



## Course Specifications (Postgraduate Degree)

<b>Course Title:</b>	<b>Forensic Biology</b>
<b>Course Code:</b>	<b>BIO 6101</b>
<b>Program:</b>	<b>Executive Master of Forensic Science</b>
<b>Department:</b>	<b>Biology</b>
<b>College:</b>	<b>Science</b>
<b>Institution:</b>	<b>Imam Mohammad Ibn Saud Islamic University (IMSIU)</b>

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## A. Course Identification

<b>1. Credit hours: 3 (3 Lectures, 0 Lab, 0 Tutorial)</b>			
<b>2. Course type</b>			
a.	University <input type="checkbox"/>	College <input type="checkbox"/>	Department <input checked="" type="checkbox"/>
			Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/>	Elective <input type="checkbox"/>	
<b>3. Level/year at which this course is offered: Level 1 / Year 1</b>			
<b>4. Pre-requisites for this course:</b> None			
<b>5. Co-requisites for this course (if any):</b> None			

### 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	36	100%
2	Blended	0	
3	E-learning	0	
4	Distance learning	0	
5	Other	0	

### 4. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	36
2	Laboratory/Studio	0
3	Tutorial	0
4	Others (specify)	0
	<b>Total</b>	<b>36</b>

## B. Course Objectives and Learning Outcomes

### 1. Course Description

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

### 2. Course Main Objectives

Become familiar with the fundamentals of various disciplines in forensic science, with an emphasis on forensic biology.

### 3. Course Learning Outcomes

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

## C. Course Content

No	List of Topics	Contact Hours
1	Introduction to Forensic Science	2
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	2
7	Forensic Toxicology	2
8	Forensic Aspects of Fire investigation & Forensic Investigations of Explosions	2
9	Fingerprint processing and comparison	2
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	2
15	Introduction to Forensic Serology-blood	2
16	Presumptive testing for blood	2
17	Introduction to Forensic Serology – Semen	1
18	Presumptive testing for Semen	1
19	The Future of Forensics	2
<b>Total</b>		<b>36</b>

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge and understanding</b>		
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.	<ul style="list-style-type: none"> <li>▪ Three hours/week lectures.</li> <li>▪ Self-study.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Regular Exams</li> <li>▪ Assignments</li> <li>▪ Short Quizzes</li> <li>▪ Oral Discussion</li> <li>• Participation</li> </ul>

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.2	Outline and use appropriate practical, presentational and statistical methods.	<ul style="list-style-type: none"> <li>▪ Three hours/week lectures.</li> <li>▪ Open discussion.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Oral Discussion</li> <li>▪ Mini-seminar.</li> <li>▪ Participation.</li> </ul>
1.3	List and discuss methods of acquiring, interpreting and analyzing both numerical and observational data.	<ul style="list-style-type: none"> <li>▪ Three hours/week lectures.</li> <li>▪ Open discussion.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Midterm.</li> <li>▪ Assignments.</li> <li>▪ Group Discussions.</li> <li>▪ Mini-seminar.</li> <li>▪ Participation.</li> </ul>
<b>2.0</b>	<b>Skills</b>		
2.1	Analyze, interpret and evaluate data from a variety of sources	<ul style="list-style-type: none"> <li>▪ Lectures activity</li> <li>▪ Self-study.</li> <li>▪ Deep discussions</li> </ul>	<ul style="list-style-type: none"> <li>▪ Oral discussion</li> <li>▪ Short Quizzes and Exams.</li> <li>▪ Participation</li> <li>▪ Mini -seminar.</li> </ul>
2.2	Develop critical skills in the interpretation of scientific knowledge and data	<ul style="list-style-type: none"> <li>▪ Brainstorming.</li> <li>▪ Self-study</li> </ul>	<ul style="list-style-type: none"> <li>▪ Participation</li> <li>▪ Oral Discussion</li> <li>▪ Short Quizzes.</li> </ul>
2.3	Explain effectively in written, graphical and oral formats	<ul style="list-style-type: none"> <li>▪ Lectures Discussions.</li> <li>▪ Brainstorming.</li> <li>▪ Self-study.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Mini-projects.</li> <li>▪ Oral Discussion.</li> <li>▪ Participation.</li> </ul>
<b>3.0</b>	<b>Values</b>		
3.1	Appraise investigating work independently and integrate with a collaborated group, using IT to acquire, analyze, and communicate information.	<ul style="list-style-type: none"> <li>▪ Brain Storms Exercises</li> <li>▪ Group Discussion</li> </ul>	<ul style="list-style-type: none"> <li>▪ Group Discussion</li> <li>▪ Assignments.</li> </ul>
3.2	Show effective capabilities in own professional groups and make decisions, enhance society's quality, and contribute to its advancement.	<ul style="list-style-type: none"> <li>▪ Small Group tasks</li> <li>▪ Open discussion at classroom.</li> <li>▪ Office hour guiding.</li> <li>▪ Group Presentation of mini-projects</li> </ul>	<ul style="list-style-type: none"> <li>▪ Participation</li> <li>▪ Assignments.</li> <li>▪ Mini-project(s).</li> </ul>

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Class Activities ( Oral Discussion, Mini-projects, Mini-seminar, Quizzes, Mid-term, Oral Presentation, Participation, Assignments)	During the semester	30%
2	Midterm	4 <sup>th</sup> week	30%
3	Final Exam	Around 13 <sup>th</sup> week	40%

\*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

## E. Student Academic Counseling and Support

**Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:**

- Students admitted to the master program will receive the appropriate academic counseling and support from the Joint Commission of the Executive Master's Program in Forensic Evidence Council (FEGC).
- The lecturer for each course allocates 4-6 office hours per week advertised on his / her own timetable, and reserved as part of his / her teaching schedule to help the students on any academic problems/difficulties.
- Student is able to get individual consultation and academic advice appointment with teaching staff via e-mail or phone calls.
- A list of teaching staff members with their room numbers, their phone numbers and their e-mail addresses is given in the Department website.

## F. Learning Resources and Facilities

### 1. Learning Resources

<b>Required Textbooks</b>	<b>An Introduction to Forensic Science</b> , Richard Saferstein, 13th Edition, Pearson, 2021, ISBN-13: 9780137542512. <b>Fundamentals of Forensic Science</b> , Houck, M.M. & Siegel, JA; 3 <sup>rd</sup> Edition, Academic Press, London, 2015. ISBN-13 : 978-0128000373
<b>Essential References Materials</b>	None
<b>Electronic Materials</b>	None
<b>Other Learning Materials</b>	None

### 2. Educational and research Facilities and Equipment Required

<b>Item</b>	<b>Resources</b>
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	Each class room should be equipped with a whiteboard and a projector.
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	The rooms are equipped with data show, Smart Board, WI-FI access.
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Laboratories should be equipped with computers and an internet connection.

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching	Students	<b>Direct:</b> Questionnaire.
	Course Responsible	<b>Direct:</b> Course e-Portfolio. <b>Indirect:</b> Second examiner checklist-Course report.
	Peer Reviewer	<b>Direct:</b> Questionnaire. <b>Indirect:</b> External assessor report.
Effectiveness of assessment	Program Leaders	<b>Direct:</b> Course e-Portfolio. <b>Indirect:</b> Course report.
Extent of achievement of course learning outcomes	Course Responsible	<b>Direct:</b> Exams - Course e-Portfolio. <b>Indirect:</b> Second examiner checklist-Course report.
	Program Leaders	<b>Indirect:</b> Exams.
Quality of learning resources	Students	<b>Indirect:</b> Second examiner checklist-Course report.
	Faculty ( Academic Advisory-GCC)	<b>Direct:</b> course Entrance/Exit. <b>Indirect:</b> Observations - Accreditation review.
	Program Leaders	<b>Direct:</b> Course e-Portfolio.
	Course Responsible	<b>Indirect:</b> Course evaluation survey- Observations- Syllabus review- Accreditation review.

**Evaluation areas** (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

**Evaluators** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

**Assessment Methods** (Direct, Indirect)

## H. Specification Approval Data

<b>Council / Committee</b>	<b>Biology Department Council</b>
<b>Reference No.</b>	<b>16/1441/1442</b>
<b>Date</b>	<b>5/5/1442</b>





## Course Specifications (Postgraduate Degree)

<b>Course Title:</b>	<b>Forensic genetics</b>
<b>Course Code:</b>	<b>BIO 6102</b>
<b>Program:</b>	<b>Executive Master of Forensic Science</b>
<b>Department:</b>	<b>Biology</b>
<b>College:</b>	<b>Science</b>
<b>Institution:</b>	<b>Imam Mohammad Ibn Saud Islamic University (IMSIU)</b>

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1. Learning Resources .....	7
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<b>G. Course Quality Evaluation</b> .....	<b>8</b>
<b>H. Specification Approval Data</b> .....	<b>8</b>

## A. Course Identification

<b>1. Credit hours: 3 (3 Lectures, 0 Lab, 0 Tutorial)</b>			
<b>2. Course type</b>			
a.	University <input type="checkbox"/>	College <input type="checkbox"/>	Department <input checked="" type="checkbox"/>
			Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/>	Elective <input type="checkbox"/>	
<b>3. Level/year at which this course is offered: Level 1 / Year 1</b>			
<b>4. Pre-requisites for this course:</b> None			
<b>5. Co-requisites for this course (if any):</b> None			

### 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	36	100%
2	Blended	0	
3	E-learning	0	
4	Distance learning	0	
5	Other	0	

### 4. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	36
2	Laboratory/Studio	0
3	Tutorial	0
4	Others (specify)	0
	<b>Total</b>	<b>36</b>

## B. Course Objectives and Learning Outcomes

### 1. Course Description

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

### 2. Course Main Objectives

*At the end of the course, the students will be able to*

1. Define and interpret genetic profiles from blood groups, Short Tandem Repeat markers and Single Nucleotide Polymorphisms.
2. Calculate likelihood ratios for matching genetic profiles, with allowances for population structure and relatedness.
3. Calculate paternity indexes.
4. Identify risks and benefits of using genetic profiles for human identification.  
Detect instances of the "prosecutor's fallacy" in trial transcripts and court rulings.

