Course Specification

(Postgraduate Programs)

Course Title: Forensic Biology
Course Code: BIO 6101
Program: Executive Master of Forensic Science
Department: Biology and Chemistry
College: Science
Institution: Imam Mohammad Ibn Saud Islamic University
Version: 1
Last Revision Date: 29 September 2024

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A. General information about the course:

1. Course Identification:

1. Credit hours: 3 (3 lectures, 0 laboratories, 0 tutorials)					
2. Course type					
A.	☐University	☐College	☒ Program	☐Track	
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Level 1 l Year 1)					
4. Course General 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.					
5. Pre-requirements for this course (if any)**:**					
None					
6. Co-requirements for this course (if any)**:**					
None					
7. Course Main Objective(s):					
At the end of the course, the students will be familiar with the fundamentals of various disciplines in forensic science, with an emphasis on forensic biology.					

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100%
2	E-learning	-	-
3	Hybrid • Traditional classroom	-	-

No	Mode of Instruction	Contact Hours	Percentage
	• E-learning		
4	Distance learning	-	-

3. Contact Hours: (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	-
3.	**Field**	-
4.	**Tutorial**	-
5.	**Others (specify)……**	-
	Total	45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods:

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and 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	Interactive Lecture Discussion and Dialogue Mind Maps Concept Maps Standard Method Inductive Method Self-Learning Cooperative Learning Field Visits	Written tests Class discussion questions Class assignments Homework Short research/reports Summaries Presentations
1.2	Outline and use appropriate practical, presentational and statistical methods	K1, K3	Interactive Lecture Discussion and Dialogue Mind Maps Concept Maps Standard Method Inductive Method Self-Learning Cooperative	Written tests Class discussion questions Class assignments Homework Short research/repor

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
			Learning Field Visits	ts Summaries Presentations
1.3	List and discuss methods of acquiring, interpreting and analyzing both numerical and observational data	K1, K4	Interactive Lecture Discussion and Dialogue Mind Maps Concept Maps Standard Method Inductive Method Self-Learning Cooperative Learning Field Visits	Written tests Class discussion questions Class assignments Homework Short research/reports Summaries Presentations
2.0	**Skills**			
2.1	Analyze, interpret and evaluate data from a variety of sources	S1	Practical Application Microteaching Modeling and Simulation Project-Based Learning Discovery Learning Collaborative Learning	Observation / Rating Scales Practical Tests Self-Assessment Peer Assessment
2.2	Develop critical skills in the interpretation of scientific knowledge and data	S1, S2	Practical Application Microteaching Modeling and Simulation Project-Based Learning Discovery Learning Collaborative Learning	Observation / Rating Scales Practical Tests Self-Assessment Peer Assessment
2.3	Explain effectively in written, graphical and oral formats	S3, S4	Practical Application Microteaching Modeling and Simulation Project-Based	Observation / Rating Scales Practical Tests Self-Assessment Peer

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
			Learning Discovery Learning Collaborative Learning	Assessment
3.0	**Values, autonomy, and responsibility**			
3.1	Appraise investigating work independently and integrate with a collaborated group, using IT to acquire, analyze, and communicate information	V1	Modeling Dialogue and discussion Self-learning Collaborative learning	Observation Self-assessment Peer assessment Achievement file
3.2	Show effective capabilities in own professional groups and make decisions, enhance society's quality, and contribute to its advancement	V2	Modeling Dialogue and discussion Self-learning Collaborative learning	Observation Self-assessment Peer assessment Achievement file

C. Course Content:

No	List of Topics	Contact Hours
1.	Introduction to Forensic Science	3
2.	Physical evidence	2
3.	Glass and Soil	2
4.	Organic Analysis & Inorganic Analysis	2
5.	Trace evidence - Hairs, Fibers and Paint	2
6.	Drugs	3
7.	Forensic Toxicology	3
8.	Forensic Aspects of Fire investigation & Forensic Investigations of Explosions	2
9.	Fingerprint processing and comparison	3
10	Document Examination, Computer Forensics	2
11.	Bloodstain Pattern analysis	2

12.	Crime scene and Evidence Processing	2
13.	Crime scene reconstruction	2
14.	Introduction to Forensic Serology	3
15.	Introduction to Forensic Serology-blood	2
16.	Presumptive testing for blood	3
17.	Introduction to Forensic Serology – Semen	2
18.	Presumptive testing for Semen	2
19.	The Future of Forensics	3
Total		**45**

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes, oral test, oral presentation, group project, essay, and Attendance	During the semester	30%
2.	Midterm Exam	8th week	30%
3.	Final Exam	16th week	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities:

1. References and Learning Resources:

Essential References	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
Supportive References	None
Electronic Materials	None
Other Learning Materials	None

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms and Laboratories
Technology equipment (Projector, smart board, software)	Projector and Smart board

Items	Resources
Other equipment (Depending on the nature of the specialty)	Forensic Science-related instruments, including safety cabinet, centrifuges, incubators, thermal cyclers, trans-illuminators, gel electrophoresis apparatus

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Direct
Effectiveness of students' assessment	Program Leaders	Direct
Quality of learning resources	Peer Reviewer	Indirect
The extent to which CLOs have been achieved	Program Leaders	Direct
Other	-	-

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	**Department of Biology Council**
REFERENCE NO.	**Meeting No. 6**
DATE	**29/9/2024**

Course Specification

(Postgraduate Programs)

Course Title: Forensic Genetics
Course Code: BIO 6102
Program: Executive Master of Forensic Science
Department: Biology and Chemistry
College: Science
Institution: Imam Mohammad Ibn Saud Islamic University
Version: 1
Last Revision Date: 29 September 2024

Table of Contents

A. General information about the course:

1. Course Identification:

1. Credit hours: 3 (3 lectures, 0 laboratories, 0 tutorials)					
2. Course type					
A.	☐University	☐College	☒ Program	☐Track	
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Level 1 l Year 1)					
4. Course General 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.					
5. Pre-requirements for this course (if any)**:**					
None					
6. Co-requirements for this course (if any)**:**					
None					
7. Course Main Objective(s):					
At the end of the course, the students will be able to 1. Define and interpret genetic profiles from blood groups, Short Tandem Repeat 2. Identify markers and Single Nucleotide Polymorphisms. 3. Calculate likelihood ratios for matching genetic profiles, with allowances for 4. Understand population structure and relatedness. 5. Calculate paternity indexes. 6. Identify risks and benefits of using genetic profiles for human identification. 7. Detect instances of the “prosecutor's fallacy'' in trial transcripts and court rulings.					

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100%

No	Mode of Instruction	Contact Hours	Percentage
2	E-learning	-	-
3	Hybrid • Traditional classroom • E-learning	-	-
4	Distance learning	-	-

3. Contact Hours: (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	-
3.	**Field**	-
4.	**Tutorial**	-
5.	**Others (specify)……**	-
	Total	45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods:

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Recognize molecular biology and genetics expertise to new forensic problems	K1	Interactive Lecture Discussion and Dialogue Mind Maps Concept Maps Standard Method Inductive Method Self-Learning Cooperative Learning Field Visits	Written tests Class discussion questions Class assignments Homework Short research/reports Summaries Presentations
1.2	Outline knowledge and understanding of forensic genetics to make accurate statements, describe	K1, K2	Interactive Lecture Discussion and Dialogue Mind Maps Concept Maps	Written tests Class discussion questions Class

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	complex information, provide detailed explanations, and integrate knowledge		Standard Method Inductive Method Self-Learning Cooperative Learning Field Visits	assignments Homework Short research/reports Summaries Presentations
1.3	List forensic genetics findings and concepts fully, appropriately and using a variety of different modalities	K2, K3, K4	Interactive Lecture Discussion and Dialogue Mind Maps Concept Maps Standard Method Inductive Method Self-Learning Cooperative Learning Field Visits	Written tests Class discussion questions Class assignments Homework Short research/reports Summaries Presentations
1.4	State the conceptual and statistical framework for the interpretation of forensic genetics data theoretically	K2, K4	Interactive Lecture Discussion and Dialogue Mind Maps Concept Maps Standard Method Inductive Method Self-Learning Cooperative Learning Field Visits	Written tests Class discussion questions Class assignments Homework Short research/reports Summaries Presentations
2.0	**Skills**			
2.1	Develop the ability to critically analyze and interpret forensic evidence in the light of the related scientific literature	S1	Practical Application Microteaching Modeling and Simulation Project-Based Learning Discovery Learning Collaborative Learning	Observation / Rating Scales Practical Tests Self-Assessment Peer Assessment

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
2.2	Justify how DNA polymorphisms can be used to identify biological samples and assess kinship	S2, S4	Practical Application Microteaching Modeling and Simulation Project-Based Learning Discovery Learning Collaborative Learning	Observation / Rating Scales Practical Tests Self-Assessment Peer Assessment
2.3	Reorganize the obtained information	S1, S4	Practical Application Microteaching Modeling and Simulation Project-Based Learning Discovery Learning Collaborative Learning	Observation / Rating Scales Practical Tests Self-Assessment Peer Assessment
3.0	**Values, autonomy, and responsibility**			
3.1	Illustrate linking between science and technology with society	V1	Modeling Dialogue and discussion Self-learning Collaborative learning	Observation Self-assessment Peer assessment Achievement file
3.2	Use quantitative models and data to solve problems	V2	Modeling Dialogue and discussion Self-learning Collaborative learning	Observation Self-assessment Peer assessment Achievement file

C. Course Content:

No	List of Topics	Contact Hours
1.	Introduction / History of DNA	4
2.	DNA comparison and statistics	4

3.	The genetic nature of forensic profiles: blood groups, STRs, SNPs	4
4.	The elements of probability theory. The birthday problem	3
5.	Presenting scientific evidence. Likelihood ratios. Common fallacies	4
6.	Profile matching and partial matching within and between populations	4
7.	Lineage markers: Y-STR and mtDNA profiles	4
8.	Parentage calculations	4
9.	Relatedness. Remains identification	3
10	Cold hits. Familial searching	3
11.	Wildlife forensics	4
12.	Ethical issues	4
Total		**45**

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes, oral test, oral presentation, group project, essay, and Attendance	During the semester	30%
2.	Midterm Exam	8th week	30%
3.	Final Exam	16th week	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities:

1. References and Learning Resources:

Essential References	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
Supportive References	None
Electronic Materials	None
Other Learning Materials	None

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms and Laboratories

Items	Resources
Technology equipment (Projector, smart board, software)	Projector and Smart board
Other equipment (Depending on the nature of the specialty)	Forensic Science-related instruments, including safety cabinet, centrifuges, incubators, thermal cyclers, trans-illuminators, gel electrophoresis apparatus

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Direct
Effectiveness of students' assessment	Program Leaders	Direct
Quality of learning resources	Peer Reviewer	Indirect
The extent to which CLOs have been achieved	Program Leaders	Direct
Other	-	-

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	**Department of Biology Council**
REFERENCE NO.	**Meeting No. 6**
DATE	**29/9/2024**

Course Specification

(Postgraduate Programs)

Course Title:	**Instrumental Analysis & Toxicology**
Course Code:	**CHM 6138**
Program:	**Executive Master of Forensic Science**
Department:	**Biology and Chemistry**
College:	**Science**
Institution:	**Imam Mohammad Ibn Saud Islamic University**
Version:	**1**
Last Revision Date:	**2 October 2024**

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A. General information about the course:

1. Course Identification:

1. Credit hours:				
3 (2 Lectures, 2 Lab, 0 Tutorial)				
2. Course type				
A.	☐University	☐College	☒ Program	☐Track
B.	☒ Required		☐Elective	
3. Level/year at which this course is offered: (1/1)				
4. Course General 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.				
5. Pre-requirements for this course (if any):				
None				
6. Pre-requirements for this course (if any):				
None				
7. Course Main Objective(s):				
• Understand 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. • Develop teaching students about sampling, sample preparation, detection, data analysis, and other areas of instrumental chemical analysis. • Students will develop an understanding of the function of basic components of chemical instrumentation. • Interpret recorded data with standard statistical methods, including noise analysis. • Learn how optical spectroscopy is used to identify specific structural features of molecules. • Learn fundamental aspects of electrochemical analysis involving voltammetry, amperometry, and polarography. • Familiarize with how mass spectrometry is used to determine molecular weights, empirical formulas, and primary structural features of different molecules.				

