Executive Master of Forensic Science Program Courses Short Syllabus

College of Science

Department: Biology

BIO 6101 Forensic Biology

Credit Hours	Lec.	Lab.	Tut.	Student Work Load	Pre-requisites	Co-requisites	Course Level	Teaching Language
3	3	0	0	7.5	None	None	1	English

Program(s) offered for: Executive Master of Forensic Science

1. Course Description:

This course covers different disciplines in forensic science including crime scene investigation, fingerprints, firearms, trace evidence and drugs. Emphasis is placed on the theory and practice techniques of biological principles applied to forensic science, including sample recovery and handling, analytical techniques, DNA profile comparison, quality control and quality assurance. Population genetics employed during the statistical evaluation of data is covered. The course is structured to allow individuals with and without biological training to participate.

2. Course Learning Outcomes (CLOs) and Alignment with PLOs

1.0 Knowledge & Understanding	
1.1	Describe and discuss the essential facts, concepts and principles of chemistry, biology and physics that are required to assist with or support a forensic investigation (**K1, K2**).
1.2	Outline and use appropriate practical, presentational and statistical methods (**K1, K3**).
1.3	List and discuss methods of acquiring, interpreting and analyzing both numerical and observational data (**K1, K4**).
2.0 Skills	
2.1	Analyze, interpret and evaluate data from a variety of sources (**S1**)
2.2	Develop critical skills in the interpretation of scientific knowledge and data (**S1, S2**).
2.3	Explain effectively in written, graphical and oral formats (**S3, S4**).
3.0 Values, Autonomy & Responsibility	
3.1	Appraise investigating work independently and integrate with a collaborated group, using IT to acquire, analyze, and communicate information (**V1**).
3.2	Show effective capabilities in own professional groups and make decisions, enhance society's quality, and contribute to its advancement (**V2**).

3. Learning Resources

Main Textbook(s): An Introduction to Forensic Science, Richard Saferstein, 13th Edition, Pearson, 2021, ISBN-13: 9780137542512.

Fundamentals of Forensic Science, Houck, M.M. & Siegel, JA; 3rd Edition, Academic Press, London, 2015. ISBN-13 : 978-0128000373

Supplementary Materials: None.

Online Resources / Software: Learning Management System (Blackboard).

College of Science

Department: Biology

BIO 6102 Forensic Genetics

Credit Hours	Lec.	Lab.	Tut.	Student Work Load	Pre-requisites	Co-requisites	Course Level	Teaching Language
3	3	0	0	7.5	None	None	1	English

Program(s) offered for: Executive Master of Forensic Science

1. Course Description:

This course introduces the field of forensic genetics through discussion of genetic and statistical issues emerging since the introduction of DNA profiling. Students develop the skills to interpret the evidence of matching genetic profiles, to perform calculations relevant for parentage determination and the identification of remains, and to consider the implications of familial searching of DNA databases.

2. Course Learning Outcomes (CLOs) and Alignment with PLOs

1.0 Knowledge & Understanding	
1.1	Recognize molecular biology and genetics expertise to new forensic problems (**K1**).
1.2	Outline knowledge and understanding of forensic genetics to make accurate statements, describe complex information, provide detailed explanations, and integrate knowledge (**K1, K2**).
1.3	List forensic genetics findings and concepts fully, appropriately and using a variety of different modalities (**K2, K3, K4**).
1.4	State the conceptual and statistical framework for the interpretation of forensic genetics data theoretically (**K2, K4**).
2.0 Skills	
2.1	Develop the ability to critically analyze and interpret forensic evidence in the light of the related scientific literature (**S1**)
2.2	Justify how DNA polymorphisms can be used to identify biological samples and assess kinship (**S2, S4**).
2.3	Reorganize the obtained information (**S1, S4**).
3.0 Values, Autonomy & Responsibility	
3.1	Illustrate linking between science and technology with society (**V1**).
3.2	Use quantitative models and data to solve problems (**V2**).

3. Learning Resources

Main Textbook(s):

An Introduction to Forensic Genetics, William Goodwin, Adrian Linacre, Sibte Hadi, 2nd Edition, Wiley, 2010, ISBN: 978-0-470-71019-7

Forensic DNA Typing, John M. Butler, 2nd Edition, Elsevier Academic Press; Elsevier. ISBN-13 : 978-0121479527

Supplementary Materials: None.