### 3. Course Learning Outcomes

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

## C. Course Content

No	List of Topics	Contact Hours
1	Introduction /History of DNA	2
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.	2
5	Presenting scientific evidence. Likelihood ratios. Common fallacies.	2
6	Profile matching and partial matching within and between populations.	4
7	Lineage markers: Y-STR and mtDNA profiles.	3
8	Parentage calculations.	4
9	Relatedness. Remains identification.	3
10	Cold hits. Familial searching.	3
11	Wildlife forensics.	3
12	Ethical issues.	2
<b>Total</b>		<b>36</b>

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge and understanding</b>		
1.1	Recognize molecular biology and genetics expertise to new forensic problems.	<ul style="list-style-type: none"> <li>▪ Three hours/week lectures.</li> <li>▪ Self-study.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Regular Exams</li> <li>▪ Assignments</li> <li>▪ Short Quizzes</li> <li>▪ Oral Discussion</li> <li>• Participation</li> </ul>
1.2	Outline knowledge and understanding of forensic genetics to make accurate statements, describe complex information, provide detailed explanations and integrate knowledge.	<ul style="list-style-type: none"> <li>▪ Three hours/week lectures.</li> <li>▪ Open discussion.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Oral Discussion</li> <li>▪ Mini-seminar.</li> <li>▪ Participation.</li> </ul>
1.3	List forensic genetics findings and concepts fully, appropriately and using a variety of different modalities.	<ul style="list-style-type: none"> <li>▪ Three hours/week lectures.</li> <li>▪ Open discussion.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Midterm.</li> <li>▪ Assignments.</li> <li>▪ Group Discussions.</li> <li>▪ Mini-seminar.</li> <li>▪ Participation.</li> </ul>

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.4	State the conceptual and statistical framework for the interpretation of forensic genetics data theoretically.	<ul style="list-style-type: none"> <li>▪ Three hours/week lectures.</li> <li>▪ Open discussion.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Midterm.</li> <li>▪ Assignments.</li> <li>▪ Group Discussions.</li> <li>▪ Mini-seminar.</li> <li>▪ Participation.</li> </ul>
2.0	<b>Skills</b>		
2.1	Develop the ability to critically analyze and interpret forensic evidence in the light of the related scientific literature.	<ul style="list-style-type: none"> <li>▪ Lectures activity</li> <li>▪ Self-study.</li> <li>▪ Deep discussions</li> </ul>	<ul style="list-style-type: none"> <li>▪ Oral discussion</li> <li>▪ Short Quizzes and Exams.</li> <li>▪ Participation</li> <li>▪ Mini -seminar.</li> </ul>
2.2	Justify how DNA polymorphisms can be used to identify biological samples and assess kinship.	<ul style="list-style-type: none"> <li>▪ Brainstorming.</li> <li>▪ Self-study</li> </ul>	<ul style="list-style-type: none"> <li>▪ Participation</li> <li>▪ Oral Discussion</li> <li>▪ Short Quizzes.</li> </ul>
2.3	Reorganize the obtained information	<ul style="list-style-type: none"> <li>▪ Lectures Discussions.</li> <li>▪ Brainstorming.</li> <li>▪ Self-study.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Mini-projects.</li> <li>▪ Oral Discussion.</li> <li>▪ Participation.</li> </ul>
3.0	<b>Values</b>		
3.1	Illustrate linking between science and technology with society.	<ul style="list-style-type: none"> <li>▪ Brainstorms Exercises</li> <li>▪ Group Discussion</li> </ul>	<ul style="list-style-type: none"> <li>▪ Group Discussion</li> <li>▪ Assignments.</li> </ul>
3.2	Use quantitative models and data to solve problems.	<ul style="list-style-type: none"> <li>▪ Small Group tasks</li> <li>▪ Open discussion at classroom.</li> <li>▪ Office hour guiding.</li> <li>▪ Group Presentation of mini-projects</li> </ul>	<ul style="list-style-type: none"> <li>▪ Participation</li> <li>▪ Assignments.</li> <li>▪ Mini-project(s).</li> </ul>

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Class Activities ( Oral Discussion, Mini-projects, Mini-seminar, Quizzes, Mid-term, Oral Presentation, Participation, Assignments)	During the semester	30%
2	Midterm	4 <sup>th</sup> week	30%
3	Final Exam	Around 13 <sup>th</sup> week	40%

\*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

## E. Student Academic Counseling and Support

### Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

- Students admitted to the master program will receive the appropriate academic counseling and support from **the Joint Commission of the Executive Master's Program in Forensic Evidence Council (FEGC)**.
- The lecturer for each course allocates 4-6 office hours per week advertised on his / her own timetable, and reserved as part of his / her teaching schedule to help the students on any academic problems/difficulties.
- Student is able to get individual consultation and academic advice appointment with teaching staff via e-mail or phone calls.
- A list of teaching staff members with their room numbers, their phone numbers and their e-mail addresses is given in the Department website.

## F. Learning Resources and Facilities

### 1. Learning Resources

<b>Required Textbooks</b>	<b>An Introduction to Forensic Genetics</b> , William Goodwin, Adrian Linacre, Sibte Hadi, 2nd Edition, Wiley, 2010, ISBN: 978-0-470-71019-7 <b>Forensic DNA Typing</b> , John M. Butler, 2nd Edition, Elsevier Academic Press; Elsevier. ISBN-13 : 978-0121479527
<b>Essential References Materials</b>	<b>None</b>
<b>Electronic Materials</b>	<b>None</b>
<b>Other Learning Materials</b>	<b>None</b>

### 2. Educational and research Facilities and Equipment Required

<b>Item</b>	<b>Resources</b>
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	<b>Each class room should be equipped with a whiteboard and a projector.</b>
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	<b>The rooms are equipped with data show, Smart Board, WI-FI access.</b>
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	<b>Laboratories should be equipped with computers and an internet connection.</b>

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching	Students	<b>Direct:</b> Questionnaire.
	Course Responsible	<b>Direct:</b> Course e-Portfolio. <b>Indirect:</b> Second examiner checklist-Course report.
	Peer Reviewer	<b>Direct:</b> Questionnaire. <b>Indirect:</b> External assessor report.
Effectiveness of assessment	Program Leaders	<b>Direct:</b> Course e-Portfolio. <b>Indirect:</b> Course report.
Extent of achievement of course learning outcomes	Course Responsible	<b>Direct:</b> Exams - Course e-Portfolio. <b>Indirect:</b> Second examiner checklist-Course report.
	Program Leaders	<b>Indirect:</b> Exams.
Quality of learning resources	Students	<b>Indirect:</b> Second examiner checklist-Course report.
	Faculty ( Academic Advisory-GCC)	<b>Direct:</b> course Entrance/Exit. <b>Indirect:</b> Observations - Accreditation review.
	Program Leaders	<b>Direct:</b> Course e-Portfolio.
	Course Responsible	<b>Indirect:</b> Course evaluation survey- Observations- Syllabus review- Accreditation review.

**Evaluation areas** (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

**Evaluators** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

**Assessment Methods** (Direct, Indirect)

## H. Specification Approval Data

<b>Council / Committee</b>	<b>Biology Department Council</b>
<b>Reference No.</b>	<b>16/1441/1442</b>
<b>Date</b>	<b>5/5/1442</b>





## Course Specifications (Postgraduate Degree)

<b>Course Title:</b>	<b>Introduction in Forensic Chemistry</b>
<b>Course Code:</b>	<b>CHM 6151</b>
<b>Program:</b>	<b>Executive Master of Forensic Science</b>
<b>Department:</b>	<b>Chemistry</b>
<b>College:</b>	<b>Science</b>
<b>Institution:</b>	<b>Imam Mohammad Ibn Saud Islamic University</b>

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<b>F. Learning Resources and Facilities.....</b>	<b>8</b>
1. Learning Resources.....	8
2. Educational and research Facilities and Equipment Required.....	8
<b>G. Course Quality Evaluation.....</b>	<b>9</b>
<b>H. Specification Approval Data.....</b>	<b>9</b>

## A. Course Identification

<b>1. Credit hours:</b> 4 (3 Lectures, 0 Lab, 2 Tutorial)
<b>2. Course type</b> <input checked="" type="checkbox"/> Required <input type="checkbox"/> Elective
<b>3. Level/year at which this course is offered:</b> Level 1 / Year 1
<b>4. Pre-requisites for this course (if any):</b> None
<b>5. Co-requisites for this course (if any):</b> None

### 6. Mode of Instruction (mark all that apply)

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

### 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
1	Lecture	36
2	Laboratory/Studio	0
3	Tutorials	24
4	Others (specify)	0
<b>Total</b>		<b>60</b>

## B. Course Objectives and Learning Outcomes

### 1. Course Description

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

### 2. Course Main Objective

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 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 evidences and measurements.
- Manipulate and evaluate data.
- Plan and organize work within published deadlines.
- Design a scheme as well as technique (s) to solve unknown crime.