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	E-learning	0	0%

No	Mode of Instruction	Contact Hours	Percentage
3	Hybrid • Traditional classroom • E-learning	0	0%
4	Distance learning	0	0%

3. Contact Hours: (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	**30**
2.	**Laboratory/Studio**	**0**
3.	**Field**	**0**
4.	**Tutorial**	**30**
5.	**Others (specify)……**	**0**
	Total	**60**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods:

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	**To recall Analytical Methods and relevant Instrumental methods.**	**K1**	▪ Two hours/week lectures. ▪ Self-study ▪ Home-exam.	▪ Regular Exams ▪ Assignments ▪ Short Quizzes ▪ Oral Discussion ▪ Participation.
1.2	**To recognize the full Atomic Spectroscopy & Molecular Spectroscopy Methods and Techniques.**	**K1; K2**	▪ Two hours/week lectures. ▪ Think and justify Molecular Spectroscopy Methods using available references (SDL) online. Open discussion.	▪ Oral Discussion marks ▪ Literatures Survey ▪ Mini-seminar. ▪ Participation.
1.3	**To outline reasonable,**	**K2; K4**	▪Two hours/week lectures.	▪ Midterm. ▪ Assignments.

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	appropriate arguments and interpretations for identifying chemical species in complex biological and environmental materials.		▪Group Discussion using available references (SDL)	▪ Group Discussions. ▪ Lab reports ▪ Literatures Survey ▪ Mini-seminar. ▪ Participation.
1.4	**To state the Classification of Analytical Methods and appropriate Analytical aspects of various toxic and drug compounds.**	**K1; K2; K3**	▪Two hours/week lectures. ▪Group Discussion using available references (SDL)	▪ Assignments ▪ Open Discussions. ▪ Literatures Survey ▪ Lab reports ▪ Mini-seminar. ▪ Participation.
2.0	**Skills**			
2.1	**To compare different analytical methods and types of instrumental methods,**	**S1; S4**	▪Lectures activity. ▪Practice some examples of Analytical Methods. ▪Self-study.	▪ Questions in Lectures. ▪ Short Quizzes and Exams. ▪ Open Discussions. ▪ Lab reports ▪ Participation ▪ Mini-seminar.
2.2	**To justify the appropriate analytical techniques for chemical species in complex biological and environmental materials.**	**S1; S2; S4**	▪ Lectures and Oral Discussions. ▪ Brainstorming. ▪ Self-study	▪ Questions in Lectures. ▪ Participation ▪ Oral Discussion ▪ Short Quizzes and Exams.
2.3	**To Summarize the analysis and interpretation results in several areas of toxicology accurately, clearly, and concisely.**	**S2; S3**	▪ Lectures ▪ Group Discussions. ▪ Brainstorming. ▪ Self-study	▪Questions in Lectures. ▪ Short Quizzes and Exams. ▪ Lab reports ▪ Participation
2.4	**To demonstrate Oral**	**S4; V1**	▪ Group Discussion	▪ Oral

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	Communication for Instrumental Analytical procedures, applied techniques, and Instruments, accompanying writing of mini-reports, operating electronic mail, and networking in communicating with others.		and Assignments ▪ Introduce several examples of Instrumental Analytical procedures, applied techniques, and Instruments, which will require reading, writing, and oral presentation. Encourage students to use electronic mail to submit Home Exams and Assignments.	Discussion, Quizzes, and Exams. ▪ Giving marks for Oral Discussion in Lectures. ▪ Marks given for Assignments
3.0	**Values, autonomy, and 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**	▪ Brainstorming. ▪ Exercises ▪ Group Discussion. Team work.	▪ Oral Discussion. ▪ Group Discussion ▪ Assignments
3.2	**To appraise effectively the collaboration and inter-professionalism in class discussions or teamwork, as well as independently.**	**V1; V2**	▪ Small Group tasks ▪ Open discussion in the classroom. ▪ Office hour guiding. ▪ Group Presentation of mini-projects	▪ Participation ▪ Homework's ▪ Mini-project(s).

C. Course Content:

No	List of Topics	Contact Hours
1.	***Introduction:*** Classification of Analytical Methods, Types of Instrumental Methods, Instruments for Analysis, Calibration of Instrumental Methods, Selecting of Analytical Method.	6
2.	***Atomic Spectroscopy & Molecular Spectroscopy:*** An Introduction to Spectrometric Methods, An Introduction to Optical Atomic Spectrometry, Atomic Absorption and Atomic Fluorescence Spectrometry, Atomic Emission Spectrometry, Atomic Mass Spectrometry, Atomic X-ray Spectrometry, Molecular Luminescence Spectrometry.	6
3	***Electroanalytical Chemistry:*** An Introduction to Electroanalytical Chemistry, Potentiometry, Coulometry, Voltammetry.	6
4	***Separation Methods:*** An Introduction to Chromatographic Separations, Gas Chromatography, High-Performance Liquid Chromatography, Supercritical Fluid Chromatography and Extraction, Capillary Electrophoresis, Electrochromatography, and Field-Flow Fractionation.	12
Total		**30**

No	List of Topics (Laboratories)	Contact Hours
1	**Laboratory rules and safety precautions**	2
2	**Identification of Fibers using FTIR**	2
3	**Forensic Analysis by Infrared Spectrophotometry for Identification of Unknown Drugs**	2
4	**A quantitative analysis of Salicylates in forensic samples by UV-visible spectrometry**	2
5	**Thin Layer Chromatography (TLC) of Analgesic Drugs (Acetaminophen, Aspirin, Caffeine, and Ibuprofen)**	2
6	**Analysis of Ink by Thin Layer Chromatography Experimental**	2
7	**Chromatography of Magic Markers**	2
8	**Chromatography of Magic Markers**	2
9	**Procedure for HPLC Analysis of Analgesic Drugs (Acetaminophen, Aspirin, Caffeine, and Ibuprofen)**	2
10	**Determination of some drugs in forensic Samples using HPLC Analysis**	2
11	**Determination of some drugs in forensic Samples using HPLC Analysis**	2
12	**Identification of Compounds in Forensics using Gas Chromatography**	2
13	**Identification of Compounds in Forensics using Gas Chromatography**	2
14	**Identification of Compounds in forensic Samples using C/MS.**	2

15	Identification of Compounds in forensic Samples using C/MS.	2
Total		30

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Activities (Oral Discussion, Mini-projects, Mini-seminar, Quizzes, Mid-term, Oral Presentation, Participation, Assignments, Lab. reports)	During the semester	30 %
2.	Midterm Exam	8th week	30 %
3.	Final Exam	16th week	40 %
	Total		100%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities:

1. References and Learning Resources:

Essential References	**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.
Supportive References	NONE
Electronic Materials	NONE
Other Learning Materials	• Blackboard • Multimedia associated with the text book and the relevant websites

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	• **Each classroom should be equipped with a whiteboard and a projector, with a maximum of 20 students.** • **In each laboratory, a list of safety and precautions is provided.** • **In each lab has proper ventilation and is well-equipped with instruments.** • **In each lab, there are containers for solid waste, liquid waste, and crushed glasses.** • **Each lab has a small pharmacy for first aid in**

Items	Resources
	case of an accident • In each lab, the rules, conditions, and safety mechanism, as well as a list of Risks and safety precautions according to Merck Catalogue, are hanging in the labs
Technology equipment (Projector, smart board, software)	**The rooms have a data show, Smart Board, and WI-FI access.**
Other equipment (Depending on the nature of the specialty)	• **Appropriate Glassware for carrying the requested experiments (conical flasks, beakers, measuring cylinders)** • **Appropriate fine chemicals and solvents (distilled Water ammonium nitrate)** • **Analytical balance (3 digits), Set gas laws with the glass jacket Data acquisition set for gas laws with glass jacket, PC, Windows® 95 or higher, calorimeter, thermometer, Filter papers, clamps, stands**

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	**Direct:** Questionnaire. **Direct:** Course e-Portfolio.
	Course Responsible	**Indirect:** Second examiner checklist-Course report.
	Peer Reviewer	**Direct:** Questionnaire. **Indirect:** Eternal assessor report.
Effectiveness of students' assessment	Program Leaders	**Direct:** Course e-Portfolio. **Indirect:** Course report.
Quality of learning resources	Students	**Indirect:** Second examiner checklist-Course report.
	Faculty (Academic Advisory - **FEGC**)	**Direct:** course Entrance/Exit. **Indirect:** Observations - Accreditation review.
	Program Leaders	**Direct:** Course e-Portfolio. **Indirect:** Course evaluation survey- Observations- Syllabus

Assessment Areas/Issues	Assessor	Assessment Methods
	Students	review- Accreditation review. **Indirect:** Second examiner checklist-Course report.
The extent to which CLOs have been achieved	Course Responsible	**Direct:** Exams - Course e-Portfolio. **Indirect:** Second examiner checklist-Course report.
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	**Department of Chemistry Council**
REFERENCE NO.	**7 (NO. 2/3)**
DATE	**29/3/1446 - 2/10/2024**

Course Specification

(Postgraduate Programs)

Course Title:	**Introduction in Forensic Chemistry**
Course Code:	**CHM 6151**
Program:	**Executive Master of Forensic Science**
Department:	**Biology and Chemistry**
College:	**Science**
Institution:	**Imam Mohammad Ibn Saud Islamic University**
Version:	**1**
Last Revision Date:	**2 October 2024**

Table of Contents

A. General information about the course:

1. Course Identification:

1. Credit hours:					
3 (2 Lectures, 0 Lab, 2 Tutorials)					
2. Course type					
A.	☐University	☐College	☒ Program	☐Track	
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (1/1)					
4. Course General 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.					
5. Pre-requirements for this course (if any)**:**					
None					
6. Pre-requirements for this course (if any)**:**					
None					
7. Course Main Objective(s):					
At the end of the course, the students will be able to: • **Outline the analysis of evidence and the presentation of results.** • **Give an account of the variety of applications of chemistry in the field of forensic chemistry.** • **Familiarity with the type of chemical "signatures" that can link a suspect with a crime.** • **Interpret data from the chemical and physical evidence and measurements.** • **Manipulate and evaluate data.** • **Plan and organize work within published deadlines.** • **Design a scheme and technique (s) to solve unknown crimes.**					

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	E-learning	0	0%
3	Hybrid • Traditional classroom • E-learning	0	0%
4	Distance learning	0	0%

3. Contact Hours: (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	**30**
2.	**Laboratory/Studio**	**0**
3.	**Field**	**0**
4.	**Tutorial**	**30**
5.	**Others (specify)……**	**0**
	Total	**60**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods:

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	**To recall Forensic Chemistry and relevant Topics.**	**K1**	▪ Three hours/week lectures. ▪ Self-study ▪ Home-exam.	▪ Regular Exams ▪ Assignments ▪ Short Quizzes ▪ Oral Discussion ▪ Participation.
1.2	**To recognize the Chemistry of Textiles, Paint and coatings relevant to Forensic Chemistry.**	**K1; K2**	▪ Three hours/week lectures. ▪ Think, and justify Textiles, Paint and coatings relevant to Forensic Chemistry relation, using available references (SDL) online. ▪ Open discussion.	▪ Oral Discussion marks ▪ Literatures Survey ▪ Mini-seminar. ▪ Participation.
1.3	**To outline reasonable appropriate arguments and interpretations for Chemical analysis for**	**K2; K4**	▪Three hours/week lectures. ▪Group Discussion using available references (SDL)	▪ Midterm. ▪ Assignments. ▪ Group Discussions. ▪ Literatures Survey

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	the scientific examination of questioned documents.			▪ Mini-seminar. ▪ Participation.
1.4	**To list the Glass analysis, Fiber Investigation, and Explosions Examinations to answer the Forensic Chemistry questions.**	**K1; K2; K3**	▪Three hours/week lectures. ▪Group Discussion using available references (SDL)	▪ Assignments ▪ Open Discussions. ▪ Literatures Survey ▪ Mini-seminar. ▪ Participation.
2.0	**Skills**			
2.1	**To Compare different Analytical Methods for the scientific examination of questioned documents.**	**S1; S4**	▪Lectures activity. ▪Practice some examples of Analytical Methods. ▪Self-study.	▪ Questions in Lectures. ▪ Short Quizzes and Exams. ▪ Open Discussions. ▪ Participation ▪ Mini - seminar.
2.2	**To justify the appropriate Forensic examination techniques for Textiles, Paint and Coatings.**	**S1; S2; S4**	▪ Lectures and Oral Discussions. ▪ Brainstorming. Self-study	▪ Questions in Lectures. ▪ Participation ▪ Oral Discussion ▪ Short Quizzes and Exams.
2.3	**To summarize the analysis and interpretation results in Forensic Chemistry questions.**	**S2; S3**	▪ Lectures ▪ Group Discussions. ▪ Brainstorming. ▪ Self-study	▪ Questions in Lectures. ▪ Short Quizzes and Exams. ▪ Participation
2.4	**To demonstrate Oral Communication for Chemical Analytical procedures and answering Forensic Chemistry questions, applied techniques, and Instruments, accompanying**	**S4; V1**	▪ Group Discussion and Assignments ▪ Introduce several examples of Forensic Chemistry question asking to analyze, which will require	▪ Oral Discussion, Quizzes, and Exams. ▪ Giving marks for Oral Discussion in Lectures. ▪ Marks given

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	writing of mini-reports, operating electronic mail, and networking in communicating with others.		reading, writing, and oral presentation. ▪ Encourage students to use electronic mail to submit Home Exams and Assignments.	for Assignments
3.0	**Values, autonomy, and 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**	▪ Brainstorming. ▪ Exercises ▪ Group Discussion. Team work.	▪ Oral Discussion. ▪ Group Discussion ▪ Assignments
3.2	**To appraise effectively the collaboration and inter-professionalism in class discussions or team works, as well as independently.**	**V1; V2**	▪ Small Group tasks ▪ Open discussion at classroom. ▪ Office hour guiding. ▪ Group Presentation of mini-projects	▪ Participation ▪ Homework's ▪ Mini-project(s).