Online Resources / Software: Learning Management System (Blackboard).

College of Science

Department: Chemistry

CHM 6138 Instrumental Analysis & Toxicology

Credit Hours	Lec.	Lab.	Tut.	Student Work Load	Pre-requisites	Co-requisites	Course Level	Teaching Language
3	2	2	0	7.5	None	None	1	English

Program(s) offered for: Executive Master of Forensic Science

1. Course Description:

This course covers the core concepts and principles of a variety of instrumental analytical procedures commonly employed in the trace measurement of toxicologically important chemical species in complex biological and environmental materials. The course is designed to lay the groundwork for appropriate laboratory practice in toxicological research by teaching students about sampling, sample preparation, detection, and data analysis, as well as other areas of instrumental chemical analysis.

2. Course Learning Outcomes (CLOs) and Alignment with PLOs

1.0 Knowledge & Understanding	
1.1	To recall Analytical Methods and relevant Instrumental methods (**K1**).
1.2	To recognize the full Atomic Spectroscopy & Molecular Spectroscopy Methods and Techniques (**K1, K2**).
1.3	To outline reasonable, appropriate arguments and interpretations for identifying chemical species in complex biological and environmental materials (**K2, K4**).
1.4	To state the Classification of Analytical Methods and appropriate Analytical aspects of various toxic and drug compounds (**K1, K2, K3**).
2.0 Skills	
2.1	To compare different analytical methods and types of instrumental methods (**S1, S4**).
2.2	To justify the appropriate analytical techniques for chemical species in complex biological and environmental materials (**S1, S2, S4**).
2.3	To Summarize the analysis and interpretation results in several areas of toxicology accurately, clearly, and concisely (**S2, S3**).
2.4	To demonstrate Oral Communication for Instrumental Analytical procedures, applied techniques, and Instruments, accompanying writing of mini-reports, operating electronic mail, and networking in communicating with others (**S4, V1**).
3.0 Values, Autonomy & Responsibility	
3.1	To perform a scientific presentation, research, and work independently and integrate with a collaborated group, Using IT to acquire, analyze, and communicate information (**V1**).
3.2	To appraise effectively the collaboration and inter-professionalism in class discussions or teamwork, as well as independently (**V1, V2**).

3. Learning Resources

Main Textbook(s):

Principles of Instrumental Analysis, Douglas A. Skoog, F. James Holler, and Stanley R. Crouch, 7th Edition, 20 Channel Center Street Boston, MA 02210 USA. 2016. ISBN: 978-1-305-57721-3.

Supplementary Materials: None.

Online Resources / Software: Learning Management System (Blackboard).

Multimedia associated with the text book and the relevant websites

College of Science

Department: Chemistry

CHM 6151 Introduction in Forensic Chemistry

Credit Hours	Lec.	Lab.	Tut.	Student Work Load	Pre-requisites	Co-requisites	Course Level	Teaching Language
3	2	0	2	7.5	None	None	1	English

Program(s) offered for: Executive Master of Forensic Science

1. Course Description:

Emphasize the importance of chemical knowledge in understanding of forensic examinations leading to criminal prosecutions. Introduce those aspects of chemistry and analytical chemistry relevant to crime detection. Familiarize the student with the principles must be demonstrated retrospectively.