### 3. Course Learning Outcomes

CLOs <i>After completion of the course, The Graduate is able</i>		Aligned PLOs
1	<b>Knowledge and Understanding</b>	
1.1	Recall Forensic Chemistry and relevant Topics.	K1
1.2	Recognize the Chemistry of Textiles, Paint and coatings relevant to Forensic Chemistry.	K1; K2
1.3	Outline reasonable appropriate arguments and interpretations for Chemical analysis for the scientific examination of questioned documents.	K2; K4
1.4	List the Glass analysis, Fiber Investigation and Explosions Examinations answering Forensic Chemistry questions.	K1; K2; K3
2	<b>Skills:</b>	
2.1	Compare different Analytical Methods for the scientific examination of questioned documents.	S1; S4
2.2	Justify the appropriate Forensic examination techniques for Textiles, Paint and Coatings.	S1; S2; S4
2.3	Summarize the analysis and interpretation results in Forensic Chemistry questions.	S2; S3
2.4	Develop oral communication for Chemical Analytical procedures and answering Forensic Chemistry question, applied techniques and Instruments, accompanying writing of mini- Reports, operating electronic mail, and Network in communicating with others.	S4; V1
3	<b>Values:</b>	
3.1	Demonstrate capacity to communicate with others .	V1
3.2	Appraise effectively the collaboration and inter-professionalism in class discussions or team works, as well as independently.	V1; V2

## C. Course Content

No	List of Topics	Contact Hours
1	<b>Introduction:</b> Forensic Chemistry, Scientific Investigation, Forensic Investigation.	6
2	<b>Textiles:</b> Introduction, A science of reconstruction, Textiles, Natural fibers, Manufactured fibers, Yarns and fabrics, Fiber types, Chemistry, The future.	8
3	<b>Paint and coatings examination:</b> Introduction, Paint chemistry, Automotive paint application, Forensic examination of paint, Paint evidence evaluation and expert opinion.	6
4	<b>Chemical analysis for the scientific examination of questioned documents:</b> Static approach, Dynamic approach, Ink composition, Examinations, Questioned documents, crime scenes and evidential considerations, Interpreting results and rendering conclusions.	8
5	<b>Glass Analysis:</b> Physical properties, composition of glass, Techniques for identification of glass.	12
6	<b>Fire Investigation:</b> Introduction, The Nature of Fire, Factors Affecting Flame Propagation, The Investigation, Location of Point of Ignition, Excavation, Laboratory Examination, Quality Management	10
7	<b>Explosions:</b> Introduction, Explosives Technology, Facilities Required for Forensic Explosives Examinations, Forensic Questions, Photography, Links with other Forensic Disciplines	10
		60

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge and Understanding</b>		
1.1	Recall Forensic Chemistry and relevant Topics.	<ul style="list-style-type: none"> <li>▪ Lectures.</li> <li>▪ Self-study</li> <li>▪ Home-exam.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Regular Exams</li> <li>▪ Assignments</li> <li>▪ Short Quizzes</li> <li>▪ Oral Discussion</li> <li>▪ Participation.</li> </ul>
1.2	Recognize the Chemistry of Textiles, Paint and coatings relevant to Forensic Chemistry.	<ul style="list-style-type: none"> <li>▪ Lectures.</li> <li>▪ Think, and justify Textiles, Paint and coatings relevant to Forensic Chemistry relation, using available references (SDL) online.</li> <li>▪ Open discussion.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Oral Discussion marks</li> <li>▪ Literatures Survey</li> <li>▪ Mini-seminar.</li> <li>▪ Participation.</li> </ul>
1.3	Outline reasonable appropriate arguments and interpretations for Chemical analysis for the scientific examination of questioned documents.	<ul style="list-style-type: none"> <li>▪ Lectures.</li> <li>▪ Group Discussion using available references (SDL)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Midterm.</li> <li>▪ Assignments.</li> <li>▪ Group Discussions.</li> <li>▪ Literatures Survey</li> <li>▪ Mini-seminar.</li> <li>▪ Participation.</li> </ul>
1.4	List the Glass analysis, Fiber Investigation and Explosions Examinations answering Forensic Chemistry questions.	<ul style="list-style-type: none"> <li>▪ Lectures.</li> <li>▪ Group Discussion using available references (SDL)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Assignments</li> <li>▪ Open Discussions.</li> <li>▪ Literatures Survey</li> <li>▪ Mini-seminar.</li> <li>▪ Participation.</li> </ul>
2.0	<b>Skills</b>		
2.1	Compare different Analytical Methods for the scientific examination of questioned documents.	<ul style="list-style-type: none"> <li>▪ Lectures activity.</li> <li>▪ Practice some examples of Analytical Methods.</li> <li>▪ Self-study.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Questions in Lectures.</li> <li>▪ Short Quizzes and Exams.</li> <li>▪ Open Discussions.</li> <li>▪ Participation</li> <li>▪ Mini -seminar.</li> </ul>
2.2	Justify the appropriate Forensic examination techniques for Textiles, Paint and Coatings.	<ul style="list-style-type: none"> <li>▪ Lectures and Oral Discussions.</li> <li>▪ Brainstorming.</li> <li>▪ Self-study</li> </ul>	<ul style="list-style-type: none"> <li>▪ Questions in Lectures.</li> <li>▪ Participation</li> <li>▪ Oral Discussion</li> <li>▪ Short Quizzes and Exams.</li> </ul>
2.3	Summarize the analysis and interpretation results in Forensic Chemistry questions.	<ul style="list-style-type: none"> <li>▪ Lectures</li> <li>▪ Group Discussions.</li> <li>▪ Brainstorming.</li> <li>▪ Self-study</li> </ul>	<ul style="list-style-type: none"> <li>▪ Questions in Lectures.</li> <li>▪ Short Quizzes and Exams.</li> <li>▪ Participation</li> </ul>

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.4	Develop oral communication for Chemical Analytical procedures and answering Forensic Chemistry question, applied techniques and Instruments, accompanying writing of mini- Reports, operating electronic mail, and Network in communicating with others.	<ul style="list-style-type: none"> <li>▪ Group Discussion and Assignments</li> <li>▪ Introduce several examples of Forensic Chemistry question asking to analyze, which will require reading, writing, and oral presentation.</li> <li>▪ Encourage students to use electronic mail to submit Home Exams and Assignments.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Oral Discussion, Quizzes, and Exams.</li> <li>▪ Giving marks for Oral Discussion in Lectures.</li> <li>▪ Marks given for Assignments</li> </ul>
3.0	<b>Values</b>		
3.1	Demonstrate capacity to communicate with others	<ul style="list-style-type: none"> <li>▪ Brainstorming.</li> <li>▪ Exercises</li> <li>▪ Group Discussion.</li> <li>▪ Team work.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Oral Discussion.</li> <li>▪ Group Discussion</li> <li>▪ Assignments</li> </ul>
3.2	Appraise effectively the collaboration and inter-professionalism in class discussions or team works, as well as independently.	<ul style="list-style-type: none"> <li>▪ Small Group tasks</li> <li>▪ Open discussion at classroom.</li> <li>▪ Office hour guiding.</li> <li>▪ Group Presentation of mini-projects</li> </ul>	<ul style="list-style-type: none"> <li>▪ Participation</li> <li>▪ Homework's</li> <li>▪ Mini-project(s).</li> </ul>

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Class Activities ( Oral Discussion, Mini-projects, Mini-seminar, Quizzes, Mid-term, Oral Presentation, Participation, Assignments)	weekly	30 %
2	Midterm Exam	4 <sup>th</sup> week	30 %
3	Final Exam	Around 13 <sup>th</sup> week	40 %
4	Total		100%

\*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

## E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

- Students will be assigned an academic advisor by the Joint Commission of the Executive Master's Program in Forensic Evidence Council (FEGC) to give them the appropriate academic counselling and support;
- The lecturer for each course allocates 6 office hours per week advertised on his /her own timetable, and reserved as part of his/her teaching schedule to help the students on any academic problems/difficulties.
- Student is able to get individual consultation and academic advice appointment with teaching staff via e-mail or phone calls and department website.
- A list of teaching staff members with their room numbers, their phone numbers and their e-mail addresses is given in the MSc Handbook and Department website.

## F. Learning Resources and Facilities

### 1. Learning Resources

<b>Required Textbooks</b>	<i>Quantitative Chemical Analysis</i> , D. C. Harris, (8th Ed.), W. H. Freeman & Co., New York, 2010, ISBN: 9781429218153.
<b>Essential Reference Materials</b>	<ul style="list-style-type: none"> <li>• <i>Crime Science to Court, the essentials of Forensic Science</i>, Royal Society of Chemistry, 4<sup>th</sup> Ed. 1998, 978-1-78262-446-2</li> <li>• <i>Basic Principles of Forensic Chemistry</i>" JaVed I. Khan, Donnell R. Christian, Thomas J. Kennedy, Springer New York Dordrecht Heidelberg London, ISBN 978-1-934115-06-0, 2012</li> <li>• <i>Forensic chemistry Fundamental and Applications</i>" Jay A. Siegel, John Wiley &amp; Sons, Ltd, The Atrium, Southern Gate, Chichester, West Sussex, PO19 8SQ, UK, 2016, ISBN 978-1-118-89772-0</li> </ul>
<b>Electronic Materials</b>	<b>NONE</b>
<b>Other Learning Materials</b>	<ul style="list-style-type: none"> <li>• Blackboard</li> <li>• Multimedia associated with the text book and the relevant websites.</li> </ul>

### 2. Educational and research Facilities and Equipment Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	Each of the classroom should be equipped with a whiteboard and a projector, with a maximum of 20 students.
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	The rooms are equipped with data show, Smart Board, WI-FI access.
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	None



## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching	Students	<b>Direct:</b> Questionnaire.
	Course Responsible	<b>Direct:</b> Course e-Portfolio. <b>Indirect:</b> Second examiner checklist-Course report.
	Peer Reviewer	<b>Direct:</b> Questionnaire. <b>Indirect:</b> External assessor report.
Effectiveness of assessment	Program Leaders	<b>Direct:</b> Course e-Portfolio. <b>Indirect:</b> Course report.
Extent of achievement of course learning outcomes	Course Responsible	<b>Direct:</b> Exams - Course e-Portfolio. <b>Indirect:</b> Second examiner checklist-Course report.
	Program Leaders	<b>Indirect:</b> Exams.
Quality of learning resources	Students	<b>Indirect:</b> Second examiner checklist-Course report.
	Faculty (Academic Advisory - FEGC)	<b>Direct:</b> course Entrance/Exit. <b>Indirect:</b> Observations - Accreditation review.
	Program Leaders	<b>Direct:</b> Course e-Portfolio. <b>Indirect:</b> Course evaluation survey- Observations- Syllabus review- Accreditation review.
	Course Responsible	

**Evaluation areas** (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

**Evaluators** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

**Assessment Methods** (Direct, Indirect)

## H. Specification Approval Data

Council / Committee	Chemistry Department Council
Reference No.	1/13
Date	10/05/1443



## Course Specifications (Postgraduate Degree)

<b>Course Title:</b>	<b>Instrumental Analysis &amp; Toxicology</b>
<b>Course Code:</b>	<b>CHM 6138</b>
<b>Program:</b>	<b>Executive Master of Forensic Science</b>
<b>Department:</b>	<b>Chemistry</b>
<b>College:</b>	<b>Science</b>
<b>Institution:</b>	<b>Imam Mohammad Ibn Saud Islamic University</b>

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## A. Course Identification

<b>1. Credit hours:</b> 5 (3 Lectures, 2 Lab, 2 Tutorials)
<b>2. Course type</b> <input checked="" type="checkbox"/> Required <input type="checkbox"/> Elective
<b>3. Level/year at which this course is offered:</b> Level 2/Year 1
<b>4. Pre-requisites for this course (if any):</b> None
<b>5. Co-requisites for this course (if any):</b> None

### 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	84	100 %
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

### 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
1	Lecture	36
2	Laboratory/Studio	24
3	Tutorials	24
4	Others (specify)	0
<b>Total</b>		<b>84</b>

## B. Course Objectives and Learning Outcomes

### 1. Course Description

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

### 2. Course Main Objective

*At the end of the course, the students will be able to:*

1. 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.
2. Develop teaching students about sampling, sample preparation, detection, and data analysis, as well as other areas of instrumental chemical analysis.
3. Students will develop an understanding of the function of basic components of chemical instrumentation.
4. Interpret recorded data with standard statistical methods including noise analysis.
5. Learn how optical spectroscopy is used to identify specific structural features of molecules.
6. Learn fundamental aspects of electrochemical analysis involving voltammetry, amperometry, and polarography.