C. Course Content:

No	List of Topics	Contact Hours
1.	**Introduction**: Forensic Chemistry, Scientific Investigation, Forensic Investigation.	**4**
2.	**Textiles:** Introduction, A science of reconstruction, Textiles, Natural fibers, Manufactured fibers, Yarns and fabrics, Fiber types, Chemistry, The future.	**8**
3	**Paint and coatings examination:** Introduction, Paint chemistry, Automotive paint application, Forensic examination of paint, Paint	**4**

	evidence evaluation and expert opinion.	
4	**Chemical analysis for the scientific examination of questioned documents:** Static approach, Dynamic approach, Ink composition, Examinations, Questioned documents, crime scenes and evidential considerations, Interpreting results and rendering conclusions.	**8**
5	**Glass Analysis:** Physical properties, composition of glass, Techniques for identification of glass.	**12**
6	**Fire Investigation:** Introduction, The Nature of Fire, Factors Affecting Flame Propagation, The Investigation, Location of Point of Ignition, Excavation, Laboratory Examination, Quality Management	**12**
7	**Explosions:** Introduction, Explosives Technology, Facilities Required for Forensic Explosives Examinations, Forensic Questions, Photography, Links with other Forensic Disciplines	**12**
Total		**60**

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Class Activities (Open Discussion, Mini-reports, Oral Presentation, solving questions)**	**During the semester**	**30 %**
2.	**Midterm Exam**	**8th week**	**30 %**
3.	**Final Exam**	**16th week**	**40 %**
	Total		**100%**

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities:

1. References and Learning Resources:

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

Electronic Materials	**None**
Other Learning Materials	• Blackboard • Multimedia associated with the text book and the relevant websites

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**Each classroom should be equipped with a whiteboard and a projector, with a maximum of 20 students.**
Technology equipment (Projector, smart board, software)	**The rooms have a data show, Smart Board, and WI-FI access.**
Other equipment (Depending on the nature of the specialty)	

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	**Direct:** Questionnaire.
	Course Responsible	**Direct:** Course e-Portfolio. **Indirect:** Second examiner checklist-Course report.
	Peer Reviewer	**Direct:** Questionnaire. **Indirect:** External assessor report.
Effectiveness of students' assessment	Program Leaders	**Direct:** Course e-Portfolio. **Indirect:** Course report.
Quality of learning resources	Students	**Indirect:** Second examiner checklist-Course report.
	Faculty (Academic Advisory - **FEGC**)	**Direct:** course Entrance/Exit. **Indirect:** Observations - Accreditation review.
	Program Leaders	**Direct:** Course e-Portfolio. **Indirect:** Course evaluation survey- Observations- Syllabus review- Accreditation review.

Assessment Areas/Issues	Assessor	Assessment Methods
	Students	**Indirect:** Second examiner checklist-Course report.
The extent to which CLOs have been achieved	Course Responsible	**Direct:** Exams - Course e-Portfolio. **Indirect:** Second examiner checklist-Course report.
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	**Department of Chemistry Council**
REFERENCE NO.	**7 (NO. 2/3)**
DATE	**29/3/1446 - 2/10/2024**

Course Specification

(Postgraduate Programs)

Course Title: Forensic Biological Instruments Analysis
Course Code: BIO 6105
Program: Executive Master of Forensic Science
Department: Biology and Chemistry
College: Science
Institution: Imam Mohammad Ibn Saud Islamic University
Version: 1
Last Revision Date: 29 September 2024

Table of Contents

A. General information about the course:

1. Course Identification:

1. Credit hours: 3 (2 lectures, 2 laboratories, 0 tutorials)				
2. Course type				
A.	☐University	☐College	☒ Program	☐Track
B.	☒ Required		☐Elective	
3. Level/year at which this course is offered: (Level 2 l Year 1)				
4. Course General 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.				
5. Pre-requirements for this course (if any)**:**				
None				
6. Co-requirements for this course (if any)**:**				
None				
7. Course Main Objective(s):				
At the end of the course, the students will be able to 1. Understand the basic principles of different molecular and toxicological techniques. 2. Acquire knowledge about the different spectrophotometric, chromatographic and molecular techniques used in the analysis of chemical and biological substances including: DNA, proteins, amino acids, drugs or metals. 3. Understand the detailed methods of sample selection, handling, storage and data interpretations.				

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	E-learning	-	-
3	Hybrid • Traditional classroom • E-learning	-	-
4	Distance learning	-	-

3. Contact Hours: (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	-
4.	**Tutorial**	-
5.	**Others (specify)……**	-
	Total	60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods:

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Outline the basic principles of different molecular and toxicological techniques	K1	Interactive Lecture Discussion and Dialogue Mind Maps Concept Maps Standard Method Inductive Method Self-Learning Cooperative Learning Field Visits	Written tests Class discussion questions Class assignments Homework Short research/reports Summaries Presentations
1.2	List substantial and up to date core knowledge of broad areas in basic	K1, K2	Interactive Lecture Discussion and Dialogue Mind Maps	Written tests Class discussion questions

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	biology, chemistry, DNA analysis, instrumentation theory, analysis and use		Concept Maps Standard Method Inductive Method Self-Learning Cooperative Learning Field Visits	Class assignments Homework Short research/reports Summaries Presentations
2.0	**Skills**			
2.1	Explain advanced understanding of a range of technical and conceptual approaches used in forensic laboratories	S1	Practical Application Microteaching Modeling and Simulation Project-Based Learning Discovery Learning Collaborative Learning	Observation / Rating Scales Practical Tests Self-Assessment Peer Assessment
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	Practical Application Microteaching Modeling and Simulation Project-Based Learning Discovery Learning Collaborative Learning	Observation / Rating Scales Practical Tests Self-Assessment Peer Assessment
2.3	Develop skills in the systematic evaluation of scientific data	S2, S3	Practical Application Microteaching Modeling and Simulation Project-Based Learning Discovery Learning Collaborative Learning	Observation / Rating Scales Practical Tests Self-Assessment Peer Assessment
3.0	**Values, autonomy, and responsibility**			
3.1	Appraise working within the group to	V1	Modeling Dialogue and	Observation Self-

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	reach the desired result		discussion Self-learning Collaborative learning	assessment Peer assessment Achievement file
3.2	Use computer programs for analyzing and processing the experimental data	V2	Modeling Dialogue and discussion Self-learning Collaborative learning	Observation Self-assessment Peer assessment Achievement file

C. Course Content:

No	List of Lecture Topics	Contact Hours
1.	Introduction	1
2.	Toxicological Applications	1
3.	Spectrophotometric principles	2
4.	Sample preparation in toxicology	2
5.	Principles of substance separation, TLC, HPLC, GC	2
6.	Capillary electrophoresis CE, Atomic Absorption spectroscopy	2
7.	Forensic applications and interpretations	2
8.	Molecular and DNA applications	2
9.	DNA Extraction samples and product	2
10	Principle of PCR, Applications of PCR	2
11.	Gel electrophoresis	2
12.	Mutation detection	2
13.	Real time PCR principles, RT-PCR Applications	2
14.	DNA finger print principles, DNA sequencing techniques	2
15.	Applications in forensic science	2
16.	Mitochondrial DNA, Forensic application of Mitochondrial DNA	2
Total		30

No	List of Laboratory Topics	Contact Hours
1.	Electrophoresis techniques for DNA, RNA and Proteins	3
2.	Using and programing of Thermal Cycler	3
3.	Introduction to 3500 Genetic Analyzer and data collection software	3
4.	Using and programing of Next generation Sequencer (Ion-Torrent)	3
5.	Using and programing of Next generation Sequencer (Illumina)	3
6.	Practical aspects of UV, Perform UV analysis	3
7.	Practical aspects of HPLC and Perform HPLC analysis	3
8.	Practical aspects of HS-GC and Perform HS-GC analyses	3
9.	Practical aspects of GC-MS and Perform GC-MS analysis	3
10.	Practical aspects of LC-MS/MS and Perform LC-MS/MS analysis	3
Total		30

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes, oral test, oral presentation, group project, essay, and Attendance	During the semester	30%
2.	Midterm Exam	8th week	30%
3.	Final Exam	16th week	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities:

1. References and Learning Resources:

Essential References	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.
Supportive References	None
Electronic Materials	None
Other Learning Materials	None

2. Educational and Research Facilities and Equipment Required:

Items	Resources

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms and Laboratories
Technology equipment (Projector, smart board, software)	Projector and Smart board
Other equipment (Depending on the nature of the specialty)	Forensic Science-related instruments, including safety cabinet, centrifuges, incubators, thermal cyclers, trans-illuminators, gel electrophoresis apparatus

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Direct
Effectiveness of students' assessment	Program Leaders	Direct
Quality of learning resources	Peer Reviewer	Indirect
The extent to which CLOs have been achieved	Program Leaders	Direct
Other	-	-

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	**Department of Biology Council**
REFERENCE NO.	**Meeting No. 6**
DATE	**29/9/2024**

Course Specification

(Postgraduate Programs)

Course Title: Molecular Biology of Forensic DNA Analysis
Course Code: BIO 6107
Program: Executive Master of Forensic Science
Department: Biology and Chemistry
College: Science
Institution: Imam Mohammad Ibn Saud Islamic University
Version: 1
Last Revision Date: 29 September 2024

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A. General information about the course:

1. Course Identification:

1. Credit hours: 3 (2 lectures, 2 laboratories, 0 tutorials)				
2. Course type				
A.	☐University	☐College	☒ Program	☐Track
B.	☒ Required		☐Elective	
3. Level/year at which this course is offered: (Level 2 l Year 1)				
4. Course General 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.				
5. Pre-requirements for this course (if any):				
None				
6. Co-requirements for this course (if any):				
None				
7. Course Main Objective(s):				
At the end of the course, the students will be able to 1. Understand the history and current state of forensic biological testing and the role of a forensic biologist in a forensic investigation. The student will also understand the role that the scientific method plays in a forensic biological investigation. 2. Develop competency in the use of equipment and techniques typically employed in a forensic biology laboratory. 3. Know the different types of biological evidence encountered in a forensic investigation and the analyses of each. 4. Learn the proper methods for the handling of biological evidence. 5. Know the various peer-reviewed journals in forensic science and various important journal articles dealing with forensic biological testing.				