2. Course Learning Outcomes (CLOs) and Alignment with PLOs

1.0 Knowledge & Understanding	
1.1	To recall Forensic Chemistry and relevant Topics (**K1**).
1.2	To recognize the Chemistry of Textiles, Paint and coatings relevant to Forensic Chemistry (**K1, K2**).
1.3	To outline reasonable appropriate arguments and interpretations for Chemical analysis for the scientific examination of questioned documents (**K2, K4**).
1.4	To list the Glass analysis, Fiber Investigation, and Explosions Examinations to answer the Forensic Chemistry questions (**K1, K2, K3**).
2.0 Skills	
2.1	To Compare different Analytical Methods for the scientific examination of questioned documents (**S1, S4**).
2.2	To justify the appropriate Forensic examination techniques for Textiles, Paint and Coatings (**S1, S2, S4**).
2.3	To summarize the analysis and interpretation results in Forensic Chemistry questions (**S2, S3**).
2.4	To demonstrate Oral Communication for Chemical Analytical procedures and answering Forensic Chemistry questions, applied techniques, and Instruments, accompanying writing of mini-reports, operating electronic mail, and networking in communicating with others (**S4, V1**).
3.0 Values, Autonomy & Responsibility	
3.1	To perform a scientific presentation, research, and work independently and integrate with a collaborated group, Using IT to acquire, analyze, and communicate information (**V1**).
3.2	To appraise effectively the collaboration and inter-professionalism in class discussions or team works, as well as independently (**V1, V2**).

3. Learning Resources

Main Textbook(s):

Quantitative Chemical Analysis, D. C. Harris, (8th Ed.), W. H. Freeman & Co., New York, 2010, ISBN: 9781429218153.

Supplementary Materials:

Crime Scence to Court, the essentials of Forensic Science, Royal Society of Chemistry, 4th Ed. 1998, 978-1-78262-446-2

Basic Principles of Forensic Chemistry" JaVed I. Khan, Donnell R. Christian, Thomas J. Kennedy, Springer New York Dordrecht Heidelberg London, ISBN 978-1-934115-06-0, 2012

Forensic chemistry Fundamental and Applications" Jay A. Siegel, John Wiley & Sons, Ltd, The Atrium, Southern Gate, Chichester, West Sussex, PO19 8SQ, UK, 2016, ISBN 978-1-118-89772-0

Online Resources / Software: Learning Management System (Blackboard).

Multimedia associated with the text book and the relevant websites

College of Science

Department: Biology

BIO 6105 Forensic Biological Instruments Analysis

Credit Hours	Lec.	Lab.	Tut.	Student Work Load	Pre-requisites	Co-requisites	Course Level	Teaching Language
3	2	2	0	7.5	None	None	2	English

Program(s) offered for: Executive Master of Forensic Science

1. Course Description:

This course focuses on the molecular and chromatographic techniques commonly used and useful in forensic research and practice. The main focus will be on understanding the principles and basic concepts of different instruments including spectrophotometric; chromatographic and DNA analysis techniques. Students will learn the data analysis and how to utilize these instruments to detect low concentration levels. Additionally; student will expose to instrumentation settings to get more information and confirmation on the results. Students will learn about modern molecular and toxicological subjects and advance techniques in both fields.

2. Course Learning Outcomes (CLOs) and Alignment with PLOs

1.0 Knowledge & Understanding	
1.1	Outline the basic principles of different molecular and toxicological techniques (**K1**).
1.2	List substantial and up to date core knowledge of broad areas in basic biology, chemistry, DNA analysis, instrumentation theory, analysis and use (**K1, K2**).
2.0 Skills	
2.1	Explain advanced understanding of a range of technical and conceptual approaches used in forensic laboratories (**S1**)
2.2	Design, carry out, and interpret crime scene scenarios that generate new knowledge that can be used to solve crime scenes and scientific situations (**S2**).
2.3	Develop skills in the systematic evaluation of scientific data (**S2, S3**).
3.0 Values, Autonomy & Responsibility	
3.1	Appraise working within the group to reach the desired result (**V1**).
3.2	Use computer programs for analyzing and processing the experimental data (**V2**).

3. Learning Resources

Main Textbook(s):

Principles of Instrumental Analysis, Douglas A. Skoog, F. James Holler, Stanley R. Crouch, 7th Ed., 2018. , ISBN-13: 978-1305577213

Quantitative Chemical Analysis Daniel C. Harris; Charles A. Luc, 10 th, Ed ISBN-13: 978-1319164300.

Supplementary Materials: None.

Online Resources / Software: Learning Management System (Blackboard).