7. Familiarize with how mass spectrometry is used to determine molecular weights, empirical formulas, and primary structural features of different molecules.

### 3. Course Learning Outcomes

CLOs <i>After completion of the course, The Graduate is able</i>		Aligned PLOs
1	<b>Knowledge and Understanding</b>	
1.1	Recall Analytical Methods and relevant Instrumental methods.	K1
1.2	Recognize the full Atomic Spectroscopy & Molecular Spectroscopy Methods and Techniques.	K1; K2
1.3	Outline reasonable appropriate arguments and interpretations for identifying chemical species in complex biological and environmental materials.	K2; K4
1.4	State the Classification of Analytical Methods and appropriate Analytical aspects of various toxic and drug compounds.	K1; K2; K3
2	<b>Skills:</b>	
2.1	Compare different Analytical Methods, vs Types of Instrumental Methods.	S1; S4
2.2	Justify the appropriate analytical techniques for chemical species in complex biological and environmental materials.	S1; S2; S4
2.3	Summarize the analysis and interpretation results in several areas of Toxicology accurately, clearly and concisely.	S2; S3
2.4	Compose oral communication for Instrumental Analytical procedures, applied techniques and Instruments, accompanying writing of mini- Reports, operating electronic mail, and Network in communicating with others.	S4; V1
3	<b>Values:</b>	
3.1	Illustrate chemical calculations orally and in writing.	V1
3.2	Use safety measures and operate laboratory instruments during laboratory sessions.	V1; V2

## C. Course Content

No	List of Topics	Contact Hours
1	<b>Introduction:</b> Classification of Analytical Methods, Types of Instrumental Methods, Instruments for Analysis, Calibration of Instrumental Methods, Selecting of Analytical Method.	8
2	<b>Atomic Spectroscopy &amp; Molecular Spectroscopy:</b> 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.	8
3	<b>Electroanalytical Chemistry:</b> An Introduction to Electroanalytical Chemistry, Potentiometry, Coulometry, Voltammetry.	8
4	<b>Separation Methods:</b> An Introduction to Chromatographic Separations, Gas Chromatography, High-Performance Liquid Chromatography, Supercritical Fluid Chromatography and Extraction, Capillary Electrophoresis, Electrochromatography, and Field-Flow Fractionation.	12
<b>Total</b>		<b>36</b>
<b>Topics to be covered (Laboratories and Tutorials)</b>		
01	LABORATORY RULES AND SAFETY PRECAUTIONS	4
02	Identification of Fibers using FTIR	4
03	Forensic Analysis by Infrared Spectrophotometry for Identification of unknown Drugs	4
04	A quantitative analysis of Salicylates in forensic samples by UV-Visible Spectrometry	4
05	Thin Layer Chromatography (TLC) of Analgesic Drugs (Acetaminophen, Aspirin, Caffeine, and Ibuprofen)	4
06	Analysis of Ink by Thin Layer Chromatography Experimental	4
07, 08	Chromatography of Magic Markers	4
09	Procedure for HPLC Analysis of Analgesic Drugs (Acetaminophen, Aspirin, Caffeine, and Ibuprofen)	4
10, 11	Determination of some drugs in forensic Samples using HPLC Analysis	4
12, 13	Identification of Compounds in Forensics using Gas Chromatography	4
14	Identification of Compounds in forensic Samples using C/MS.	4
15	Review	4
<b>Total</b>		<b>48</b>

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge and Understanding</b>		
1.1	Recall Analytical Methods and relevant Instrumental methods.	<ul style="list-style-type: none"> <li>▪ Three hours/week lectures.</li> <li>▪ Three hours/week laboratory activity</li> <li>▪ Self-study</li> <li>▪ Home-exam.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Regular Exams</li> <li>▪ Assignments</li> <li>▪ Lab. reports</li> <li>▪ Short Quizzes</li> <li>▪ Oral Discussion</li> <li>▪ Participation.</li> </ul>
1.2	Recognize the full Atomic Spectroscopy & Molecular Spectroscopy Methods and Techniques.	<ul style="list-style-type: none"> <li>▪ Three hours/week lectures.</li> <li>▪ Three hours/week laboratory activity</li> <li>▪ Self-study</li> <li>▪ Home-exam.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Regular Exams</li> <li>▪ Assignments</li> <li>▪ Lab. reports</li> <li>▪ Short Quizzes</li> <li>▪ Oral Discussion</li> <li>▪ Participation.</li> </ul>
1.3	Outline reasonable appropriate arguments and interpretations for identifying chemical species in complex biological and environmental materials.	<ul style="list-style-type: none"> <li>▪ Three hours/week lectures.</li> <li>▪ Group Discussion using available references (SDL)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Midterm.</li> <li>▪ Assignments.</li> <li>▪ Group Discussions.</li> <li>▪ Literatures Survey</li> <li>▪ Mini-seminar.</li> <li>▪ Participation.</li> </ul>
1.4	State the Classification of Analytical Methods and appropriate Analytical aspects of various toxic and drug compounds.	<ul style="list-style-type: none"> <li>▪ Three hours/week lectures.</li> <li>▪ Group Discussion using available references (SDL)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Assignments</li> <li>▪ Open Discussions.</li> <li>▪ Literatures Survey</li> <li>▪ Mini-seminar.</li> <li>▪ Participation.</li> </ul>
2.0	<b>Skills</b>		
2.1	Compare different Analytical Methods, vs Types of Instrumental Methods.	<ul style="list-style-type: none"> <li>▪ Lectures activity</li> <li>▪ Lab. activity</li> <li>▪ Self-study.</li> <li>▪ Deep discussions</li> </ul>	<ul style="list-style-type: none"> <li>▪ Oral discussion</li> <li>▪ Short Quizzes and Exams.</li> <li>▪ Lab. reports</li> <li>▪ Participation</li> <li>▪ Mini -seminar.</li> </ul>
2.2	Justify the appropriate analytical techniques for chemical species in complex biological and environmental materials.	<ul style="list-style-type: none"> <li>▪ Lectures activity</li> <li>▪ Lab. activity</li> <li>▪ Self-study.</li> <li>▪ Deep discussions</li> </ul>	<ul style="list-style-type: none"> <li>▪ Oral discussion</li> <li>▪ Short Quizzes and Exams.</li> <li>▪ Lab. reports</li> <li>▪ Participation</li> <li>▪ Mini -seminar.</li> </ul>
2.3	Summarize the analysis and interpretation results in several areas of Toxicology accurately, clearly and concisely.	<ul style="list-style-type: none"> <li>▪ Lectures</li> <li>▪ Group Discussions.</li> <li>▪ Brainstorming.</li> <li>▪ Self-study</li> </ul>	<ul style="list-style-type: none"> <li>▪ Questions in Lectures.</li> <li>▪ Short Quizzes and Exams.</li> <li>▪ Participation</li> </ul>
2.4	Compose oral communication for Instrumental Analytical procedures, applied techniques and Instruments,	<ul style="list-style-type: none"> <li>▪ Group Discussion and Assignments</li> </ul>	<ul style="list-style-type: none"> <li>▪ Oral Discussion, Quizzes, and Exams.</li> </ul>

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	accompanying writing of mini- Reports, operating electronic mail, and Network in communicating with others.	<ul style="list-style-type: none"> <li>▪ Introduce several examples of Instrumental Analytical procedures, applied techniques and Instruments, which will require reading, writing, and oral presentation.</li> <li>▪ Encourage students to use electronic mail to submit Home Exams and Assignments.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Giving marks for Oral Discussion in Lectures.</li> <li>▪ Marks given for Assignments</li> </ul>
3.0	<b>Values</b>		
3.1	Illustrate chemical calculations orally and in writing.	<ul style="list-style-type: none"> <li>▪ Brainstorming.</li> <li>▪ Exercises</li> <li>▪ Group Discussion.</li> <li>▪ Team work.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Oral Discussion.</li> <li>▪ Group Discussion</li> <li>▪ Assignments</li> </ul>
3.2	Use safety measures and operate laboratory instruments during laboratory sessions.	<ul style="list-style-type: none"> <li>▪ Small Group tasks</li> <li>▪ Open discussion at classroom.</li> <li>▪ Office hour guiding.</li> <li>▪ Group Presentation of mini-projects</li> </ul>	<ul style="list-style-type: none"> <li>▪ Participation</li> <li>▪ Homework's</li> <li>▪ Mini-project(s).</li> </ul>

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Class Activities ( Oral Discussion, Mini-projects, Mini-seminar, Quizzes, Mid-term, Oral Presentation, Participation, Assignments, Lab. reports)	During the semester	30%
2	Midterm Exam	4 <sup>th</sup> week	30 %
3	Final Exam	Around 13 <sup>th</sup> week	40 %
4	Total		100%

\*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)



## E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

- Students will be assigned an academic advisor by the Joint Commission of the Executive Master's Program in Forensic Evidence Council (FEGC) to give them the appropriate academic counselling and support;
- The lecturer for each course allocates 6 office hours per week advertised on his /her own timetable, and reserved as part of his/her teaching schedule to help the students on any academic problems/difficulties.
- Student is able to get individual consultation and academic advice appointment with teaching staff via e-mail or phone calls and department website.
- A list of teaching staff members with their room numbers, their phone numbers and their e-mail addresses is given in the MSc in Forensic Science Handbook and Department website.