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	E-learning	-	-
3	Hybrid • Traditional classroom • E-learning	-	-
4	Distance learning	-	-

3. Contact Hours: (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	-
4.	**Tutorial**	-
5.	**Others (specify)……**	-
	Total	60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods:

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Outline the basic principles of forensic and the biological molecular methods	K1	Interactive Lecture Discussion and Dialogue Mind Maps Concept Maps Standard Method Inductive Method Self-Learning Cooperative Learning Field Visits	Written tests Class discussion questions Class assignments Homework Short research/reports Summaries Presentations
1.2	Describe the underpinning science applicable to forensic science and the role	K1, K2	Interactive Lecture Discussion and Dialogue Mind Maps	Written tests Class discussion questions

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	of molecular biology techniques		Concept Maps Standard Method Inductive Method Self-Learning Cooperative Learning Field Visits	Class assignments Homework Short research/reports Summaries Presentations
1.3	State The methods of forensic investigation and law relevant to forensic science and its relationship of biological sciences	K3, K4	Interactive Lecture Discussion and Dialogue Mind Maps Concept Maps Standard Method Inductive Method Self-Learning Cooperative Learning Field Visits	Written tests Class discussion questions Class assignments Homework Short research/reports Summaries Presentations
1.4	List Application of understanding in areas of forensic chemistry and forensic biology	K1, K4	Interactive Lecture Discussion and Dialogue Mind Maps Concept Maps Standard Method Inductive Method Self-Learning Cooperative Learning Field Visits	Written tests Class discussion questions Class assignments Homework Short research/reports Summaries Presentations
2.0	**Skills**			
2.1	Explain practical techniques in forensic science	S1	Practical Application Microteaching Modeling and Simulation Project-Based Learning Discovery Learning Collaborative	Observation / Rating Scales Practical Tests Self-Assessment Peer Assessment

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
			Learning	
2.2	Analyze knowledge of forensic practices to investigations and cases	S1, S2	Practical Application Microteaching Modeling and Simulation Project-Based Learning Discovery Learning Collaborative Learning	Observation / Rating Scales Practical Tests Self-Assessment Peer Assessment
2.3	Evaluate technical and theoretical information	S3, S4	Practical Application Microteaching Modeling and Simulation Project-Based Learning Discovery Learning Collaborative Learning	Observation / Rating Scales Practical Tests Self-Assessment Peer Assessment
3.0	**Values, autonomy, and responsibility**			
3.1	Appraise appropriate tools and use in a correct manner	V1	Modeling Dialogue and discussion Self-learning Collaborative learning	Observation Self-assessment Peer assessment Achievement file
3.2	Show ability to communicate effectively with class mates and teaching staff	V2	Modeling Dialogue and discussion Self-learning Collaborative learning	Observation Self-assessment Peer assessment Achievement file

C. Course Content:

No	List of Lecture Topics	Contact Hours
1.	Nucleic Acid Extraction	3

2.	DNA Quantitation	3
3.	Amplification by PCR	3
4.	DNA Electrophoresis	3
5.	Detection Methods	3
6.	Variable-number tandem repeat (VNTR) Profiling	3
7.	Autosomal Short Tandem Repeat Profiling	3
8.	Sex Chromosome Haplotyping and Gender	3
9.	Identification, Single Nucleotide Polymorphism Profiling	3
10	Mitochondrial DNA Profiling	3
Total		**30**

No	List of Laboratory Topics	Contact Hours
1.	DNA extraction from different biological samples using the Chelex method.	3
2.	DNA extraction using the salting-out method.	3
3.	DNA extraction from different biological samples using organic methods.	3
4.	DNA extraction from different biological samples using a solid-phase.	3
5.	Qualitative and quantitative analysis of DNA samples using agarose, UV spectrophotometer, and fluorimeter.	3
6.	Qualitative and quantitative analysis of DNA samples using Real-time PCR	3
7.	PCR amplification of DNA samples and gel electrophoresis of PCR products	3
8.	DNA Sequence Analysis	3
9.	Mitochondrial DNA sequencing and data analysis	3
10.	DNA Data analysis and reporting	3
Total		**30**

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes, oral test, oral presentation, group project, essay, and Attendance	During the semester	30%
2.	Midterm Exam	8th week	30%
3.	Final Exam	16th week	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities:

1. References and Learning Resources:

Essential References	Forensic Biology, Richard Li, Second edition, 2021. ISBN: 9781032098791. Molecular Forensics, Ralph Rapley and David Whitehouse 2007. ISBN: 978-0-470-02495-9.
Supportive References	None
Electronic Materials	None
Other Learning Materials	None

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms and Laboratories
Technology equipment (Projector, smart board, software)	Projector and Smart board
Other equipment (Depending on the nature of the specialty)	Forensic Science-related instruments, including safety cabinet, centrifuges, incubators, thermal cyclers, trans-illuminators, gel electrophoresis apparatus

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Direct
Effectiveness of students' assessment	Program Leaders	Direct
Quality of learning resources	Peer Reviewer	Indirect
The extent to which CLOs have been achieved	Program Leaders	Direct
Other	-	-

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	**Department of Biology Council**
REFERENCE NO.	**Meeting No. 6**

DATE	**29/9/2024**

Course Specification

(Postgraduate Programs)

Course Title:	**Forensic Toxicology and Drug Analysis**
Course Code:	**CHM 6139**
Program:	**Executive Master of Forensic Science**
Department:	**Biology and Chemistry**
College:	**Science**
Institution:	**Imam Mohammad Ibn Saud Islamic University**
Version:	**1**
Last Revision Date:	**2 October 2024**

Table of Contents

A. General information about the course:

1. Course Identification:

1. Credit hours:					
3 (2 Lectures, 0 Lab, 2 Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Program	☐Track	
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (2/1)					
4. Course General 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.					
5. Pre-requirements for this course (if any):					
None					
6. Pre-requirements for this course (if any):					
None					
7. Course Main Objective(s):					
At the end of the course, the students will be able to: • Familiarize with the three major disciplines of forensic toxicology • Familiarize with the most frequently encountered substances in forensic toxicology and drug-related casework. • Apply important chemical and physical properties of drugs to explain how drugs are extracted or isolated from non-biological and biological evidence, including blood, urine, and human tissues. Explain also how drugs are distributed throughout the body. • Compare and contrast different drugs within the same classification and discuss analytical approaches' relative advantages and disadvantages. • Apply knowledge of methods and techniques to detect substances such as benzodiazepines, barbiturates, narcotics, cocaine, methamphetamine, cannabinoids, and other abused drugs in the laboratory. • Evaluate analytical methods and/or published research in the scientific literature and present those findings in writing.					

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	E-learning	0	0%
3	Hybrid • Traditional classroom • E-learning	0	0%
4	Distance learning	0	0%

3. Contact Hours: (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	**30**
2.	**Laboratory/Studio**	**0**
3.	**Field**	**0**
4.	**Tutorial**	**30**
5.	**Others (specify)……**	**0**
	Total	**60**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods:

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	**To recall Postmortem Forensic Toxicology and relevant Types.**	**K1; K2**	▪ Two hours/week lectures. ▪ Self-study ▪ Home-exam.	▪ Regular Exams ▪ Assignments ▪ Short Quizzes ▪ Oral Discussion ▪ Participation.
1.2	**To recognize the full Specimen Preparation and applied methods for Full Specimen analysis.**	**K3; K4**	▪ Two hours/week lectures. ▪ Think, and justify Specimen Preparation methods, using available references (SDL) online. Open discussion.	▪ Oral Discussion marks ▪ Literatures Survey ▪ Mini-seminar. ▪ Participation.

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.3	**To outline reasonable, appropriate arguments and interpretations for identifying and elucidating Toxic materials and Drugs.**	**K1; K2; K3**	▪Two hours/week lectures. ▪Group Discussion using available references (SDL)	▪ Midterm. ▪ Assignments. ▪ Group Discussions. ▪ Literatures Survey ▪ Lab reports ▪ Mini-seminar. ▪ Participation.
1.4	**To state the pharmacological characteristics and analytical aspects of various drug classes commonly encountered in forensic toxicology.**	**K1; K2; K4**	▪Two hours/week lectures. ▪Group Discussion using available references (SDL)	▪ Assignments ▪ Open Discussions. ▪ Lab reports ▪ Literatures Survey ▪ Mini-seminar. ▪ Participation.
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**	▪Lectures activity. ▪Practice some examples of drugs and toxic compounds by their effects. ▪Self-study.	▪ Questions in Lectures. ▪ Short Quizzes and Exams. ▪ Open Discussions. ▪ Participation ▪ Mini-seminar.
2.2	**To justify the appropriate techniques and experiments for Collating, analyzing, interpreting toxic specimens based on toxicological analysis.**	**S2**	▪ Lectures and Oral Discussions. ▪ Brainstorming. ▪ Self-study	▪ Questions in Lectures. ▪ Participation ▪ Oral Discussion ▪ Short Quizzes and Exams.
2.3	**To summarize the Toxic Chemical Structures and Drugs in terms of Structure-Activity Relationships and Mechanisms of**	**S1; S3**	▪ Lectures ▪ Group Discussions. ▪ Brainstorming. ▪ Self-study	▪ Questions in Lectures. ▪ Short Quizzes and Exams. ▪ Lab reports ▪ Participation

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	Action.			
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**	▪ Group Discussion and Assignments ▪ Introduce several examples of Postmortem Forensic Toxicology to elucidate and justify used techniques in an investigation, which will require reading, writing, and oral presentation. ▪ Encourage students to use electronic mail to submit Home Exams and Assignments.	▪ Oral Discussion, Quizzes, and Exams. ▪ Giving marks for Oral Discussion in Lectures. ▪ Marks given for Assignments
3.0	**Values, autonomy, and 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**	▪ Brainstorming. ▪ Exercises ▪ Group Discussion. Team work.	▪ Oral Discussion. ▪ Group Discussion ▪ Assignments
3.2	**To appraise effectively the collaboration and inter-professionalism in class discussions or team works, as well as independently.**	**V1; V2**	▪ Small Group tasks ▪ Open discussion at classroom. ▪ Office hour guiding. ▪ Group Presentation of	▪ Participation ▪ Homework's ▪ Mini-project(s).

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
			mini-projects	

C. Course Content:

No	List of Topics	Contact Hours
1.	***Part 1: Introduction:*** Postmortem Forensic Toxicology, Types of Postmortem Forensic Toxicology Cases, Death Investigation, Human Performance Toxicology, Definition, Laboratory Psychomotor Performance Testing, Application, Drug-Facilitated Crimes, History of Drug-Facilitated Crimes, Challenges of Drug-Facilitated Crimes for Forensic Toxicologists, Most Common Drugs Detected in Alleged Drug-Facilitated Crimes, Overcoming the Toxicological Challenges of Drug-Facilitated Crimes, Forensic Drug Testing, The Criminal Justice System, Performance-Enhancing Drug Testing, Drugs and Drug Classes Anabolic-Androgen Steroids and Anabolic Agents, Stimulants, Diuretics and Masking Agents, Narcotic Analgesics, Marijuana and Synthetic Cannabinoids, Other Drugs	**15**
2.	***Part 2: Methodologies:*** Specimen Preparation, Purpose, Specimens, Extent of Testing, Specimen Digestion for Elemental/Inorganic Analyses, /Extraction, Liquid/Liquid Extraction, Solid Phase Extraction, Ultraviolet-Visible Spectrophotometry, Chromatography, Derivatization, Derivatization for GC-MS, Derivatization for GC-MS, Derivatization by Drug Class, Immunoassay, Mass Spectrometry, Quantitative Analytical Methods, Method Validation, Terms and Definitions, Immunoassay Method Validation, Chromatographic Method Validations, Statistics for Forensic Toxicology.	**15**
3	***Part 3: Analytes:*** Alcohol, Production of Alcoholic Beverages, Fate of Alcohol in the Body, Blood Alcohol Analysis, Stability of Ethanol in Blood and Urine, Benzodiazepines, Chemistry and Use, Individual Benzodiazepines, Miscellaneous Central Nervous System Depressants, Use and Abuse, Opioids, Chemistry and Mechanism of Action, Structure–Activity Relationships, Cocaine, Chemistry, Effects and Toxicity, Cannabis, Chemistry, Synthetic Cannabinoids, Amphetamines, Neuroleptics, Miscellaneous Therapeutic Drugs, Carbon Monoxide/Cyanide, Inhalants, Metals, Drug Stability in Biological Specimens, Postmortem Redistribution of Drugs, Postmortem Clinical Testing, Hair Drug Testing, Oral Fluid Testing, Meconium Drug Testing, Drugs in Embalmed Tissues/Sympathomimetic Amines, Hallucinogens and Psychedelics, Antidepressants,	**15**
Total		**60**

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Activities (Oral Discussion, Mini-projects, Miniseminar, Quizzes, Mid-term, Oral Presentation, Participation, Assignments)	During the semester	30 %
2.	Midterm Exam	8th week	30 %
3.	Final Exam	16th week	40 %
	Total		100%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities:

1. References and Learning Resources:

Essential References	**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.
Supportive References	NONE
Electronic Materials	https://www.sciencedirect.com/topics/pharmacology-toxicology-and-pharmaceutical-science/forensic-toxicology
Other Learning Materials	• Blackboard Multimedia associated with the text book and the relevant websites.