College of Science

Department: Biology

BIO 6107 Molecular Biology of Forensic DNA Analysis

Credit Hours	Lec.	Lab.	Tut.	Student Work Load	Pre-requisites	Co-requisites	Course Level	Teaching Language
3	2	2	0	7.5	None	None	2	English

Program(s) offered for: Executive Master of Forensic Science

1. Course Description:

This course provides a study of DNA analysis applied to criminal forensics. The course will cover basics of DNA structure and function, DNA extraction, quantification, amplification, separation, development of DNA profiling methods, and current DNA typing techniques related to DNA forensics. New developments in the field of forensic DNA analysis will also be examined.

2. Course Learning Outcomes (CLOs) and Alignment with PLOs

1.0 Knowledge & Understanding	
1.1	Outline the basic principles of forensic and the biological molecular methods (K1).
1.2	Describe the underpinning science applicable to forensic science and the role of molecular biology techniques (K1, K2).
1.3	State The methods of forensic investigation and law relevant to forensic science and its relationship of biological sciences (K3, K4).
1.4	List Application of understanding in areas of forensic chemistry and forensic biology (K1, K4).
2.0 Skills	
2.1	Explain practical techniques in forensic science (S1)
2.2	Analyze knowledge of forensic practices to investigations and cases (S1, S2).
2.3	Evaluate technical and theoretical information (S3, S4).
3.0 Values, Autonomy & Responsibility	
3.1	Appraise appropriate tools and use in a correct manner (V1).
3.2	Show ability to communicate effectively with class mates and teaching staff (V2).

3. Learning Resources

Main Textbook(s):

Forensic Biology, Richard Li, Second edition, 2021. ISBN: 9781032098791.

Molecular Forensics, Ralph Rapley and David Whitehouse 2007. ISBN: 978-0-470-02495-9.

Supplementary Materials: None.

Online Resources / Software: Learning Management System (Blackboard).

College of Science

Department: Chemistry

CHM 6139 Forensic Toxicology and Drug Analysis

Credit Hours	Lec.	Lab.	Tut.	Student Work Load	Pre-requisites	Co-requisites	Course Level	Teaching Language
3	2	0	2	7.5	None	None	2	English

Program(s) offered for: Executive Master of Forensic Science

1. Course Description:

This course covers forensic toxicology and drug analysis over one semester. The study of drugs and poisons for legal purposes is called forensic toxicology. In addition to regularly encountered drugs and toxins, the course will cover the three key fields of postmortem forensic toxicology, human performance toxicology, and forensic drug testing. Students will learn about the origins, history, forms, physicochemical features, pharmacology, and effects of a variety of drugs, including CNS stimulants, CNS depressants, opioids (natural and manufactured narcotic analgesics), cannabinoids, hallucinogens, and other drugs of interest. Sample handling and pre-treatment, drug isolation from matrices employing solid phase and liquid-liquid extraction, chemical derivatization, donor manipulation, result interpretation, and quality assurance challenges will all be covered.

2. Course Learning Outcomes (CLOs) and Alignment with PLOs

1.0 Knowledge & Understanding	
1.1	To recall Postmortem Forensic Toxicology and relevant Types (**K1, K2**).
1.2	To recognize the full Specimen Preparation and applied methods for Full Specimen analysis (**K3, K4**).
1.3	To outline reasonable, appropriate arguments and interpretations for identifying and elucidating Toxic materials and Drugs (**K1, K2, K3**).
1.4	To state the pharmacological characteristics and analytical aspects of various drug classes commonly encountered in forensic toxicology (**K1, K2, K4**).
2.0 Skills	
2.1	To Compare different drugs and toxic compounds within the same classification in their effects as Crimes sources (**K3**, **S1, S3**).
2.2	To justify the appropriate techniques and experiments for Collating, analyzing, interpreting toxic specimens based on toxicological analysis (**S2**).
2.3	To summarize the Toxic Chemical Structures and Drugs in terms of Structure-Activity Relationships and Mechanisms of Action (**S1, S3**).
2.4	To demonstrate Oral Communication for Postmortem Forensic Toxicology and applied techniques and methods, accompanying writing of mini-report, operating electronic mail, and networking in communicating with others (**S3**, **S4, V1**).
3.0 Values, Autonomy & Responsibility	
3.1	To perform a scientific presentation, research, and work independently and integrate with a collaborated group, Using IT to acquire, analyze, and communicate information (**V1**).
3.2	To appraise effectively the collaboration and inter-professionalism in class discussions or team works, as well as independently (**V1, V2**).