## F. Learning Resources and Facilities

### 1. Learning Resources

<b>Required Textbooks</b>	<b>Principles of Instrumental Analysis</b> , 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.
<b>Essential Reference Materials</b>	<b>NONE</b>
<b>Electronic Materials</b>	<b>NONE</b>
<b>Other Learning Materials</b>	<ul style="list-style-type: none"> <li>• Blackboard</li> <li>• Multimedia associated with the text book and the relevant websites.</li> </ul>

### 2. Educational and research Facilities and Equipment Required

<b>Item</b>	<b>Resources</b>
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	Each of the classroom should be equipped with a whiteboard and a projector, with a maximum of 20 students. Laboratories should be equipped with computers and an internet connection.
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	The rooms are equipped with data show, Smart Board, WI-FI access.
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	None

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching	Students	<b>Direct:</b> Questionnaire.
	Course Responsible	<b>Direct:</b> Course e-Portfolio. <b>Indirect:</b> Second examiner checklist-Course report.
	Peer Reviewer	<b>Direct:</b> Questionnaire. <b>Indirect:</b> External assessor report.
Effectiveness of assessment	Program Leaders	<b>Direct:</b> Course e-Portfolio. <b>Indirect:</b> Course report.
Extent of achievement of course learning outcomes	Course Responsible	<b>Direct:</b> Exams - Course e-Portfolio. <b>Indirect:</b> Second examiner checklist-Course report.
	Program Leaders	<b>Indirect:</b> Exams.
Quality of learning resources	Students	<b>Indirect:</b> Second examiner checklist-Course report.
	Faculty (Academic Advisory - FEGC)	<b>Direct:</b> course Entrance/Exit. <b>Indirect:</b> Observations - Accreditation review.
	Program Leaders	<b>Direct:</b> Course e-Portfolio. <b>Indirect:</b> Course evaluation survey- Observations- Syllabus review- Accreditation review.
	Course Responsible	

**Evaluation areas** (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

**Evaluators** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

**Assessment Methods** (Direct, Indirect)

## H. Specification Approval Data

<b>Council / Committee</b>	<b>Chemistry Department Council</b>
<b>Reference No.</b>	<b>1/13</b>
<b>Date</b>	<b>10/05/1443</b>



## Course Specifications (Postgraduate Degree)

<b>Course Title:</b>	<b>Statistics for Forensic Scientists</b>
<b>Course Code:</b>	<b>STA 6117</b>
<b>Program:</b>	<b>Executive Master of Forensic Science</b>
<b>Department:</b>	<b>Mathematics and Statistics</b>
<b>College:</b>	<b>Science</b>
<b>Institution:</b>	<b>Imam Mohammad Ibn Saud Islamic University</b>

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## A. Course Identification

<b>1. Credit hours – 5 (3 Lectures, 0 Lab, 4 Tutorials)</b>			
<b>2. Course type</b>			
a.	University <input type="checkbox"/>	College <input type="checkbox"/>	Department <input checked="" type="checkbox"/>
			Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/>	Elective <input type="checkbox"/>	
<b>3. Level/year at which this course is offered: Level 2 / Year 1</b>			
<b>4. Pre-requisites for this course:</b> None			
<b>5. Co-requisites for this course (if any):</b> None			

### 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	84	100%
2	Blended	0	
3	E-learning	0	
4	Distance learning	0	
5	Other	0	

### 7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	36
2	Laboratory/Studio	0
3	Tutorial	48
4	Others (specify)	0
	<b>Total</b>	<b>84</b>

## B. Course Objectives and Learning Outcomes

### 1. Course Description

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

### 2. Course Main Objectives

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. Appraise the value of traces in a wide range of scenarios encountered in forensic 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.

### 3. Course Learning Outcomes

CLOs		Aligned-PLOs
1	<b>Knowledge and Understanding</b>	
1.1	Outline a relevant statistical analysis in problems of Kinship, relatedness in pedigrees, DVI, and Familial searching.	K2
1.2	Describe forensic automatic likelihood ratio methods.	K3
1.3	State the differences between populations and samples and methods to make inferences from the sample to the population and the consequent need for well-designed experiments and surveys.	K2
1.4	Describe some relevant basic statistical procedures to test the validity of DNA-matching procedures and models.	K4
2	<b>Skills:</b>	
2.1	Evaluate the collection of traces and interpret the results of analyses through propositions, hypotheses, and statistical methods.	S1
2.2	Compose investigative and problem-solving skills to evaluate forensic science problems.	S3
2.3	Compare various methods to record and communicate observations and evaluation of traces throughout all stages of an investigation.	S2-S4
3	<b>Values:</b>	
3.1	Demonstrate working individually	V2
3.2	Appraise working in groups.	V2

### C. Course Content

No	List of Topics (Each topic has lab sessions by using Excel)	Contact Hours
1	Chapter 1-The history of forensic inference and statistics: Introduction. What is the scientific method? What is statistics?	4

No	List of Topics (Each topic has lab sessions by using Excel)	Contact Hours
	Statistics, forensic practice, and the criminal justice system. Populations and samples, deduction and induction, examples in practice.	
2	<b>Chapter 2-Probability models and uncertainty:</b> 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.	4
3	<b>Chapter 3-Statistical Inference:</b> Definitions. Goals of inference. Point estimation, properties of estimators, standard errors, sampling distributions. Interval estimation, Hypothesis testing, types of errors, <i>p</i> -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.	5
4	<b>Chapter 4-Collecting data:</b> 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.	5
5	<b>Chapter 5-Diagnostic Tests:</b> Sensitivity and Specificity. Positive and Negative Predictive Values. Likelihood Ratio and Post-test Probability. Comparing Sensitivities and Specificities of Two Diagnostic Procedures.	6
6	<b>Chapter 6-Odds Ratio:</b> 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.	6
7	<b>Chapter 7-Applications of Statistics to Particular Fields in Forensic Science:</b> 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	6
<b>Total</b>		36

No	Tutorial Topics	Contact Hours
1	<b>Excel initiation.</b>	6
2	<b>Descriptive statistics using Excel</b>	6
3	<b>Inferential statistics using Excel.</b>	6
4	<b>Gather Data with Excel</b>	6
5	<b>Sensitivity and specificity in Excel</b>	8

No	Lab Topics	Contact Hours
6	Odds ratio in Excel.	8
7	Some Applications using Excel.	8
<b>Total</b>		48

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge and understanding</b>		
1.1	Outline a relevant statistical analysis in problems of Kinship, relatedness in pedigrees, DVI and Familial searching.	<ul style="list-style-type: none"> <li>• 3 lecture hours weekly</li> <li>• 3 labs hour weekly</li> <li>• Self-study</li> </ul>	<ul style="list-style-type: none"> <li>• Exams</li> <li>• Lab exam</li> <li>• Mini-project</li> </ul>
1.2	Describe of forensic automatic likelihood ratio methods.		
1.3	State the differences between populations and samples and methods to make inferences from the sample to the population, and the consequent need for well-designed experiments and surveys.		
1.4	Describe some relevant basic statistical procedures to test the validity of DNA-matching procedures and models.		
2.0	<b>Skills</b>		
2.1	Evaluate the collection of traces and interpret the results of analyses through the use of propositions, hypotheses, and statistical methods.	<ul style="list-style-type: none"> <li>• Self-study</li> <li>• Deep problems</li> </ul>	<ul style="list-style-type: none"> <li>• Lab exam</li> <li>• Quiz</li> <li>• Mini-project</li> </ul>
2.2	Compose investigative and problem-solving skills to evaluate forensic science problems.		
2.3	Compare various methods to record and communicate observations and evaluation of traces throughout all stages of an		
3.0	<b>Values</b>		
3.1	Demonstrate working individually	Personal questions	Lab exam
3.2	Appraise working in groups.	Teamwork	Mini-projects



## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Lab exam, Quizzes, Mini-projects	During the semester	30%
2	Midterm	4th Week	30%
3	Final Exam	Around 13th week	40%

\*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

## E. Student Academic Counseling and Support

**Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:**

- Students admitted to the master program will receive the appropriate academic counseling and support from the **Joint Commission of the Executive Master's Program in Forensic Evidence Committee (FEGC)**.
- The lecturer for each course allocates 4-6 office hours per week advertised on his / her own timetable, and is reserved as part of his / her teaching schedule to help the students on any academic problems/difficulties.
- Student is able to get individual consultation and academic advising appointment with teaching staff via e-mail or phone calls.
- A list of teaching staff members with their room numbers, their phone numbers and their e-mail addresses is given in the Department website.

## F. Learning Resources and Facilities

### 1. Learning Resources

<b>Required Textbooks</b>	<i>Statistics and the Evaluation of Evidence for Forensic Scientists</i> , 3 <sup>rd</sup> Edition, Colin Aitken, Franco Taroni, Silvia Bozza, Wiley, 2020. <b>(Main Reference)</b>
<b>Essential References Materials</b>	<ul style="list-style-type: none"> <li>• <i>Introduction to Statistics for Forensic Scientists</i>, David Lucy, Wiley, 2005.</li> <li>• <i>Bayesian Networks for Probabilistic Inference and Decision Analysis in Forensic Science</i>, 2<sup>nd</sup> Edition, Franco Taroni, Alex Biedermann, Silvia Bozza, Paolo Garbolino, Colin Aitken, Wiley, 2014.</li> </ul>
<b>Electronic Materials</b>	None
<b>Other Learning Materials</b>	Microsoft Excel Software

## 2. Facilities Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> <li>▪ Each classroom should be equipped with a whiteboard and a projector.</li> <li>▪ Laboratories should be equipped with computers and an internet connection.</li> </ul>
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	<b>The rooms are equipped with data show and Smart Board.</b>
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	<b>None.</b>

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
<b>Effectiveness of teaching and assessment, Quality of learning resources</b>	<b>Students</b>	<b>During the semester and at the end of the course each student will complete two evaluation forms.</b>
<b>Extent of achievement of course learning outcomes, Quality of learning resources</b>	<b>Instructor</b>	<b>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.</b>

**Evaluation areas** (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

**Evaluators** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

**Assessment Methods** (Direct, Indirect)

## H. Specification Approval Data

Council / Committee	Mathematics and Statistics Department Council
Reference No.	15
Date	14/12/2021 -- 10/05/1443
Decision number	49/15