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**Each classroom should be equipped with a whiteboard and a projector, with a maximum of 20 students.**
Technology equipment (Projector, smart board, software)	**The rooms have a data show, Smart Board, and WI-FI access.**
Other equipment (Depending on the nature of the specialty)	

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students Course Responsible	**Direct:** Questionnaire. **Direct:** Course e-Portfolio. **Indirect:** Second

Assessment Areas/Issues	Assessor	Assessment Methods
	Peer Reviewer	examiner checklist-Course report. **Direct:** Questionnaire. **Indirect:** External assessor report.
Effectiveness of students' assessment	Program Leaders	**Direct:** Course e-Portfolio. **Indirect:** Course report.
Quality of learning resources	Students	**Indirect:** Second examiner checklist-Course report.
	Faculty (Academic Advisory - **FEGC**)	**Direct:** course Entrance/Exit. **Indirect:** Observations - Accreditation review.
	Program Leaders	**Direct:** Course e-Portfolio. **Indirect:** Course evaluation survey- Observations- Syllabus review- Accreditation review.
	Students	**Indirect:** Second examiner checklist-Course report.
The extent to which CLOs have been achieved	Course Responsible	**Direct:** Exams - Course e-Portfolio. **Indirect:** Second examiner checklist-Course report.
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	**Department of Chemistry Council**
REFERENCE NO.	**7 (NO. 2/3)**
DATE	**29/3/1446 - 2/10/2024**

Course Specification

(Postgraduate Programs)

Course Title:	**Statistics for Forensic Scientists**
Course Code:	**STA 6117**
Program:	**Executive Master of Forensic Science**
Department:	**Biology and Chemistry**
College:	**Science**
Institution:	**Imam Mohammad Ibn Saud Islamic University**
Version:	**1**
Last Revision Date:	**9 September 2024**

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours:					
3 (2 Lectures, 0 Lab, 2 Tutorial)					
2. Course type					
A.	☐ University	☐ College	☒ Program	☐ Track	☐ Others
B.	☒ Required		☐ Elective		
3. Level/Year at which this course is offered: Level 2 / Year 1					
4. Course general 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.					
5. Pre-requirements for this course (if any)**:**					
None.					
6. Co-requisites for this course (if any)**:**					
None.					
7. Course Main Objective(s):					
Upon successful completion of the course, the students will be able to: **1.Outline the role of hypotheses and inference in forensic science;** **2.Apply probability theory to the interpretation of evidences and traces;** **3.Apparaise the value of traces in a wide range of scenarios encountered inforensic science (including source level and activity level questions,database hits, and multiple traces);** **4.Explain the value of the evidence in verbal and written forms;** **5.Analyze and visualize data using the appropriate statistical software.**					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	**60**	**100%**
2	E-learning	**0**	**0%**
3	Hybrid • Traditional classroom • E-learning	**0**	**0%**

No	Mode of Instruction	Contact Hours	Percentage
4	Distance learning	0	0%

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	**30**
2.	**Laboratory/Studio**	**0**
3.	**Field**	**0**
4.	**Tutorial**	**30**
5.	**Others (specify)**	**0**
Total		**60**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	**Identify a relevant statistical analysis in problems of Kinship, relatedness in pedigrees, DVI, and Familial searching.**	**K2**	**2 lecture hours\week**	**Direct: Regular Exams**
1.2	**Describe forensic automatic likelihood ratio methods.**	**K3**	**2 tutorial hours\week**	**Direct: Short Quizzes**
1.3	**State the differences between populations and samples and methods to make inferences for well-designed experiments and surveys.**	**K2**	**Self-study**	**Direct: Regular Exams**
1.4	**Describe some relevant basic statistical**	**K4**	**Real-life problems**	**Direct: Short Quizzes**

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	procedures to test the validity of DNA-matching procedures and models.			
2.0	Skills			
2.1	Evaluate the collection of traces and interpret the results of analyses through propositions, hypotheses, and statistical methods.	S1	Self-study	Direct: • Participations • Short Quizzes
2.2	Compose investigative and problem-solving skills to evaluate forensic science problems.	S3	Real-life problems	Direct: Homework and Mini projects
2.3	Compare various methods to record andcommunicate observations and evaluation of traces throughout all stages of an investigation.	S2, S4	Real-life problems	Direct: Short Quizzes
3.0	Values, autonomy, and responsibility			
3.1	Generate initiatives with independence and responsibility.	V2	Personal questions	Direct: Participation
3.2	Appraise team works.	V2	Teamwork and class discussions.	Direct: Homework and Mini projects

C. Course Content

No	List of Topics	Contact Hours
1.	Chapter 1-The history of forensic inference and statistics:	6

	Introduction. What is the scientific method? What is statistics? Statistics, forensic practice, and the criminal justice system. Populations and samples, deduction and induction, examples in practice.	
2.	**Chapter 2-Probability models and uncertainty:** Measurement, variability and uncertainty. Reliability, repeatability, and reproducibility, accuracy and precision. Probability distributions, parameters. Probability models for discrete and continuous variables. Expectation, variance, covariance and correlation of variables. Uncertainty on Sensitivity and Specificity.	**8**
3.	**Chapter 3-Statistical Inference:** Definitions. Goals of inference. Point estimation, properties of estimators, standard errors, sampling distributions. Interval estimation, Hypothesis testing, types of errors, *p*-values. Frequentist methods for statistical inference. Bayesian methods and forensic inference. Comparing philosophies of statistical inference. Validation of forensic automatic likelihood ratio methods. Bayesian networks in forensic science.	**8**
4.	**Chapter 4-Collecting data:** From probability to inference. Collecting data: observational studies, surveys, and experiments. Sampling methods: probability versus non-probability sampling. Precision, margin of error, and calculation of sample size. Experiments and experimental design.	**8**
5.	**Chapter 5-Diagnostic Tests:** Sensitivity and Specificity. Positive and Negative Predictive Values. Likelihood Ratio and Post-test Probability. Comparing Sensitivities and Specificities of Two Diagnostic Procedures.	**10**
6.	**Chapter 6-Odds Ratio:** Likelihood Function for the Odds Ratio. Likelihood Function for Relative Risk with Fixed Entries. Calculating the Odds Ratio Likelihood Function and Support. Validation of forensic automatic likelihood ratio methods.	**10**
7.	**Chapter 7-Applications of Statistics to Particular Fields in Forensic Science:** Evidence types (DNA, latent prints, firearms, ...). Kinship. Statistical support for conclusions in fingerprint examinations. Forensic glass evidence. Types of evidence and types of forensic questions. Statistical models in forensic voice comparison. Bringing new statistical approaches to eyewitness evidence	**10**
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**HomeWorks, Quizzes, Mini projects**	**During the semester**	**30%**

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
2.	Midterm Exam	8th week	30%
3.	Final Exam	16th week	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	• **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.
Supportive References	1. **D. Avis, A. Hertz, and O. Marcotte (editors),** Graph Theory and Combinatorial Optimization, Springer, 2005. 2. **D.-Z. Du, P.M. Pardalos (editors),** Handbook of Combinatorial Optimization, Kluwer Academic Publishers, 1999.
Electronic Materials	None
Other Learning Materials	None

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	▪ Each class room should be equipped with a whiteboard and a projector. ▪ Laboratories should be equipped with computers and an internet connection.
Technology equipment (projector, smart board, software)	The rooms should be equipped with data show and Smart Board.
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	During the semester and at the end of the

Assessment Areas/Issues	Assessor	Assessment Methods
		course each student will complete two evaluation forms.
Effectiveness of Students assessment	**Instructor**	**At the end of each semester the course instructor should complete the course report, including a summary of student questionnaire responses appraising progress and identifying changes that need to be made if necessary.**
Quality of learning resources	**Students**	**During the semester and at the end of the course each student will complete two evaluation forms.**
The extent to which CLOs have been achieved	**Instructor**	**At the end of each semester the course instructor should complete the course report, including a summary of student questionnaire responses appraising progress and identifying changes that need to be made if necessary.**
Other	**None**	

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**MATHEMATICS AND STATISTICS DEPARTMENT COUNCIL**
REFERENCE NO.	**4/1446**
DATE	**06/03/1446 (09/09/2024)**

Course Specification

(Postgraduate Programs)

Course Title: Forensic Serology and DNA Fingerprinting
Course Code: BIO 6209
Program: Executive Master of Forensic Science
Department: Biology and Chemistry
College: Science
Institution: Imam Mohammad Ibn Saud Islamic University
Version: 1
Last Revision Date: 29 September 2024

Table of Contents

A. General information about the course:

1. Course Identification:

1. Credit hours: 3 (2 lectures, 2 laboratories, 0 tutorials)				
2. Course type				
A.	☐University	☐College	☒ Program	☐Track
B.	☒ Required		☐Elective	
3. Level/year at which this course is offered: (Level 3 l Year 2)				
4. Course General 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.				
5. Pre-requirements for this course (if any):				
None				
6. Co-requirements for this course (if any):				
None				
7. Course Main Objective(s):				
At the end of the course, the students will be able to 1. Explain how the forensic serology discipline utilizes 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. 2. Describe methods of red cell antigens, serum/plasma, red cell enzyme analysis and DNA profiling. 3. Recognize the significance of maintaining chain-of-custody of the samples and applying the laboratory safety measures. 4. Know the significance and value of quality assurance and quality control. 5. Explain fully the duties of the serologist/DNA analyst as expert witness.				

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	E-learning	-	-
3	Hybrid • Traditional classroom • E-learning	-	-
4	Distance learning	-	-

3. Contact Hours: (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	-
4.	**Tutorial**	-
5.	**Others (specify)……**	-
	Total	60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods:

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Outline the basic concepts of forensic serology as it applies to the collection, preservation and testing of biological evidence	K1	Interactive Lecture Discussion and Dialogue Mind Maps Concept Maps Standard Method Inductive Method Self-Learning Cooperative Learning Field Visits	Written tests Class discussion questions Class assignments Homework Short research/reports Summaries Presentations
1.2	State the biological evidence in criminal matters using DNA technologies,	K2, K3, K4	Interactive Lecture Discussion and Dialogue Mind Maps	Written tests Class discussion questions

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	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		Concept Maps Standard Method Inductive Method Self-Learning Cooperative Learning Field Visits	Class assignments Homework Short research/reports Summaries Presentations
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	Interactive Lecture Discussion and Dialogue Mind Maps Concept Maps Standard Method Inductive Method Self-Learning Cooperative Learning Field Visits	Written tests Class discussion questions Class assignments Homework Short research/reports Summaries Presentations
1.4	Recognize the significance of maintaining chain-of-custody of the samples and applying the laboratory safety measures	K2, K3	Interactive Lecture Discussion and Dialogue Mind Maps Concept Maps Standard Method Inductive Method Self-Learning Cooperative Learning Field Visits	Written tests Class discussion questions Class assignments Homework Short research/reports Summaries Presentations
1.5	Describe the significance and value of quality assurance and	K4	Interactive Lecture Discussion and Dialogue Mind Maps	Written tests Class discussion questions

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	quality control		Concept Maps Standard Method Inductive Method Self-Learning Cooperative Learning Field Visits	Class assignments Homework Short research/reports Summaries Presentations
2.0	**Skills**			
2.1	Explain the application of experimental techniques and procedures routinely used in this field	S1, S2	Practical Application Microteaching Modeling and Simulation Project-Based Learning Discovery Learning Collaborative Learning	Observation / Rating Scales Practical Tests Self-Assessment Peer Assessment
2.2	Interpret DNA data	S1, S3	Practical Application Microteaching Modeling and Simulation Project-Based Learning Discovery Learning Collaborative Learning	Observation / Rating Scales Practical Tests Self-Assessment Peer Assessment
2.3	Evaluate reports, review and testimony skills required of a DNA analyst	S2, S4	Practical Application Microteaching Modeling and Simulation Project-Based Learning Discovery Learning Collaborative Learning	Observation / Rating Scales Practical Tests Self-Assessment Peer Assessment
3.0	**Values, autonomy, and responsibility**			
3.1	Use laboratory instruments and	V1	Modeling Dialogue and	Observation Self-

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	computers		discussion Self-learning Collaborative learning	assessment Peer assessment Achievement file
3.2	Write reports and preparation of presentations and the preparation of graphics and models by using technology	V2	Modeling Dialogue and discussion Self-learning Collaborative learning	Observation Self-assessment Peer assessment Achievement file