3. Learning Resources

Main Textbook(s):

Principles of Forensic Toxicology, Barry S. Levine, Sarah Kerrigan, Springer Nature, 5th Edition, Gewerbestrasse 11, 6330 Cham, Switzerland, Switzerland AG. 2020. ISBN 978-3-030-42916-4.

Supplementary Materials: None.

Online Resources / Software: Learning Management System (Blackboard).

https://www.sciencedirect.com/topics/pharmacology-toxicology-and-pharmaceutical-science/forensic-toxicology

Multimedia associated with the text book and the relevant websites

Department: Mathematics and Statistics

STA 6117 Statistics for Forensic Scientists

Credit Hours	Lec.	Lab.	Tut.	Student Work Load	Pre-requisites	Co-requisites	Course Level	Teaching Language
3	2	0	2	7.5	None	None	2	English

Program(s) offered for: Executive Master of Forensic Science

1. Course Description:

This course aims to provide students with foundational knowledge in forensically relevant probability theory, statistical analysis, and modeling methods to prepare them to apply these tools to their specific areas of expertise. In addition, students will gain skills in using the logical approach to interpret observations and results in the context of practical forensic examples, case studies, and databases of forensic data.

2. Course Learning Outcomes (CLOs) and Alignment with PLOs

1.0 Knowledge & Understanding	
1.1	Identify a relevant statistical analysis in problems of Kinship, relatedness in pedigrees, DVI, and Familial searching (K2).
1.2	Describe forensic automatic likelihood ratio methods (K3).
1.3	State the differences between populations and samples and methods to make inferences for well-designed experiments and surveys (K2).
1.4	Describe some relevant basic statistical procedures to test the validity of DNA-matching procedures and models (K4).
2.0 Skills	
2.1	Evaluate the collection of traces and interpret the results of analyses through propositions, hypotheses, and statistical methods (S1).
2.2	Compose investigative and problem-solving skills to evaluate forensic science problems (S3).
2.3	Compare various methods to record and communicate observations and evaluation of traces throughout all stages of an investigation (S2, S4).
3.0 Values, Autonomy & Responsibility	
3.1	Generate initiatives with independence and responsibility (V2).
3.2	Appraise team works (V2).

3. Learning Resources

Main Textbook(s):

W. Cook, W. Cunningham, W. Pulleyblank, and A. Schrijver, Combinatorial Optimization; Wiley-Blackwell, 1997.

B. Korte, and J. Vygen, Combinatorial Optimization; Springer, 2012.

C. Papadimitriou, K. Steiglitz, Combinatorial Optimization: Algorithms and Complexity; Dover Publications Inc., 2000.

Supplementary Materials:

D. Avis, A. Hertz, and O. Marcotte (editors), Graph Theory and Combinatorial Optimization, Springer, 2005.

D.-Z. Du, P.M. Pardalos (editors), Handbook of Combinatorial Optimization, Kluwer Academic Publishers, 1999.

Online Resources / Software: Learning Management System (Blackboard).

Department: Biology

BIO 6209 Forensic Serology and DNA Fingerprinting

Credit Hours	Lec.	Lab.	Tut.	Student Work Load	Pre-requisites	Co-requisites	Course Level	Teaching Language
3	2	2	0	7.5	None	None	3	English

Program(s) offered for: Executive Master of Forensic Science

1. Course Description:

This course focuses on forensic identification, analysis, and comparison of the biological evidentiary samples. Electrophoresis, DNA extraction and purification procedures. Polymerase chain reaction (PCR), and methods of genetics and DNA analysis and detection. Casework training and students will get hands-on experience.