## Course Specifications (Postgraduate Degree)

<b>Course Title:</b>	<b>Forensics Biological Instruments Analysis</b>
<b>Course Code:</b>	<b>BIO 6105</b>
<b>Program:</b>	<b>Executive Master of Forensic Science</b>
<b>Department:</b>	<b>Biology</b>
<b>College:</b>	<b>Science</b>
<b>Institution:</b>	<b>Imam Mohammad Ibn Saud Islamic University (IMSIU)</b>

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## A. Course Identification

<b>1. Credit hours: 3 (2 Lecture, 2 Lab, 0 Tutorial)</b>			
<b>2. Course type</b>			
a.	University <input type="checkbox"/>	College <input type="checkbox"/>	Department <input checked="" type="checkbox"/>
			Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/>	Elective <input type="checkbox"/>	
<b>3. Level/year at which this course is offered: Level 3 / Year 1</b>			
<b>4. Pre-requisites for this course:</b> None			
<b>5. Co-requisites for this course (if any):</b> None			

### 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	48	100%
2	Blended	0	
3	E-learning	0	
4	Distance learning	0	
5	Other	0	

### 4. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	24
2	Laboratory/Studio	24
3	Tutorial	0
4	Others (specify)	0
	<b>Total</b>	<b>48</b>

## B. Course Objectives and Learning Outcomes

### 1. Course Description

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

### 2. Course Main Objectives

*At the end of the course, the students will be able to*

1. Understanding 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.

### 3. Course Learning Outcomes

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

## C. Course Content

No	List of Topics	Contact Hours
1	Introduction	2
2	Toxicological Applications	
3	Spectrophotometric principles	1
4	Sample preparation in toxicology	1
5	Principles of substance separation, TLC, HPLC, GC	2
6	Capillary electrophoresis CE, Atomic Absorption spectroscopy	2
7	Forensic applications and interpretations	1
8	Molecular and DNA applications	2
9	DNA Extraction samples and product	1
10	Principle of PCR, Applications of PCR	2
11	Gel electrophoresis	1
12	Mutation detection	1
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
<b>Total</b>		<b>24</b>
No	Laboratories	Contact Hours
1	Electrophoresis for DNA, RNA and Proteins	2
2	Electrophoresis techniques (PCR, RFLP, Capillary Electrophoresis)	2
3	Using and programing of Thermal Cyclers	2
4	Introduction to 3500 Genetic Analyzer and data collection software	2
5	Using and programing of Next generation Sequencer (Ion- Torrent)	2
6	Using and programing of Next generation Sequencer (Illumina)	2

7	Practical aspects of UV, Perform UV analysis.	2
8	Practical aspects of HPLC	2
9	Practical aspects of HPLC Perform HPLC-DAD analysis	2
10	Practical aspects of HS-GC. Perform HS-GC analyses	2
11	Practical aspects of GC-MS Perform GC-MS analysis.	2
12	Practical aspects of LC-MS/MS and LC-TOF/MS Perform LC-MS/MS analysis.	2
<b>Total</b>		<b>24</b>

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge and understanding</b>		
1.1	Outline the basic principles of different molecular and toxicological techniques.	<ul style="list-style-type: none"> <li>▪ Two hour/week lectures.</li> <li>▪ Three hours/week laboratory activity</li> <li>▪ Self-study.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Regular Exams</li> <li>▪ Assignments</li> <li>▪ Lab. reports</li> <li>▪ Short Quizzes</li> <li>▪ Oral Discussion</li> <li>• Participation</li> </ul>
1.2	List substantial and up to date core knowledge of broad areas in basic biology, chemistry, DNA analysis, instrumentation theory, analysis and use.	<ul style="list-style-type: none"> <li>▪ Two hours/week lectures.</li> <li>▪ Open discussion.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Midterm.</li> <li>▪ Assignments.</li> <li>▪ Group Discussions.</li> <li>▪ Mini-seminar.</li> <li>▪ Participation.</li> </ul>
2.0	<b>Skills</b>		
2.1	Explain advanced understanding of a range of technical and conceptual approaches used in forensic laboratories	<ul style="list-style-type: none"> <li>▪ Lectures activity</li> <li>▪ Lab. activity</li> <li>▪ Self-study.</li> <li>▪ Deep discussions</li> </ul>	<ul style="list-style-type: none"> <li>▪ Oral discussion</li> <li>▪ Short Quizzes and Exams.</li> <li>▪ Lab. reports</li> <li>▪ Participation</li> <li>▪ Mini -seminar.</li> </ul>
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.	<ul style="list-style-type: none"> <li>▪ Brainstorming.</li> <li>▪ Self-study</li> </ul>	<ul style="list-style-type: none"> <li>▪ Participation</li> <li>▪ Oral Discussion</li> <li>▪ Short Quizzes.</li> </ul>
2.3	Develop skills in the systematic evaluation of scientific data.	<ul style="list-style-type: none"> <li>▪ Lectures Discussions.</li> <li>▪ Lab. Discussions.</li> <li>▪ Brainstorming.</li> <li>▪ Self-study.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Mini-projects.</li> <li>▪ Oral Discussion.</li> <li>▪ Participation.</li> </ul>



Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
3.0	<b>Values</b>		
3.1	<b>Appraise working within the group to reach the desired result.</b>	<ul style="list-style-type: none"> <li>▪ Brain Storms Exercises</li> <li>▪ Group Discussion</li> </ul>	<ul style="list-style-type: none"> <li>▪ Group Discussion</li> <li>▪ Assignments.</li> </ul>
3.2	<b>Use computer programs for analyzing and processing the experimental data.</b>	<ul style="list-style-type: none"> <li>▪ Small Group tasks</li> <li>▪ Open discussion at classroom.</li> <li>▪ Office hour guiding.</li> <li>▪ Group Presentation of mini-projects</li> </ul>	<ul style="list-style-type: none"> <li>▪ Participation</li> <li>▪ Assignments.</li> <li>▪ Mini-project(s).</li> </ul>

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	<b>Class Activities ( Oral Discussion, Mini-projects, Mini-seminar, Quizzes, Mid-term, Oral Presentation, Participation, Assignments, Lab. reports)</b>	<b>During the semester</b>	<b>30%</b>
2	<b>Midterm</b>	<b>4<sup>th</sup> week</b>	<b>30%</b>
3	<b>Final Exam</b>	<b>Around 13<sup>th</sup> week</b>	<b>40%</b>

\*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

## E. Student Academic Counseling and Support

**Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:**

- **Students admitted to the master program will receive the appropriate academic counseling and support from the Joint Commission of the Executive Master's Program in Forensic Evidence Council (FEGC).**
- **The lecturer for each course allocates 4-6 office hours per week advertised on his / her own timetable, and reserved as part of his / her teaching schedule to help the students on any academic problems/difficulties.**
- **Student is able to get individual consultation and academic advice appointment with teaching staff via e-mail or phone calls.**
- **A list of teaching staff members with their room numbers, their phone numbers and their e-mail addresses is given in the Department website.**

## F. Learning Resources and Facilities

### 1. Learning Resources

<b>Required Textbooks</b>	<b>Principles of Instrumental Analysis</b> , Douglas A. Skoog, F. James Holler, Stanley R. Crouch, 7 <sup>th</sup> Ed., 2018. , ISBN-13: 978-1305577213 <b>Quantitative Chemical Analysis</b> Daniel C. Harris; Charles A. Luc, 10 <sup>th</sup> Ed ISBN-13: 978-1319164300.
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<b>Essential References Materials</b>	None
<b>Electronic Materials</b>	None
<b>Other Learning Materials</b>	None

## 2. Educational and research Facilities and Equipment Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> <li>▪ Each classroom should be equipped with a whiteboard and a projector.</li> <li>▪ Laboratories should be equipped with computers and an internet connection.</li> </ul>
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	The rooms are equipped with data show, Smart Board, WI-FI access.
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	None.

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching	Students	<b>Direct:</b> Questionnaire.
	Course Responsible	<b>Direct:</b> Course e-Portfolio. <b>Indirect:</b> Second examiner checklist-Course report.
	Peer Reviewer	<b>Direct:</b> Questionnaire. <b>Indirect:</b> External assessor report.
Effectiveness of assessment	Program Leaders	<b>Direct:</b> Course e-Portfolio. <b>Indirect:</b> Course report.
Extent of achievement of course learning outcomes	Course Responsible	<b>Direct:</b> Exams - Course e-Portfolio. <b>Indirect:</b> Second examiner checklist-Course report.
	Program Leaders	<b>Indirect:</b> Exams.
Quality of learning resources	Students	<b>Indirect:</b> Second examiner checklist-Course report.
	Faculty ( Academic Advisory-GCC)	<b>Direct:</b> course Entrance/Exit. <b>Indirect:</b> Observations - Accreditation review.
	Program Leaders Course Responsible	<b>Direct:</b> Course e-Portfolio.

Evaluation Areas/Issues	Evaluators	Evaluation Methods
		<b>Indirect:</b> Course evaluation survey- Observations- Syllabus review- Accreditation review.

