findings to crime and learning methods for uncovering the material truth of the crime.

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

**Type/ Content of the Course :** Elective/Forensic Chemistry is a field of forensic science that aims to identify or compare the chemical nature of evidence found at a crime scene and determine whether the substance has any legal restrictions. It involves linking the evidence to other findings, crime scenes, or suspects/victims.

**Credit of the Course :** 3

**Term / Weekly Hour :** Fall/3

**Name(s)/Surname(s) of Instructors :** Dr.Derya DEMİRCİOĞLU

**Contect Number of Insts. :** 0505 888 52 99 / 0312 464 82 10

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

**Prerequisites :**

**Teaching Methods :** Theoretical/Practical

**Resources :**

1. Scientific Investigation Technique: Criminalistics, Gendarmerie and Coast Guard Academy Publications, 2024.
2. Criminalistics, Gendarmerie and Coast Guard Academy Publications, 2021.
3. Forensic Sciences-II, Gendarmerie General Command, Ankara: Gendarmerie Printing House, 2011.
4. SCHWOEBLE A.J., EXLINE D.L., "Current Methods in Forensic Gunshot Residue Analysis," CRC Press, 2000.
5. SKOOG D.A., HOLLER F.J., NIEMAN T.A., "Principles of Instrumental Analysis," 1998.

**WEEKLY TOPICS**

|  |  |
| --- | --- |
| **Weeks** | **Units** |
| **1** | **Introduction to Forensic Chemistry**   1. **Concepts and Areas of Forensic Chemistry** 2. **Fundamental Chemical Examination Methods** |
| **2** | **Analytical Methods Used in Forensic Chemistry**-**I**   1. **Gravimetric Methods** 2. **Volumetric Methods** |
| **3** | **Analytical Methods Used in Forensic Chemistry-II**   1. **Spectroscopic Methods** 2. **Chromatographic Methods** |
| **4** | **Toxicological Analyses**   1. **Narcotic and Psychotropic Substance Analyses** 2. **Legal Regulations and International Treaties Related to Narcotic and Psychotropic Substance Trafficking** 3. **Toxic Substance Analyses** |
| **5** | **General Chemistry Analyses**   1. Gunshot Residue Analysis 2. Determination of Shooting Distance 3. Comparative Analyses |
| **6** | **Fingerprint Analysis**   1. Formation and Characteristics of Fingerprints and Palm Prints 2. Detection of Fingerprints and Palm Prints at the Crime Scene 3. Collection of Fingerprint and Palm Print Samples from Individuals 4. OPTES (Automated Fingerprint Identification System) |
| **7** | ***Midterm*** |
| **8** | **17025 Laboratory Accreditation** |
| **9** | **Glass and Soil Analyses**   1. Physical Comparative Analysis of Glass Samples 2. Chemical Analysis of Glass Samples 3. Physical Comparative Analysis of Soil Samples 4. Chemical Analysis of Soil Samples |
| **10** | **Textile Fiber Analysis**   1. Physical Comparative Analysis of Fiber Samples 2. Chemical Analysis of Fiber Samples |
| **11** | **Dye Analysis**   1. Physical Comparative Analysis of Dye Samples 2. Chemical Analysis of Dye Samples |
| **12** | **Analysis of Metals and Polymers**   1. Physical Comparative and Chemical Analysis of Metal Samples 2. Physical Comparative and Chemical Analysis of Polymer Samples |
| **13** | **Explosive Material Analysis**   1. Classification of Explosive Materials 2. Analysis of Explosive Materials |
| **14** | **Fire and Arson Analysis**   1. Causes of Fire 2. Types of Fire 3. Analysis of Fire-Starting Materials |
| **15** | **Final** |

**EVALUATION SYSTEM**

|  |  |  |
| --- | --- | --- |
| **Semester Studies** | **Number** | **Contribution Margin %** |
| **Attandence** | 14 | 10 |
| **Quiz** | - | - |
| **Midterm** | 1 | 30 |
| **Practice** | - | - |
| **Project** | - | - |
| **Assignment / Presentation** | 1 | 30 |
| **Final** | 1 | 30 |
| **Total** |  | 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** | - | - | - |
| **Project** | - | - | - |
| **Assignments** | 1 | 22 | 22 |
| **Midterm**   1. **Exam** 2. **Individual Study For The Exam** | 1 | 20 | 20 |
| **Final**   1. **Exam** 2. **Individual Study For The Exam** | 1 | 24 | 24 |
| **Total workload (hours)** | 31 | 72 | 150 |
| **ECTS Credit of The Course (Total workload (hours) / 25)** |  |  | **6** |

**COURSE OUTCOMES**

|  |  |
| --- | --- |
| **No.** | **Explanation** |
| **O1** | **Will be able to evaluate the fundamentals of forensic chemistry.** |
| **O2** | Expresses the importance of forensic chemistry in criminal cases. |
| **O3** | Will be able to evaluate the instrumental analysis methods used in forensic chemistry. |
| **O4** | Will be able to evaluate crime scene investigations and chemical evidence. |
| **O5** | Is familiar with the methods for analyzing toxic substances. |
| **O6** | Will be able to assess abused substances. |
| **O7** | Is knowledgeable about explosive materials and their analysis methods. |
| **O8** | Is familiar with dye analysis methods. |
| **O9** | Will be able to evaluate gunshot residue analysis and the methods used. |
| **O10** | **Will be able to evaluate fire residue analysis and the methods used.** |
| **O11** | Is familiar with the examination methods for textile and fiber evidence. |
| **O12** | Is familiar with glass and soil analysis methods. |

**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** | **5** | **4** | **5** | **4** | **5** | **3** | **4** | **5** | **3** | **5** | **4** | **5** |
| **O2** | **4** | **5** | **5** | **5** | **3** | **4** | **5** | **4** | **5** | **4** | **3** | **3** |
| **O3** | **5** | **4** | **5** | **3** | **3** | **4** | **4** | **4** | **4** | **5** | **5** | **4** |
| **O4** | **4** | **5** | **5** | **4** | **3** | **4** | **3** | **4** | **5** | **5** | **4** | **5** |
| **O5** | **4** | **5** | **5** | **5** | **5** | **4** | **3** | **4** | **3** | **4** | **3** | **3** |
| **O6** | **4** | **3** | **4** | **5** | **4** | **3** | **4** | **3** | **4** | **5** | **4** | **3** |
| **O7** | **4** | **5** | **5** | **5** | **4** | **5** | **3** | **4** | **5** | **5** | **4** | **3** |
| **O8** | **4** | **5** | **4** | **5** | **4** | **4** | **3** | **4** | **3** | **4** | **4** | **5** |
| **O9** | **3** | **4** | **5** | **4** | **5** | **4** | **5** | **4** | **4** | **5** | **4** | **4** |
| **O10** | **5** | **4** | **4** | **3** | **4** | **5** | **4** | **4** | **3** | **5** | **4** | **3** |
| **O11** | **4** | **3** | **4** | **5** | **4** | **3** | **4** | **5** | **4** | **3** | **4** | **5** |
| **O12** | **4** | **5** | **4** | **3** | **4** | **5** | **4** | **5** | **4** | **3** | **4** | **4** |

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

Dr.Derya DEMİRCİOĞLU

**.../…/2024**

**Prof.Dr. Gökhan İbrahim ÖĞÜNÇ**

**Director of the Institute of Forensic Sciences**