2. Course Learning Outcomes (CLOs) and Alignment with PLOs

1.0 Knowledge & Understanding	
1.1	Outline the basic concepts of forensic serology as it applies to the collection, preservation and testing of biological evidence (**K1**).
1.2	State the biological evidence in criminal matters using DNA technologies, including the methods routinely used for the isolation of DNA from cells and techniques applied to DNA quantitation, electrophoretic separation, as well as data analysis, interpretation and reporting (**K2, K3, K4**).
1.3	List the forensic serology discipline utilization the genetic markers typing and DNA profiling, in criminal investigations, to associate a person, place, or item with a crime, and in civil applications, such as paternity testing, baby mix-up, and as an aid in identifying individuals (**K1, K4**).
1.4	Recognize the significance of maintaining chain-of-custody of the samples and applying the laboratory safety measures (**K2, K3**).
1.5	Describe the significance and value of quality assurance and quality control (**K4**).
2.0 Skills	
2.1	Explain the application of experimental techniques and procedures routinely used in this field (**S1**, **S2**).
2.2	Interpret DNA data (**S1**, **S3**).
2.3	Evaluate reports, review and testimony skills required of a DNA analyst (**S2, S4**).
3.0 Values, Autonomy & Responsibility	
3.1	Use laboratory instruments and computers (**V1**).
3.2	Write reports and preparation of presentations and the preparation of graphics and models by using technology (**V2**).

3. Learning Resources

Main Textbook(s):

Forensic Serology, Shanan Tobe, 1st Edition, 2022, ISBN: 9780128129685

Forensic Serology and DNA Profiling , Na Vikraman , 9th June 2021, ISBN: 1230004838678

Supplementary Materials: None.

Online Resources / Software: Learning Management System (Blackboard).

College of Science

Department: Biology

BIO 6210 Entomology and Microbial Forensic

Credit Hours	Lec.	Lab.	Tut.	Student Work Load	Pre-requisites	Co-requisites	Course Level	Teaching Language
2	1	2	0	5	None	None	3	English

Program(s) offered for: Executive Master of Forensic Science

1. Course Description:

This is an introductory course designed to provide students with a basic understanding of the interaction between the discipline of entomology and the legal system. Students will be taught the basic entomology concepts necessary to understand forensic entomology. They will also gain an understanding of how knowledge of insects and other arthropods is important to criminal and civil litigation surrounding death investigations, stored products, and urban environments.

2. Course Learning Outcomes (CLOs) and Alignment with PLOs

1.0 Knowledge & Understanding	
1.1	Outline the connection between insects and forensic entomology (**K1**).
1.2	Name the arthropods and insects associated to criminal and civil litigation (**K1, K2**).
2.0 Skills	
2.1	Justify the cause of death using forensic entomology (**S2**).
2.2	Evaluate and identify the relationship between cause and consequence in the different mechanisms (**S1, S2**).
2.3	Compare organs of the body and the interpretation of its mechanisms (**S3**).
3.0 Values, Autonomy & Responsibility	
3.1	Appraise team work and management of resources and time (**V1**).
3.2	Demonstrate the operation and use of computer and means of modern technology (**V2**).

3. Learning Resources

Main Textbook(s):

Forensic Entomology: The Utility of Arthropods in Legal Investigations. Jason H. Byrd and James L. Castner. 2019. Third Edition. ISBN 0815350201, 9780815350200

Supplementary Materials: None.

Online Resources / Software: Learning Management System (Blackboard).

College of Science

Department: Biology

BIO 6211 Anatomy and Physiology

Credit Hours	Lec.	Lab.	Tut.	Student Work Load	Pre-requisites	Co-requisites	Course Level	Teaching Language
3	2	2	0	7.5	None	None	3	English

Program(s) offered for: Executive Master of Forensic Science

1. Course Description:

This course enables students to develop an understanding of the relationships between the structures and functions of the human body. Students will also learn the mechanisms for maintaining homeostasis within the human body. This course will involve laboratory activities, projects, dissections, textbook material, models, diagrams, journal writings, and clinical studies. The following website will also be used for most text/ lecture related homework assignments.

2. Course Learning Outcomes (CLOs) and Alignment with PLOs

1.0 Knowledge & Understanding	
1.1	Describe the general body organization and anatomical terminology (K1).
1.2	Outline the structure and function of cell, tissues, skin, skeletal system, muscular system (K1, K2).
2.0 Skills	
2.1	Explain in-depth understanding the principles of anatomy and physiology and their interrelationships (S1).
2.2	Interpret a basic understanding of the integration of organ systems to maintain homeostasis (S1, S2, S3).
2.3	Summarize practical knowledge of physiological techniques (S1, S2, S3).
3.0 Values, Autonomy & Responsibility	
3.1	Demonstrate the ability to condense raw data into meaningful values and then assessing the resulting trends is a key skill in a number of vocations, both within science and in other areas (V1).
3.2	Illustrate skills of group discussions and work dynamically as a team member and be effective in sharing ideas and engaging in fruitful discussion (V1, V2).