**Evaluation areas** (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

**Evaluators** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

**Assessment Methods** (Direct, Indirect)

## H. Specification Approval Data

<b>Council / Committee</b>	<b>Biology Department Council</b>
<b>Reference No.</b>	<b>16/1441/1442</b>
<b>Date</b>	<b>5/5/1442</b>



## Course Specifications (Postgraduate Degree)

<b>Course Title:</b>	<b>Molecular Biology of Forensic DNA Analysis</b>
<b>Course Code:</b>	<b>BIO 6107</b>
<b>Program:</b>	<b>Executive Master of Forensic Science</b>
<b>Department:</b>	<b>Biology</b>
<b>College:</b>	<b>Science</b>
<b>Institution:</b>	<b>Imam Mohammad Ibn Saud Islamic University (IMSIU)</b>

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2. Facilities Required.....	7
<b>G. Course Quality Evaluation .....</b>	<b>8</b>
<b>H. Specification Approval Data .....</b>	<b>8</b>

## A. Course Identification

<b>1. Credit hours: 3 (2 Lecture, 2 Lab, 0 Tutorials)</b>			
<b>2. Course type</b>			
a.	University <input type="checkbox"/>	College <input type="checkbox"/>	Department <input checked="" type="checkbox"/>
			Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/>	Elective <input type="checkbox"/>	
<b>3. Level/year at which this course is offered: Level 3 / Year 1</b>			
<b>4. Pre-requisites for this course:</b> None			
<b>5. Co-requisites for this course (if any):</b> None			

### 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	48	100%
2	Blended	0	
3	E-learning	0	
4	Distance learning	0	
5	Other	0	

### 4. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	24
2	Laboratory/Studio	24
3	Tutorial	0
4	Others (specify)	0
	<b>Total</b>	<b>48</b>

## B. Course Objectives and Learning Outcomes

### 1. Course Description

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

### 2. Course Main Objectives

*At the end of the course, the students will be able to*

1. The student will 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. The student will develop competency in the use of equipment and techniques typically employed in a forensic biology laboratory
3. The student will know the different types of biological evidence encountered in a forensic investigation and the analyses of each
4. The student will learn the proper methods for the handling of biological evidence
5. The student will become familiar with the various peer-reviewed journals in forensic science and various important journal articles dealing with forensic biological testing

### 3. Course Learning Outcomes

CLOs		Aligned-PLOs
1	<b>Knowledge and Understanding</b>	
1.1	Outline the basic principles of forensic and the biological molecular methods.	K1
1.2	Describe the underpinning science applicable to forensic science and the role of molecular biology techniques.	K1; K2
1.3	State The methods of forensic investigation and law relevant to forensic science and its relationship of biological sciences.	K3; K4
1.4	List Application of understanding in areas of forensic chemistry and forensic biology.	K1; K4
2	<b>Skills:</b>	
2.1	Explain practical techniques in forensic science.	S1
2.2	Analyze knowledge of forensic practices to investigations and cases.	S1; S2
2.3	Evaluate technical and theoretical information.	S3; S4
3	<b>Values:</b>	
3.1	Appraise appropriate tools and use in a correct manner.	V1
3.2	Show ability to communicate effectively with class mates and teaching staff.	V2

## C. Course Content

No	List of Topics	Contact Hours
1	Nucleic Acid Extraction	4
2	DNA Quantitation	
3	Amplification by PCR	2
4	DNA Electrophoresis	4
5	Detection Methods	
6	variable-number tandem repeat (VNTR) Profiling	2
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
<b>Total</b>		<b>24</b>
No	Laboratories	Contact Hours
1	DNA extraction from different biological samples using the Chelex method.	2
2	DNA extraction using the salting-out method.	2
3	DNA extraction from different biological samples using organic methods.	2
4	DNA extraction from different biological samples using a solid-phase.	2
5	Qualitative and quantitative analysis of DNA samples using agarose, UV spectrophotometer, and fluorometer.	2
6	Qualitative and quantitative analysis of DNA samples using Real-time PCR	4
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	2
10	DNA Data analysis and reporting	2
<b>Total</b>		<b>24</b>

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge and understanding</b>		
1.1	Outline the basic principles of forensic and the biological molecular methods.	<ul style="list-style-type: none"> <li>▪ Two hour/week lectures.</li> <li>▪ Three hours/week laboratory activity</li> <li>▪ Self-study.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Regular Exams</li> <li>▪ Assignments</li> <li>▪ Lab. reports</li> <li>▪ Short Quizzes</li> <li>▪ Oral Discussion</li> <li>• Participation</li> </ul>
1.2	Describe the underpinning science applicable to forensic science and the role of molecular biology techniques.	<ul style="list-style-type: none"> <li>▪ Two hour/week lectures.</li> <li>▪ Open discussion.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Midterm.</li> <li>▪ Assignments.</li> <li>▪ Group Discussions.</li> <li>▪ Mini-seminar.</li> <li>▪ Participation.</li> </ul>



Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.3	State The methods of forensic investigation and law relevant to forensic science and its relationship of biological sciences.	<ul style="list-style-type: none"> <li>▪ Two hour/week lectures.</li> <li>▪ Three hours/week laboratory activity</li> <li>▪ Self-study.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Regular Exams</li> <li>▪ Assignments</li> <li>▪ Lab. reports</li> <li>▪ Short Quizzes</li> <li>▪ Oral Discussion</li> <li>• Participation</li> </ul>
1.4	List Application of understanding in areas of forensic chemistry and forensic biology.	<ul style="list-style-type: none"> <li>▪ Two hour/week lectures.</li> <li>▪ Open discussion.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Midterm.</li> <li>▪ Assignments.</li> <li>▪ Group Discussions.</li> <li>▪ Mini-seminar.</li> <li>▪ Participation.</li> </ul>
<b>2.0</b>	<b>Skills</b>		
2.1	Explain practical techniques in forensic science.	<ul style="list-style-type: none"> <li>▪ Lectures activity</li> <li>▪ Lab. activity</li> <li>▪ Self-study.</li> <li>▪ Deep discussions</li> </ul>	<ul style="list-style-type: none"> <li>▪ Oral discussion</li> <li>▪ Short Quizzes and Exams.</li> <li>▪ Lab. reports</li> <li>▪ Participation</li> <li>▪ Mini -seminar.</li> </ul>
2.2	Analyze knowledge of forensic practices to investigations and cases.	<ul style="list-style-type: none"> <li>▪ Lectures activity</li> <li>▪ Lab. activity</li> <li>▪ Self-study.</li> <li>▪ Deep discussions</li> </ul>	<ul style="list-style-type: none"> <li>▪ Oral discussion</li> <li>▪ Short Quizzes and Exams.</li> <li>▪ Lab. reports</li> <li>▪ Participation</li> <li>▪ Mini -seminar.</li> </ul>
2.3	Evaluate technical and theoretical information.	<ul style="list-style-type: none"> <li>▪ Brainstorming.</li> <li>▪ Self-study</li> </ul>	<ul style="list-style-type: none"> <li>▪ Participation</li> <li>▪ Oral Discussion</li> <li>▪ Short Quizzes.</li> </ul>
<b>3.0</b>	<b>Values</b>		
3.1	Appraise appropriate tools and use in a correct manner.	<ul style="list-style-type: none"> <li>▪ Brain Storms Exercises</li> <li>▪ Group Discussion</li> </ul>	<ul style="list-style-type: none"> <li>▪ Group Discussion</li> <li>▪ Assignments.</li> </ul>
3.2	Show ability to communicate effectively with class mates and teaching staff.	<ul style="list-style-type: none"> <li>▪ Small Group tasks</li> <li>▪ Open discussion at classroom.</li> <li>▪ Office hour guiding.</li> <li>▪ Group Presentation of mini-projects</li> </ul>	<ul style="list-style-type: none"> <li>▪ Participation</li> <li>▪ Assignments.</li> <li>▪ Mini-project(s).</li> </ul>

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Class Activities ( Oral Discussion, Mini-projects, Mini-seminar, Quizzes, Mid-term, Oral Presentation, Participation, Assignments, Lab. reports)	During the semester	30%
2	Midterm	4 <sup>th</sup> week	30%

#	Assessment task*	Week Due	Percentage of Total Assessment Score
3	Final Exam	Around 13 <sup>th</sup> week	40%

\*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

## E. Student Academic Counseling and Support

**Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:**

- Students admitted to the master program will receive the appropriate academic counseling and support from the Joint Commission of the Executive Master's Program in Forensic Evidence Council (FEGC).
- The lecturer for each course allocates 4-6 office hours per week advertised on his / her own timetable, and reserved as part of his / her teaching schedule to help the students on any academic problems/difficulties.
- Student is able to get individual consultation and academic advice appointment with teaching staff via e-mail or phone calls.
- A list of teaching staff members with their room numbers, their phone numbers and their e-mail addresses is given in the Department website.

## F. Learning Resources and Facilities

### 1. Learning Resources

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

### 2. Educational and research Facilities and Equipment Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> <li>▪ Each classroom should be equipped with a whiteboard and a projector.</li> <li>▪ Laboratories should be equipped with computers and an internet connection.</li> </ul>
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	The rooms are equipped with data show, Smart Board, WI-FI access.
<b>Other Resources</b>	Reagents, instrument, and consumables for wet lab needed to achieve objectives of this course.

Item	Resources
(Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching	Students	<b>Direct:</b> Questionnaire.
	Course Responsible	<b>Direct:</b> Course e-Portfolio. <b>Indirect:</b> Second examiner checklist-Course report.
	Peer Reviewer	<b>Direct:</b> Questionnaire. <b>Indirect:</b> External assessor report.
Effectiveness of assessment	Program Leaders	<b>Direct:</b> Course e-Portfolio. <b>Indirect:</b> Course report.
Extent of achievement of course learning outcomes	Course Responsible	<b>Direct:</b> Exams - Course e-Portfolio. <b>Indirect:</b> Second examiner checklist-Course report.
	Program Leaders	<b>Indirect:</b> Exams.
Quality of learning resources	Students	<b>Indirect:</b> Second examiner checklist-Course report.
	Faculty ( Academic Advisory-GCC)	<b>Direct:</b> course Entrance/Exit. <b>Indirect:</b> Observations - Accreditation review.
	Program Leaders	<b>Direct:</b> Course e-Portfolio. <b>Indirect:</b> Course evaluation survey- Observations- Syllabus review- Accreditation review.
	Course Responsible	

**Evaluation areas** (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

**Evaluators** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

**Assessment Methods** (Direct, Indirect)

## H. Specification Approval Data

Council / Committee	<b>Biology Department Council</b>
Reference No.	<b>16/1441/1442</b>
Date	<b>5/5/1442 (20/12/2020)</b>



## Course Specifications (Postgraduate Degree)

<b>Course Title:</b>	<b>Forensic Toxicology and Drug Analysis</b>
<b>Course Code:</b>	<b>CHM 6139</b>
<b>Program:</b>	<b>Executive Master of Forensic Science</b>
<b>Department:</b>	<b>Chemistry</b>
<b>College:</b>	<b>Science</b>
<b>Institution:</b>	<b>Imam Mohammad Ibn Saud Islamic University</b>

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## A. Course Identification

<b>1. Credit hours:</b> 3 (2 Lecture, 0 Lab, 2 Tutorials)
<b>2. Course type</b> <input checked="" type="checkbox"/> Required <input type="checkbox"/> Elective
<b>3. Level/year at which this course is offered:</b> Level 3/Year 1
<b>4. Pre-requisites for this course (if any):</b> None
<b>5. Co-requisites for this course (if any):</b> None

### 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	48	100 %
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

### 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
1	Lecture	24
2	Laboratory/Studio	0
3	Tutorials	24
4	Others (specify)	0
<b>Total</b>		<b>48</b>

## B. Course Objectives and Learning Outcomes

### 1. Course Description

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

### 2. Course Main Objective

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 the relative advantages and disadvantages of analytical approaches.