C. Course Content:

No	List of Lecture Topics	Contact Hours
1.	Immune system, immune response, innate and acquired immunity, antigens, antibodies, haptens and adjuvants, immunoglobulin- types, physicochemical properties and function, rising of anti-sera, Lectins - their forensic significance. Buffers and serological reagents, methods of sterilization employed for serological work.	5
2.	Composition of blood, Formation of blood, Blood groups – history, biochemistry and genetics of ABO, Rh, Mn and other systems. Methods of ABO blood grouping (absorption-inhibition, mixed agglutination and absorption elution) from blood stains and other body fluids/stains viz. menstrual blood, semen, saliva, sweat, tear, pus, vomit, hair, bone, nail etc., blood group specific ABH substances. Secretors and non-secretors. Blood groups that make racial distinctions. Lewis antigen, Bombay Blood groups. HLA antigens and HLA typing. Role of sero-genetic markers in individualization and paternity disputes. Pitfalls in red cell typing.	5
3.	Determination of human and animal origin from bones, hair, flesh, nails, skin, teeth body tissue, fluids/ stains viz. blood, menstrual blood, semen, saliva, sweat, tear, pus, vomit, etc., through immunodiffusion and Immuno-electrophoresis, cross reactivity among closely related species. Individualization of blood stains: Determination of blood groups, sex age and racial origin from dried bloodstains.	6
4.	Red cell enzymes: Genetics, polymorphism and typing of PGM, GLO-I, ESD, EAP, AK, ADA etc. and their forensic significance. Serum proteins: Genetics, polymorphism and typing of - Hb, HP, Tf, Bf, C3 etc. and their	3

	forensic significance.	
5.	An overview of molecules involved in the flow of genetic information, double helical structure of DNA, alternate forms of DNA double helix, denaturation and renaturation of DNA, DNA binding proteins, factors affecting DNA stability, types and structure of RNA, RNA-DNA hybrid helices, DNA repair, direct and indirect evidence for DNA and RNA as the genetic material. Chemical nature of DNA and RNA. Replication of DNA in prokaryotes and eukaryotes, genetic code, degeneracy and universality of genetic code, transcription and translation machinery. Nature and structure of human genome and its diversity. mt-DNA, Y-Chromosomes and the peopling, migration, of modern humans. Concept of gene – Conventional and modern views. Fine structure of gene, split gene, pseudogene, non-coding gene, overlapping genes and multiple gene families.	3
6.	Concept of sequence variation - VNTRs, STRs, Mini STRs , SNPs. Detection techniques - RFLP, PCR amplifications, Amp-FLP, sequence polymorphism, Y-STR, Mitochondrial DNA. Evaluation of results, frequency estimate calculations and interpretation, Allele frequency determination, Match probability – Database, Quality control, Certification and Accreditation.	4
7.	History of DNA profiling applications in disputed paternity cases, child swapping, missing person's identity, civil immigration, veterinary, wildlife and agriculture cases. Legal perspectives – legal standards for admissibility of DNA profiling – procedural & ethical concerns, status of development of DNA profiling in India & abroad. Limitations of DNA profiling. Population databases of DNA markers –STRs, Mini STRs, SNPs. New & Future technologies: Analysis of SNP, DNA chip technology-Microarrays Cell free DNA, Synthetic DNA.	4
Total		**30**

No	List of Laboratory Topics	Contact Hours
1.	Serology instrumentation	3
2.	Blood identification	3
3.	Blood pattern identification	3
4.	Urine identification by analysis of blood group antigenic substances, polymorphic proteins, and DNA	4
5.	Immunoassay	3
6.	Sweat & Semen identification	3
7.	Forensic microscopy of hair and fibers	2
8.	DNA extraction and STR identification from Hair, nails, and bones	3

9.	STR Genotyping via Capillary Electrophoresis	2
10.	Allele frequency calculations & paternity test	2
11.	SNP analysis for mtDNA sequence	2
Total		**30**

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes, oral test, oral presentation, group project, essay, and Attendance	During the semester	30%
2.	Midterm Exam	8th week	30%
3.	Final Exam	16th week	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities:

1. References and Learning Resources:

Essential References	Forensic Serology, Shanan Tobe, 1st Edition, 2022, ISBN: 9780128129685 Forensic Serology and DNA Profiling , Na Vikraman , 9th June 2021, ISBN: 1230004838678
Supportive References	None
Electronic Materials	None
Other Learning Materials	None

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms and Laboratories
Technology equipment (Projector, smart board, software)	Projector and Smart board
Other equipment (Depending on the nature of the specialty)	Forensic Science-related instruments, including safety cabinet, centrifuges, incubators, thermal cyclers, trans-illuminators, gel electrophoresis apparatus

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Direct
Effectiveness of students' assessment	Program Leaders	Direct
Quality of learning resources	Peer Reviewer	Indirect
The extent to which CLOs have been achieved	Program Leaders	Direct
Other	-	-

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	**Department of Biology Council**
REFERENCE NO.	**Meeting No. 6**
DATE	**29/9/2024**

Course Specification

(Postgraduate Programs)

Course Title: Entomology and Microbial Forensic
Course Code: BIO 6210
Program: Executive Master of Forensic Science
Department: Biology and Chemistry
College: Science
Institution: Imam Mohammad Ibn Saud Islamic University
Version: 1
Last Revision Date: 29 September 2024

Table of Contents

A. General information about the course:

1. Course Identification:

1. Credit hours: 2 (1 lecture, 2 laboratories, 0 tutorials)				
2. Course type				
A.	☐University	☐College	☒ Program	☐Track
B.	☒ Required		☐Elective	
3. Level/year at which this course is offered: (Level 3 l Year 2)				
4. Course General 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.				
5. Pre-requirements for this course (if any)**:**				
None				
6. Co-requirements for this course (if any)**:**				
None				
7. Course Main Objective(s):				
At the end of the course, the students will be able to 1. Recognize, recall, and synthesize information pertaining to the application of entomology to criminal and civil litigation. 2. Provide invaluable aid in death cases where human remains are colonized by insects and in the overall investigation. 3. Identify the arthropods associated with such cases and to analyze entomological data for interpreting insect evidence.				

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100%
2	E-learning	-	-
3	Hybrid • Traditional classroom • E-learning	-	-
4	Distance learning	-	-

3. Contact Hours: (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	15
2.	**Laboratory/Studio**	30
3.	**Field**	-
4.	**Tutorial**	-
5.	**Others (specify)……**	-
	Total	45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods:

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Outline the connection between insects and forensic entomology	K1	Interactive Lecture Discussion and Dialogue Mind Maps Concept Maps Standard Method Inductive Method Self-Learning Cooperative Learning Field Visits	Written tests Class discussion questions Class assignments Homework Short research/reports Summaries Presentations
1.2	Name the arthropods and insects associated to criminal and civil	K1, K2	Interactive Lecture Discussion and Dialogue Mind Maps	Written tests Class discussion questions

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	litigation		Concept Maps Standard Method Inductive Method Self-Learning Cooperative Learning Field Visits	Class assignments Homework Short research/reports Summaries Presentations
2.0	**Skills**			
2.1	Justify the cause of death using forensic entomology	S2	Practical Application Microteaching Modeling and Simulation Project-Based Learning Discovery Learning Collaborative Learning	Observation / Rating Scales Practical Tests Self-Assessment Peer Assessment
2.2	Evaluate and identify the relationship between cause and consequence in the different mechanisms	S1, S2	Practical Application Microteaching Modeling and Simulation Project-Based Learning Discovery Learning Collaborative Learning	Observation / Rating Scales Practical Tests Self-Assessment Peer Assessment
2.3	Compare organs of the body and the interpretation of its mechanisms	S3	Practical Application Microteaching Modeling and Simulation Project-Based Learning Discovery Learning Collaborative Learning	Observation / Rating Scales Practical Tests Self-Assessment Peer Assessment
3.0	**Values, autonomy, and responsibility**			
3.1	Appraise team work and management of	V1	Modeling Dialogue and	Observation Self-

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	resources and time		discussion Self-learning Collaborative learning	assessment Peer assessment Achievement file
3.2	Demonstrate the operation and use of computer and means of modern technology	V2	Modeling Dialogue and discussion Self-learning Collaborative learning	Observation Self-assessment Peer assessment Achievement file

C. Course Content:

No	List of Lecture Topics	Contact Hours
1.	Death: Signs of death and changes after death. Somatic death, molecular death ,early changes after death - Algor mortis, rigor mortis, cadaveric spasm, heat stiffening, cold stiffening, changes in blood, chemical changes in cerebrospinal fluid, changes in vitreous humor, post mortem lividity, fluidity of blood,. Late changes – putrefaction-external and internal changes. Adiopocere, mummification, gastric content and bladder content and time of death from growth of hair and nails .destruction of body and tissues by maggots and other insects, rodents, fish and crabs, molds . Sudden death, post-mortem demonstration of myocardial infarction Medico legal aspects of death-Asphyxia, syncope, coma, death by starvation, drowning, hanging and strangulation. Causes and mechanism of traumatic death, manner of death. Classification of traumatic deaths.	4
2.	Mechanical Injuries: Abrasions, Bruises, Lacerations, Incised wounds, Stab wounds, Firearm injuries, Defense injuries, fabricated injuries. Traffic accident injuries: vehicular injuries, railway injuries and aircraft injuries. Thermal injuries: Burn and scalds, Lightning, Electricity, Explosions. Chemical trauma. Injuries- Accidental, self-inflicted, or inflicted by others. Ante -mortem and post-mortem, artificial injuries and aging of injuries. Fractures, Dislocations Secondary causes of death Regional injuries- wound of the scalp- incised, contusions, lacerations, firearm injuries. Fractures of the skull from direct & indirect impact, injuries of the brain, face, eyes, nose, ears, lip, teeth and alveoli, neck, spine and spinal cord, chest, rib, sternum, ribs, lungs, heart, blood	4

	vessels, diaphragm, esophagus, abdomen, stomach, liver, intestine, pancreas, spleen, kidneys, adrenals urinary bladder, rectum external genitalia, muscles, bones and joints.	
3.	Forensic Entomology- History, significance, determination of time since death- Dipteran larval development & successional colonization of body, determining whether the body has been moved, body disturbance, presence and position wounds, linking suspect to the scene, identification of drugs and toxins from the insects and larvae feeding on the body, entomology as an evidentiary tool in child and senior abuse cases and animal abuse cases, collection of entomological evidence.	4
4.	Structure and function of the major organ systems: digestive, respiratory, endocrine, nervous, excretory, reproductive, cardiovascular and neuromuscular. Microorganism responsible for food poisoning. Times of digestion of foods. Collection, preservation and forwarding of samples – vomit, stool, stomach wash and residual food etc. Microorganism encountered in biological warfare.	3
Total		**15**

No	List of Laboratory Topics	Contact Hours
1.	Insect orders & families, Beetles, mosquitos & houseflies	4
2.	Adult & Larval Identification	2
3.	Collecting/Practice collecting from a “crime scene”	2
4.	Analysis of ‘crime scene’ insect samples	2
5.	Identification of species diversity of insects collected from cadavers	4
6.	Use of microscopes, Gram-staining technique	4
7.	Streak plate method of bacterial cell isolation	4
8.	Types and identification of microbial organisms of forensic significance	4
9.	Human microbiota as a fingerprint: potential use as trace evidence	2
10.	Microbiology of decomposition: applications in forensics	2
Total		**30**

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes, oral test, oral presentation, group project, essay, and Attendance	During the semester	30%

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
2.	Midterm Exam	8th week	30%
3.	Final Exam	16th week	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities:

1. References and Learning Resources:

Essential References	Forensic Entomology: The Utility of Arthropods in Legal Investigations. Jason H. Byrd and James L. Castner. 2019. Third Edition. ISBN 0815350201, 9780815350200
Supportive References	None
Electronic Materials	None
Other Learning Materials	None

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms and Laboratories
Technology equipment (Projector, smart board, software)	Projector and Smart board
Other equipment (Depending on the nature of the specialty)	Forensic Science-related instruments, including safety cabinet, centrifuges, incubators, thermal cyclers, trans-illuminators, gel electrophoresis apparatus

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Direct
Effectiveness of students' assessment	Program Leaders	Direct
Quality of learning resources	Peer Reviewer	Indirect
The extent to which CLOs have been achieved	Program Leaders	Direct
Other	-	-

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	**Department of Biology Council**
REFERENCE NO.	**Meeting No. 6**
DATE	**29/9/2024**

Course Specification

(Postgraduate Programs)

Course Title: Anatomy and Physiology
Course Code: BIO 6211
Program: Executive Master of Forensic Science
Department: Biology and Chemistry
College: Science
Institution: Imam Mohammad Ibn Saud Islamic University
Version: 1
Last Revision Date: 29 September 2024

Table of Contents

A. General information about the course:

1. Course Identification:

1. Credit hours: 3 (2 lectures, 2 laboratories, 0 tutorials)				
2. Course type				
A.	☐University	☐College	☒ Program	☐Track
B.	☒ Required		☐Elective	
3. Level/year at which this course is offered: (Level 3 l Year 2)				
4. Course General 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.				
5. Pre-requirements for this course (if any)**:**				
None				
6. Co-requirements for this course (if any)**:**				
None				
7. Course Main Objective(s):				
At the end of the course, the students will be able to 1. Use anatomical terminology to identify and describe locations of major organs of each system covered. 2. Explain interrelationships among molecular, cellular, tissue, and organ functions in each system. 3. Describe the interdependency and interactions of the systems. 4. Explain contributions of organs and systems to the maintenance of homeostasis and identify causes and effects of homeostatic imbalances. 5. Describe modern technology and tools used to study anatomy and physiology.				