3. Learning Resources

Main Textbook(s):

Human Anatomy and Physiology , Marieb and Hoehn , 11st edition ISBN-13 : 978-0134580999, ISBN-10 : 0134580990
Textbook of Medical Physiology Guyton and Hall Date of Publication: 06/2020 Elsevier ISBN Number 9780323597128

Supplementary Materials: None.

Online Resources / Software: Learning Management System (Blackboard).

College of Science

Department: Biology

BIO 6291 The Scientific Method in Forensic Science

Credit Hours	Lec.	Lab.	Tut.	Student Work Load	Pre-requisites	Co-requisites	Course Level	Teaching Language
3	3	0	0	7.5	BIO 6101, BIO 6105, CHM 6138, CHM 6151, STA 6117	None	3	English

Program(s) offered for: Executive Master of Forensic Science

1. Course Description:

This course is designed to develop and improve the capability of graduate students to carry out search and interpret as well summarize the literature survey relevant for Forensic Evidence Topics. This course will introduce students to scientific research methodology in Forensic Science so as to develop understanding of the research process as applied to Forensic sciences and other scientific research. Students will learn about an overview of research and Forensically sciences research, formulation of research objective and research problems, the importance of literature study and review, scientific research methodology design, preparation of research proposals, data collection and presentation, writing research reports and scientific articles.

2. Course Learning Outcomes (CLOs) and Alignment with PLOs

1.0 Knowledge & Understanding	
1.1	Recall the fundamentals and application of Biology and Chemistry fields in investigating and solving a Forensic Evidence problem (**K1**).
1.2	Outline the appropriate methods and routes in formulating a Forensic Evidence problem or topic (**K2, K3, K4**).
1.3	List in-depth the Forensic Science Progress and development via literatures survey analysis (**K1, K4**).
1.4	Recognize a critical assessment of scientific investigating work conducted by others (**K1, K3**).
2.0 Skills	
2.1	Develop experience in searching and assessing current Forensic Science literature (**S1, S2**).
2.2	Summarize the literature survey the applied methods and techniques used (**S1**, **S3**).
2.3	Analyze and contrast the literature survey with instructor guidance (**S2, S4**).
2.4	Appraise communication, accompanying writing of mini- reports, operating electronic mail, and network in communicating conclusions and recommendations (**S2, S3, S4**).
3.0 Values, Autonomy & Responsibility	
3.1	Demonstrate group leadership skill and to evaluate the responsibility (**V1**).
3.2	Illustrate the ability to communicate their ideas with the instructor at all times during and after the class (**V2**).

3. Learning Resources

Main Textbook(s):

Mike Illes & Paul Wilson (2020) The Scientific Method in Forensic Science A Canadian Handbook. Toronto, Canada ISBN-13: 9781773381633.

Igwenagu, Chinelo. (2016). Fundamentals of research methodology and data collection.

Marczyk, Geoffrey R. (2014) Essentials of research design and methodology. Wiley.

Supplementary Materials: None.

Online Resources / Software: Learning Management System (Blackboard).

Department: Chemistry

CHM 6231 Advanced Analytical Chemistry

Credit Hours	Lec.	Lab.	Tut.	Student Work Load	Pre-requisites	Co-requisites	Course Level	Teaching Language
3	3	0	0	7.5	None	None	4	English

Program(s) offered for: Executive Master of Forensic Science

1. Course Description:

This course is designed to provide comprehensive topics of sampling and modern sample preparation techniques. The course will cover the classical methods of analysis (gravimetric methods and volumetric methods). The topics include advanced aspects of Spectroscopic methods of analysis, Electro-chemical methods of analysis, and Chromatographic techniques.

2. Course Learning Outcomes (CLOs) and Alignment with PLOs

1.0 Knowledge & Understanding	
1.1	To recall the principles of a wide range of modern analytical methods of sampling types (K1, K3, K4).
1.2	To list principles in Analytical Chemistry (K1, K2).
1.3	To describe the applications of spectral methods in analytical chemistry (K1, K4).
1.4	To memorize the Chromatographic and Electrochemical Methods (K1, K4).
2.0 Skills	
2.1	To analyze problems and explore strategies for Volumetric and Gravimetric Methods applications (S1, S2).
2.2	To interpret the obtained data from different Spectral Methods (S2, S3).
2.3	To choose the appropriate techniques in Electrochemical analytical methods for a specific sample (S2, S4).
2.4	To demonstrate Oral Communication on applying analytical chemistry techniques in the industry and their impact in KSA, accompanying mini- Reports, operating electronic mail, and Network in communicating with others (S1, S4, V1).
3.0 Values, Autonomy & Responsibility	
3.1	Perform communications to integrity, academic ethical practices to find solutions for scientific and social issues, and a commitment to responsible citizenship and using IT (V1).
3.2	Appraise effectively in research or professional groups and make decisions, develop knowledge, enhance society's quality, and contribute to its advancement (V1, V2).

3. Learning Resources

Main Textbook(s):

Fundamentals of analytical chemistry, Douglas A. Skoog, Donald M. West, F. James Holler, Stanley R. Crouch. 9th Edition. ISBN-13: 978-0-495-55828-6.

Analytical Chemistry, Gary D. Christian, Purnendu K. (Sandy) Dasgupta, Kevin A. Schug., 7th Edition. ISBN: 978-0-470-88757-8

Supplementary Materials: None.

Online Resources / Software: Learning Management System (Blackboard).

Multimedia associated with the text book and the relevant websites

Department: Biology

BIO 6299 Research Project

Credit Hours	Lec.	Lab.	Tut.	Student Work Load	Pre-requisites	Co-requisites	Course Level	Teaching Language
4	-	-	-	10	BIO 6291	None	4	English

Program(s) offered for: Executive Master of Forensic Science

1. Course Description:

The capstone Research Project in Forensic Science is the culminating course for students in the Executive Master of Forensic Science program. This course provides an opportunity to apply Forensic Science methods to tackle real-world problems. Students will select a relevant research topic, conduct a literature review, and develop Forensic Science models. They will work closely with faculty advisors to refine their research methodologies and address ethical considerations in data collection and in final written reports. The course concludes with a comprehensive written report and an oral presentation, showcasing students' ability to effectively communicate their findings. This capstone experience prepares students for advanced academic pursuits and equips them with essential skills for careers in Forensic Science and related fields.

2. Course Learning Outcomes (CLOs) and Alignment with PLOs

1.0 Knowledge & Understanding	
1.1	Recall advanced application of in-depth and up-to-date technical knowledge and research principles in forensic science (K1, K3).
1.2	Describe appropriately judged professional solutions to forensic science problems (K3, K4).
1.3	Describe a required understanding of the basic concepts about forensic science in relevant topics and fields (K3, K4).
1.4	List the essential processes and procedures for the investigation in forensic science and present it inclusively (K1, K3).
2.0 Skills	
2.1	Analyze criminal samples and evidence to make decisions based on the knowledge gain (S1, S2, S4).
2.2	Compare the professional instruments, highly sensitive equipment, hazardous and non-hazardous materials with full capability to analyze Forensic Science Samples and cases, and problems (S1, S3).
2.3	Summarize and analyze existing academic literature serving the forensic science arguments (S2, S4).
2.4	justify laboratory instruments and perform biological and chemical experiments and analysis, handle chemicals and operate tools (S4).
3.0 Values, Autonomy & Responsibility	
3.1	Demonstrate ability to deal with various sources of knowledge and the ability to exploit and to estimate the time (V1).
3.2	Analyze the results with other colleagues and with supervisors (S4, V1, V2).

3. Learning Resources

Main Textbook(s): These are detected depending on the nature of the specialty of the research project

Supplementary Materials: These are detected depending on the nature of the specialty of the research project.

Online Resources / Software: These are detected depending on the nature of the specialty of the research project