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	E-learning	-	-
3	Hybrid • Traditional classroom • E-learning	-	-
4	Distance learning	-	-

3. Contact Hours: (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	-
4.	**Tutorial**	-
5.	**Others (specify)……**	-
	Total	60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods:

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Describe the general body organization and anatomical terminology	K1	Interactive Lecture Discussion and Dialogue Mind Maps Concept Maps Standard Method Inductive Method Self-Learning Cooperative Learning Field Visits	Written tests Class discussion questions Class assignments Homework Short research/reports Summaries Presentations
1.2	Outline the structure and function of cell, tissues, skin, skeletal system, muscular	K1, K2	Interactive Lecture Discussion and Dialogue Mind Maps	Written tests Class discussion questions

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	system		Concept Maps Standard Method Inductive Method Self-Learning Cooperative Learning Field Visits	Class assignments Homework Short research/reports Summaries Presentations
2.0	**Skills**			
2.1	Explain in-depth understanding the principles of anatomy and physiology and their interrelationships	S1	Practical Application Microteaching Modeling and Simulation Project-Based Learning Discovery Learning Collaborative Learning	Observation / Rating Scales Practical Tests Self-Assessment Peer Assessment
2.2	Interpret a basic understanding of the integration of organ systems to maintain homeostasis	S1, S2, S3	Practical Application Microteaching Modeling and Simulation Project-Based Learning Discovery Learning Collaborative Learning	Observation / Rating Scales Practical Tests Self-Assessment Peer Assessment
2.3	Summarize practical knowledge of physiological techniques	S1, S2, S3	Practical Application Microteaching Modeling and Simulation Project-Based Learning Discovery Learning Collaborative Learning	Observation / Rating Scales Practical Tests Self-Assessment Peer Assessment
3.0	**Values, autonomy, and responsibility**			
3.1	Demonstrate the ability to condense	V1	Modeling Dialogue and	Observation Self-

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	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		discussion Self-learning Collaborative learning	assessment Peer assessment Achievement file
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	Modeling Dialogue and discussion Self-learning Collaborative learning	Observation Self-assessment Peer assessment Achievement file

C. Course Content:

No	List of Lecture Topics	Contact Hours
1.	Cell structure and function: Membrane structure, lipids, proteins and carbohydrates in cell membranes. Role of cell membrane in transport of material into and out of the cell. Cell organelles, cytoskeleton, and projections from cell membrane. The nucleus. Chromosomes. Basic structure of DNA and RNA. Synthesis of proteins, karyotyping, cell division. Chromosomal sex and sex chromatin. Abnormal cell growth and tumors.	8
2.	Introduction to body function: External and internal environment, homeostasis. Negative and positive feedback mechanism. Essential body function- procuring and ingestion of food, respiration, excretion of waste products. Need for movement. Mode of communication within the body. Importance of electrolytes, acids and alkalis, carbohydrates, proteins and fats in the body.	7
3.	Tissues of the body: epithelia and glands. Classification of epithelia, types of glands, their classification and function. Connective tissues- basic component, cell in general connective tissues. Different forms of connective tissues, fibers of connective tissues, cells of connective tissues- adipose tissue. Functions of connective tissues. Cartilage, structure, types of cartilage, gross structure of bones, elements	8

	comprising bone tissue. Lamellar bone, woven bone, cancellous bone. Structure of compact bone, periosteum, formation of bone, development of a typical long bone, fracture healing.	
4.	Skin and its appendages-structure and functions, pigmentation, blood and nerve supply. Structure of hair and hair follicle, hair cycle- anagen, catagen, telogen. Arrector pilli, muscles, sebaceous glands, nails, sweat gland. Musculoskeletal, striated, non-striated, voluntary, involuntary. Organization of muscle fibers in muscle. Tendons. Nerves tissues-neuron structure, type of neurons, synapse, grey and white matter, peripheral nerves and ganglia.	7
Total		**30**

No	List of Laboratory Topics	Contact Hours
1.	The Biometry: (fingerprints, palm prints, footprints, ear prints and lip prints)	3
2.	Osteology	3
3.	Odontology	3
4.	Inspection of the crime scene for different cases of death	3
5.	Signs of death - causes of death - sudden natural death and its implications - death related to drug and poison abuse - death as a result of Asphyxia - suicide and its implications.	3
6.	Identification of the deceased - body parts in terrorist crimes - burns and fire deaths.	3
7.	Methods for sampling laboratory analysis from the deceased body.	3
8.	Cardiac arrest tutorials	3
9.	Human remains	3
10.	Histological identifications of human tissues and traces	3
Total		**30**

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes, oral test, oral presentation, group project, essay, and Attendance	During the semester	30%
2.	Midterm Exam	8th week	30%
3.	Final Exam	16th week	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities:

1. References and Learning Resources:

Essential References	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
Supportive References	None
Electronic Materials	None
Other Learning Materials	None

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms and Laboratories
Technology equipment (Projector, smart board, software)	Projector and Smart board
Other equipment (Depending on the nature of the specialty)	Forensic Science-related instruments, including safety cabinet, centrifuges, incubators, thermal cyclers, trans-illuminators, gel electrophoresis apparatus

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Direct
Effectiveness of students' assessment	Program Leaders	Direct
Quality of learning resources	Peer Reviewer	Indirect
The extent to which CLOs have been achieved	Program Leaders	Direct
Other	-	-

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	**Department of Biology Council**
REFERENCE NO.	**Meeting No. 6**

DATE	**29/9/2024**

Course Specification

(Postgraduate Programs)

Course Title: The Scientific Method in Forensic Science
Course Code: BIO 6291
Program: Executive Master of Forensic Science
Department: Biology and Chemistry
College: Science
Institution: Imam Mohammad Ibn Saud Islamic University
Version: 1
Last Revision Date: 29 September 2024

Table of Contents

A. General information about the course:

1. Course Identification:

1. Credit hours: 3 (3 lectures, 0 laboratories, 0 tutorials)				
2. Course type				
A.	☐University	☐College	☒ Program	☐Track
B.	☒ Required		☐Elective	
3. Level/year at which this course is offered: (Level 3 l Year 2)				
4. Course General 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.				
5. Pre-requirements for this course (if any)**:**				
BIO 6101, BIO 6105, CHM 6138, CHM 6151, STA 6117				
6. Co-requirements for this course (if any)**:**				
None				
7. Course Main Objective(s):				
At the end of the course, the students will be able to 1. Understand the scientific research methodology in Forensic Science. 2. Recognize various designs and methodologies of Forensic Science. 3. Provide suggestions for treatment of investigating challenges in a scientific way. 4. Make bibliography about the current state of the art of specific Forensic Scientific subjects. 5. Read, comment and summarize scientific papers and reports. 6. Make a critical assessment of investigating work conducted by others. 7. Offer scientific oral presentation and writing scientific report relevant to Forensic science.				

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100%
2	E-learning	-	-
3	Hybrid • Traditional classroom • E-learning	-	-
4	Distance learning	-	-

3. Contact Hours: (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	-
3.	**Field**	-
4.	**Tutorial**	-
5.	**Others (specify)……**	-
	Total	45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods:

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Recall the fundamentals and application of Biology and Chemistry fields in investigating and solving a Forensic Evidence problem	K1	Interactive Lecture Discussion and Dialogue Mind Maps Concept Maps Standard Method Inductive Method Self-Learning Cooperative Learning Field Visits	Written tests Class discussion questions Class assignments Homework Short research/reports Summaries Presentations
1.2	Outline the appropriate methods	K2, K3, K4	Interactive Lecture Discussion and	Written tests Class

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	and routes in formulating a Forensic Evidence problem or topic		Dialogue Mind Maps Concept Maps Standard Method Inductive Method Self-Learning Cooperative Learning Field Visits	discussion questions Class assignments Homework Short research/reports Summaries Presentations
1.3	List in-depth the Forensic Science Progress and development via literatures survey analysis	K1, K4	Interactive Lecture Discussion and Dialogue Mind Maps Concept Maps Standard Method Inductive Method Self-Learning Cooperative Learning Field Visits	Written tests Class discussion questions Class assignments Homework Short research/reports Summaries Presentations
1.4	Recognize a critical assessment of scientific investigating work conducted by others	K1, K3	Interactive Lecture Discussion and Dialogue Mind Maps Concept Maps Standard Method Inductive Method Self-Learning Cooperative Learning Field Visits	Written tests Class discussion questions Class assignments Homework Short research/reports Summaries Presentations
2.0	**Skills**			
2.1	Develop experience in searching and assessing current Forensic Science literature	S1, S2	Practical Application Microteaching Modeling and Simulation Project-Based Learning	Observation / Rating Scales Practical Tests Self-Assessment Peer Assessment

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
			Discovery Learning Collaborative Learning	
2.2	Summarize the literature survey the applied methods and techniques used	S1, S3	Practical Application Microteaching Modeling and Simulation Project-Based Learning Discovery Learning Collaborative Learning	Observation / Rating Scales Practical Tests Self-Assessment Peer Assessment
2.3	Analyze and contrast the literature survey with instructor guidance	S2, S4	Practical Application Microteaching Modeling and Simulation Project-Based Learning Discovery Learning Collaborative Learning	Observation / Rating Scales Practical Tests Self-Assessment Peer Assessment
2.4	Appraise communication, accompanying writing of mini-reports, operating electronic mail, and network in communicating conclusions and recommendations	S2, S3, S4	Practical Application Microteaching Modeling and Simulation Project-Based Learning Discovery Learning Collaborative Learning	Observation / Rating Scales Practical Tests Self-Assessment Peer Assessment
3.0	**Values, autonomy, and responsibility**			
3.1	Demonstrate group leadership skill and to evaluate the responsibility	V1	Modeling Dialogue and discussion Self-learning Collaborative learning	Observation Self-assessment Peer assessment Achievement file
3.2	Illustrate the ability	V2	Modeling	Observation

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	to communicate their ideas with the instructor at all times during and after the class		Dialogue and discussion Self-learning Collaborative learning	Self-assessment Peer assessment Achievement file

C. Course Content:

No	List of Topics	Contact Hours
1.	Introduction to Scientific Research	5
2.	Overview of Forensic Research	4
3.	Literature Review	6
4.	Formulate Research Problem and Research Objective	5
5.	Research Design for the Forensic Science Student and Practitioner	5
6.	Research Proposal	8
7.	How to Critically Review a Published Scientific articles	5
8.	The Importance of Ethics and Impartiality in Forensic Science	4
9.	The Key to Effective Communication in Forensic Science	3
Total		**45**

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	1st written report and oral presentation: Review of literature Scientific research question and proposal	4th week	20%
2.	2nd written report and oral presentation: Scientific research design and methodology Reference styles and citations manager	8th week	20%
3.	3rd written report and oral presentation: Drafting research article and submission Response to reviewers' comments and revision	12th week	20%
4.	Essay	16th week	20%
5.	Final oral presentation	16th week	20%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities:

1. References and Learning Resources:

Essential References	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.
Supportive References	None
Electronic Materials	None
Other Learning Materials	None

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms and Laboratories
Technology equipment (Projector, smart board, software)	Projector and Smart board
Other equipment (Depending on the nature of the specialty)	Forensic Science-related instruments, including safety cabinet, centrifuges, incubators, thermal cyclers, trans-illuminators, gel electrophoresis apparatus

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Direct
Effectiveness of students' assessment	Program Leaders	Direct
Quality of learning resources	Peer Reviewer	Indirect
The extent to which CLOs have been achieved	Program Leaders	Direct
Other	-	-

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	**Department of Biology Council**
REFERENCE NO.	**Meeting No. 6**
DATE	**29/9/2024**

Course Specification

(Postgraduate Programs)

Course Title:	**Advanced Analytical Chemistry**
Course Code:	**CHM 6231**
Program:	**Executive Master of Forensic Science**
Department:	**Biology and Chemistry**
College:	**Science**
Institution:	**Imam Mohammad Ibn Saud Islamic University**
Version:	**1**
Last Revision Date:	**2 October 2024**

Table of Contents

A. General information about the course:

1. Course Identification:

1. Credit hours:					
3 (3 Lectures, 0 Lab, 0 Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Progam	☐Track	
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (4/2)					
4. Course General 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.					
5. Pre-requirements for this course (if any):					
None					
6. Pre-requirements for this course (if any):					
None					
7. Course Main Objective(s):					
• Recognize the required techniques for a variety of sampling types. • Develop awareness of handling sample preparation in an appropriate way. • Be familiar with volumetric and gravimetric analysis and their application in different fields. • Develop awareness of spectral, electrochemical, and chromatographic methods and choose the appropriate technique.					

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100%
2	E-learning	0	0%
3	Hybrid • Traditional classroom • E-learning	0	0%
4	Distance learning	0	0%

3. Contact Hours: (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	**45**
2.	**Laboratory/Studio**	**0**
3.	**Field**	**0**
4.	**Tutorial**	**0**
5.	**Others (specify)……**	**0**
	Total	**45**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods:

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	**To recall the principles of a wide range of modern analytical methods of sampling types.**	**K1; K3; K4**	▪Three hours/week lectures. ▪Self-study. ▪ Home-exam.	▪ Regular Exams ▪ Assignments ▪ Short Quizzes ▪ Oral Discussion ▪ Participation.
1.2	**To list principles in Analytical Chemistry.**	**K1; K2**	▪Three hours/week lectures. ▪Think, to justify the principles of analytical chemistry, available references (SDL) online. Open discussion.	▪ Oral Discussion marks ▪ Literatures Survey ▪ Mini-seminar. ▪ Participation.
1.3	**To describe the applications of spectral methods in analytical chemistry.**	**K1; K4**	▪ Three hours/week lectures. ▪Group Discussion using available references (SDL) online.	▪ Midterm. ▪ Assignments. ▪ Group Discussions. ▪ Literatures Survey ▪ Mini-seminar. ▪ Participation.
1.4	**To memorize the**	**K1; K4**	▪ Three	▪ Assignments

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	Chromatographic and Electrochemical Methods.		hours/week lectures. ▪Group Discussion Analytical methods for separation using available references online.	▪ Open Discussions. ▪ Literatures Survey ▪ Mini-seminars. Participation.
2.0	**Skills**			
2.1	**To analyze problems and explore strategies for Volumetric and Gravimetric Methods applications.**	**S1 ; S2**	▪ Lectures activity ▪ Self-study. ▪Deep discussions on the Volumetric and Gravimetric Methods applications.	▪ Questions in Lectures. ▪ Short Quizzes and Exams. ▪ Open Discussions. ▪ Participation ▪ Mini - seminar.
2.2	**To interpret the obtained data from different Spectral Methods.**	**S2 ; S3**	▪Practice examples Spectral Methods interpretation. ▪Brainstorming. ▪ Self-study	▪ Questions in Lectures. ▪ Participation ▪ Oral Discussion ▪ Short Quizzes.
2.3	**To choose the appropriate techniques in Electrochemical analytical methods for a specific sample.**	**S2 ; S4**	▪Lectures and Oral Discussions. ▪Brainstorming. ▪ Self-study.	▪Questions in Lectures. ▪Short Quizzes and Exams. ▪Oral Discussion. ▪ Participation.
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**	**S1; S4; V1**	▪ Group Discussion and Assignments. ▪ Suggest applying analytical chemistry techniques in the industry and its impact on KSA, which will	▪ Oral Discussion. ▪ Quizzes, and Exams. ▪ Giving marks for Oral Discussion in Lectures. ▪ Marks given for

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	Network in communicating with others.		require reading, writing, and oral presentation. ▪ Encourage students to use electronic mail to submit Home Exams and Assignments.	Assignments.
3.0	**Values, autonomy, and 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**	▪ Brain Storms Exercises Group Discussion	▪ Oral Discussion. ▪ Group Discussion ▪ Assignments.
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**	▪ Small Group tasks ▪ Open discussion at classroom. ▪ Office hour guiding. ▪ Group Presentation of mini-projects	▪ Participation ▪ Homework's ▪ Mini-project(s).

C. Course Content:

No	List of Topics	Contact Hours
1.	**Various sampling techniques of organic and inorganic analytes.**	**6**
2.	**Scientific principles in analytical chemistry**	**9**
3	**Volumetric and Gravimetric Methods:** Principle, Stoichiometric calculations in Volumetric and Gravimetric Analysis and their application	**9**
4	**Spectral Methods:** Recent techniques in spectroscopic methods of analysis, Infrared spectroscopy (Definition - Theory – Infrared	**12**

	instruments), Ultraviolet/Visible spectroscopy (Principle – Instrumentation – Applications), and Atomic spectroscopy (Principle – Instrumentation – Applications).	
	Electrochemical Methods: Simple introduction, Potentiometry, conductometry, coulometry, polarography, amperometry, voltammetry.	**6**
	Chromatographic Methods: Principles, Theory and different types.	**3**
Total		**45**

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Activities (Oral Discussion, Mini-projects, Miniseminar, Quizzes, Mid-term, Oral Presentation, Participation, Assignments, Lab. reports)**	**During the semester**	**30 %**
2.	**Midterm Exam**	**8th week**	**30 %**
3.	**Final Exam**	**16th week**	**40 %**
	Total		**100%**

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities:

1. References and Learning Resources:

Essential References	**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
Supportive References	None
Electronic Materials	• The Journal of Analytical Chemistry • Saudi Digital Library
Other Learning Materials	• Blackboard • Multimedia associated with the text book and the relevant websites

2. Educational and Research Facilities and Equipment Required:

Items	Resources

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**Each classroom should be equipped with a whiteboard and a projector, with a maximum of 20 students.**
Technology equipment (Projector, smart board, software)	**The rooms have a data show, Smart Board, and WI-FI access.**
Other equipment (Depending on the nature of the specialty)	**None**

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	**Direct:** Questionnaire.
	Course Responsible	**Direct:** Course e-Portfolio. **Indirect:** Second examiner checklist-Course report.
	Peer Reviewer	**Direct:** Questionnaire. **Indirect:** External assessor report.
Effectiveness of students' assessment	Program Leaders	**Direct:** Course e-Portfolio. **Indirect:** Course report.
Quality of learning resources	Students	**Indirect:** Second examiner checklist-Course report.
	Faculty (Academic Advisory - **FEGC**)	**Direct:** course Entrance/Exit. **Indirect:** Observations - Accreditation review.
	Program Leaders	**Direct:** Course e-Portfolio. **Indirect:** Course evaluation survey- Observations- Syllabus review- Accreditation review.
	Students	**Indirect:** Second examiner checklist-Course report.
The extent to which CLOs have been achieved	Course Responsible	**Direct:** Exams - Course e-Portfolio. **Indirect:** Second examiner checklist-Course report.

Assessment Areas/Issues	Assessor	Assessment Methods
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	Department of Chemistry Council
REFERENCE NO.	7 (NO. 2/3)
DATE	29/3/1446 - 2/10/2024

Course Specification

(Postgraduate Programs)

Course Title: Research Project
Course Code: BIO 6299
Program: Executive Master of Forensic Science
Department: Biology and Chemistry
College: Science
Institution: Imam Mohammad Ibn Saud Islamic University
Version: 1
Last Revision Date: 29 September 2024

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A. General information about the course:

1. Course Identification:

1. Credit hours: 4				
2. Course type				
A.	☐University	☐College	☒ Program	☐Track
B.	☒ Required		☐Elective	
3. Level/year at which this course is offered: (Level 4 l Year 2)				
4. Course General Description:				
This course is an independent task to be carried out by each student individually and accomplished according to specific timetable duration. Research Project is a solo act based on one major forensic science topic and supervised by one of the staff members. An examination committee, along with the project's supervisor, evaluates and discusses the project on a pre-stated date. The research project involves a proposal that includes the experimental design, data collection, and analysis. The student is given the freedom to a great extent in choosing the research project title; the selected topic focuses on and follows with the aid of the supervising instructor. The topics and contents vary depending on the ability of the student and the courses that he/she has completed.				
5. Pre-requirements for this course (if any)**:**				
BIO 6291				
6. Co-requirements for this course (if any)**:**				
None				
7. Course Main Objective(s):				
After completing the research project, the student is supposed to acquire the necessary skills in the following: 1. Make bibliography about the current state of the art of specific forensic science topics. 2. Able to read, comment and summarize scientific reports relevant for forensic science. 3. Be adept for the development of innovative ideas in the forensic science investigation. 4. Gain an understanding of the importance of the development of forensic science in specific problems and their limitations and applications. 5. Be adept at the application of biological and chemicals fundamentals to solve real forensic science problems in the considered domain. 6. Be familiar with new strategic ideas promising in the near future for the scientific				

community relevant to forensic science.
7. Practice in writing reports from research investigation works.
8. Improve laboratory skills.
9. Be able to develop his/her intellectual abilities in forensic science.

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	-	-
2	E-learning	-	-
3	Hybrid • Traditional classroom • E-learning	-	-
4	Distance learning	-	-
5	Others	60	100%

3. Contact Hours: (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	-
2.	**Laboratory/Studio**	60
3.	**Field**	-
4.	**Tutorial**	-
5.	**Others (specify)……**	-
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods:

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Recall advanced application of in-depth and up-to-date technical knowledge and research principles in	K1, K3	Interactive Lecture Discussion and Dialogue Mind Maps Concept Maps Standard Method	Written tests Class discussion questions Class assignments

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	forensic science		Inductive Method Self-Learning Cooperative Learning Field Visits	Homework Short research/reports Summaries Presentations
1.2	Describe appropriately judged professional solutions to forensic science problems	K3, K4	Interactive Lecture Discussion and Dialogue Mind Maps Concept Maps Standard Method Inductive Method Self-Learning Cooperative Learning Field Visits	Written tests Class discussion questions Class assignments Homework Short research/reports Summaries Presentations
1.3	Describe a required understanding of the basic concepts about forensic science in relevant topics and fields	K3, K4	Interactive Lecture Discussion and Dialogue Mind Maps Concept Maps Standard Method Inductive Method Self-Learning Cooperative Learning Field Visits	Written tests Class discussion questions Class assignments Homework Short research/reports Summaries Presentations
1.4	List the essential processes and procedures for the investigation in forensic science and present it inclusively	K1, K3	Interactive Lecture Discussion and Dialogue Mind Maps Concept Maps Standard Method Inductive Method Self-Learning Cooperative Learning Field Visits	Written tests Class discussion questions Class assignments Homework Short research/reports Summaries Presentations

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
2.0	**Skills**			
2.1	Analyze criminal samples and evidence to make decisions based on the knowledge gain	S1, S2, S4	Practical Application Microteaching Modeling and Simulation Project-Based Learning Discovery Learning Collaborative Learning	Observation / Rating Scales Practical Tests Self-Assessment Peer Assessment
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	Practical Application Microteaching Modeling and Simulation Project-Based Learning Discovery Learning Collaborative Learning	Observation / Rating Scales Practical Tests Self-Assessment Peer Assessment
2.3	Summarize and analyze existing academic literature serving the forensic science arguments	S2, S4	Practical Application Microteaching Modeling and Simulation Project-Based Learning Discovery Learning Collaborative Learning	Observation / Rating Scales Practical Tests Self-Assessment Peer Assessment
2.4	justify laboratory instruments and perform biological and chemical experiments and analysis, handle chemicals and operate tools	S4	Practical Application Microteaching Modeling and Simulation Project-Based Learning Discovery Learning Collaborative Learning	Observation / Rating Scales Practical Tests Self-Assessment Peer Assessment
3.0	**Values, autonomy, and responsibility**			

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
3.1	Demonstrate ability to deal with various sources of knowledge and the ability to exploit and to estimate the time	V1	Modeling Dialogue and discussion Self-learning Collaborative learning	Observation Self-assessment Peer assessment Achievement file
3.2	Analyze the results with other colleagues and with supervisors	S4, V1, V2	Modeling Dialogue and discussion Self-learning Collaborative learning	Observation Self-assessment Peer assessment Achievement file

C. Course Content:

No	List of Topics	Contact Hours
1.	Plan and execute a 15-week project in experimental or theoretical forensic science (or a mixture of both) and might involve substantial computing, construction and design, theory, measurements, and numerical modeling or analysis.	6
2.	Project topic selection and accompanying justification.	6
3.	Proposed project outline.	6
4.	Project schedule, individual or as a team member, task identification	6
5.	Setting and meeting deadlines and dealing with changes to the project plan as they arise.	6
6.	Weekly reports.	6
7.	Regular interaction and discussion with student's project supervisor, regarding experimentations and the results.	6
8.	Undertake a literature review on a topic of relevance to the overall project.	6
9.	Research project thesis, including literature review, materials, methods, results with appropriate tables, figures, curves, and discussion, conclusion, as well as references.	6
10	Oral presentation of student's project work, summarizing the essential scientific and practical aspects and outcomes of the project at the end of semester.	6
Total		**60**

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	1st report by the supervisor	4th week	20%
2.	2nd report by the supervisor	8th week	20%
3.	3rd report by the supervisor	12th week	20%
4.	Final report by the examination committee	16th week	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities:

1. References and Learning Resources:

Essential References	These are detected depending on the nature of the specialty of the research project
Supportive References	These are detected depending on the nature of the specialty of the research project
Electronic Materials	These are detected depending on the nature of the specialty of the research project
Other Learning Materials	These are detected depending on the nature of the specialty of the research project

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Laboratories
Technology equipment (Projector, smart board, software)	Software
Other equipment (Depending on the nature of the specialty)	These are detected depending on the nature of the specialty of the research project

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Direct
Effectiveness of students' assessment	Program Leaders	Direct
Quality of learning resources	Peer Reviewer	Indirect
The extent to which CLOs have	Program Leaders	Direct

Assessment Areas/Issues	Assessor	Assessment Methods
been achieved		
Other	-	-

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	Department of Biology Council
REFERENCE NO.	Meeting No. 6
DATE	29/9/2024