- 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.

### 3. Course Learning Outcomes

CLOs <i>After completion of the course, The Graduate is able</i>		Aligned PLOs
<b>1</b>	<b>Knowledge and Understanding</b>	
1.1	Recall Postmortem Forensic Toxicology and relevant Types.	K1; K2
1.2	Recognize the full Specimen Preparation and applied methods for Full Specimen analysis.	K3; K4
1.3	Outline reasonable appropriate arguments and interpretation for identifying and elucidating of Toxic materials and Drugs.	K1; K2; K3
1.4	State the pharmacological characteristics and analytical aspects of various drugs classes commonly encountered in forensic toxicology.	K1; K2; K4
<b>2</b>	<b>Skills:</b>	
2.1	Compare different drugs and toxic compounds within the same classification in their effects as Crimes sources.	K3; S1, S3
2.2	Justify the appropriate techniques and experiments for Collating, analyzing, interpreting toxic specimens based on toxicological analysis.	S2
2.3	Summarize the Toxic Chemical Structures and Drugs in terms of Structure-Activity Relationships and Mechanisms of Action.	S1; S3
2.4	Compose oral communication for Postmortem Forensic Toxicology and applied techniques and methods, accompanying writing of mini- Reports, operating electronic mail, and Network in communicating with others.	S3; S4; V1
<b>3</b>	<b>Values:</b>	
3.1	Appraise collaborative work skill.	V1
3.2	Use devices efficiently.	V1; V2

## C. Course Content

No	List of Topics	Contact Hours
1	<p><b>Part 1: Introduction:</b> 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</p>	16
2	<p><b>Part 2: Methodologies:</b> 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.</p>	16
3	<p><b>Part 3: Analytes:</b> 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,</p>	16
		48



## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge and Understanding</b>		
1.1	Recall Postmortem Forensic Toxicology and relevant Types.	<ul style="list-style-type: none"> <li>▪ Two hour/week lectures.</li> <li>▪ Three hours/week tutorials.</li> <li>▪ Self-study</li> <li>▪ Home-exam.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Regular Exams</li> <li>▪ Assignments</li> <li>▪ Short Quizzes</li> <li>▪ Oral Discussion</li> <li>▪ Participation.</li> </ul>
1.2	Recognize the full Specimen Preparation and applied methods for Full Specimen analysis.	<ul style="list-style-type: none"> <li>▪ Two hour/week lectures.</li> <li>▪ Three hours/week tutorials.</li> <li>▪ Think, and justify Specimen Preparation methods, using available references (SDL) online.</li> <li>▪ Open discussion.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Oral Discussion marks</li> <li>▪ Literatures Survey</li> <li>▪ Mini-seminar.</li> <li>▪ Participation.</li> </ul>
1.3	Outline reasonable appropriate arguments and interpretation for identifying and elucidating of Toxic materials and Drugs.	<ul style="list-style-type: none"> <li>▪ Two hour/week lectures.</li> <li>▪ Three hours/week tutorials.</li> <li>▪ Group Discussion using available references (SDL)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Midterm.</li> <li>▪ Assignments.</li> <li>▪ Group Discussions.</li> <li>▪ Literatures Survey</li> <li>▪ Mini-seminar.</li> <li>▪ Participation.</li> </ul>
1.4	State the pharmacological characteristics and analytical aspects of various drugs classes commonly encountered in forensic toxicology.	<ul style="list-style-type: none"> <li>▪ Two hour/week lectures.</li> <li>▪ Three hours/week tutorials.</li> <li>▪ Group Discussion using available references (SDL)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Assignments</li> <li>▪ Open Discussions.</li> <li>▪ Literatures Survey</li> <li>▪ Mini-seminar.</li> <li>▪ Participation.</li> </ul>
2.0	<b>Skills</b>		
2.1	Compare different drugs and toxic compounds within the same classification in their effects as Crimes sources.	<ul style="list-style-type: none"> <li>▪ Lectures activity.</li> <li>▪ Practice some examples of drugs and toxic compounds by their effects.</li> <li>▪ Self-study.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Questions in Lectures.</li> <li>▪ Short Quizzes and Exams.</li> <li>▪ Open Discussions.</li> <li>▪ Participation</li> <li>▪ Mini -seminar.</li> </ul>
2.2	Justify the appropriate techniques and experiments for Collating, analyzing, interpreting toxic specimens based on toxicological analysis.	<ul style="list-style-type: none"> <li>▪ Lectures and Oral Discussions.</li> <li>▪ Brainstorming.</li> <li>▪ Self-study</li> </ul>	<ul style="list-style-type: none"> <li>▪ Questions in Lectures.</li> <li>▪ Participation</li> <li>▪ Oral Discussion</li> <li>▪ Short Quizzes and Exams.</li> </ul>

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.3	Summarize the Toxic Chemical Structures and Drugs in terms of Structure-Activity Relationships and Mechanisms of Action.	<ul style="list-style-type: none"> <li>▪ Lectures</li> <li>▪ Group Discussions.</li> <li>▪ Brainstorming.</li> <li>▪ Self-study</li> </ul>	<ul style="list-style-type: none"> <li>▪ Questions in Lectures.</li> <li>▪ Short Quizzes and Exams.</li> <li>▪ Participation</li> </ul>
2.4	Compose oral communication for Postmortem Forensic Toxicology and applied techniques and methods, accompanying writing of mini- Reports, operating electronic mail, and Network in communicating with others.	<ul style="list-style-type: none"> <li>▪ Group Discussion and Assignments</li> <li>▪ Introduce several examples of Postmortem Forensic Toxicology to elucidate and justify used techniques in investigation, which will require reading, writing, and oral presentation.</li> <li>▪ Encourage students to use electronic mail to submit Home Exams and Assignments.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Oral Discussion, Quizzes, and Exams.</li> <li>▪ Giving marks for Oral Discussion in Lectures.</li> <li>▪ Marks given for Assignments</li> </ul>
3.0	<b>Values</b>		
3.1	Appraise collaborative work skill.	<ul style="list-style-type: none"> <li>▪ Brainstorming.</li> <li>▪ Exercises</li> <li>▪ Group Discussion.</li> <li>▪ Team work.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Oral Discussion.</li> <li>▪ Group Discussion</li> <li>▪ Assignments</li> </ul>
3.2	Use devices efficiently.	<ul style="list-style-type: none"> <li>▪ Small Group tasks</li> <li>▪ Open discussion at classroom.</li> <li>▪ Office hour guiding.</li> <li>▪ Group Presentation of mini-projects</li> </ul>	<ul style="list-style-type: none"> <li>▪ Participation</li> <li>▪ Homework's</li> <li>▪ Mini-project(s).</li> </ul>

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Class Activities ( Oral Discussion, Mini-projects, Mini-seminar, Quizzes, Mid-term, Oral Presentation, Participation, Assignments)	weekly	30 %
2	Midterm Exam	4 <sup>th</sup> week	30 %
3	Final Exam	Around 13 <sup>th</sup> week	40 %
4	Total		100%

\*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

## E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

- Students will be assigned an academic advisor by the Joint Commission of the Executive Master's Program in Forensic Evidence Council (FEGC) to give them the appropriate academic counselling and support;
- The lecturer for each course allocates 6 office hours per week advertised on his /her own timetable, and reserved as part of his/her teaching schedule to help the students on any academic problems/difficulties.
- Student is able to get individual consultation and academic advice appointment with teaching staff via e-mail or phone calls and department website.
- A list of teaching staff members with their room numbers, their phone numbers and their e-mail addresses is given in the MSc in Forensic Science Handbook and Department website.

## F. Learning Resources and Facilities

### 1. Learning Resources

<b>Required Textbooks</b>	<i>Principles of Forensic Toxicology</i> , Barry S. Levine, Sarah Kerrigan, Springer Nature, 5 <sup>th</sup> Edition, Gewerbstrasse 11, 6330 Cham, Switzerland, Switzerland AG. 2020. ISBN 978-3-030-42916-4.
<b>Essential Reference Materials</b>	<b>NONE</b>
<b>Electronic Materials</b>	<a href="https://www.sciencedirect.com/topics/pharmacology-toxicology-and-pharmaceutical-science/forensic-toxicology">https://www.sciencedirect.com/topics/pharmacology-toxicology-and-pharmaceutical-science/forensic-toxicology</a> <a href="https://academic.oup.com/jat/issue">https://academic.oup.com/jat/issue</a>
<b>Other Learning Materials</b>	<ul style="list-style-type: none"> <li>• Blackboard</li> <li>• Multimedia associated with the text book and the relevant websites.</li> </ul>

### 2. Educational and research Facilities and Equipment Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	Each of the classroom should be equipped with a whiteboard and a projector, with a maximum of 20 students.
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	The rooms are equipped with data show, Smart Board, WI-FI access.
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	None

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching	Students	<b>Direct:</b> Questionnaire.
	Course Responsible	<b>Direct:</b> Course e-Portfolio. <b>Indirect:</b> Second examiner checklist-Course report.
	Peer Reviewer	<b>Direct:</b> Questionnaire. <b>Indirect:</b> External assessor report.
Effectiveness of assessment	Program Leaders	<b>Direct:</b> Course e-Portfolio. <b>Indirect:</b> Course report.
Extent of achievement of course learning outcomes	Course Responsible	<b>Direct:</b> Exams - Course e-Portfolio. <b>Indirect:</b> Second examiner checklist-Course report.
	Program Leaders	<b>Indirect:</b> Exams.
Quality of learning resources	Students	<b>Indirect:</b> Second examiner checklist-Course report.
	Faculty (Academic Advisory - FEGC)	<b>Direct:</b> course Entrance/Exit. <b>Indirect:</b> Observations - Accreditation review.
	Program Leaders	<b>Direct:</b> Course e-Portfolio. <b>Indirect:</b> Course evaluation survey- Observations- Syllabus review- Accreditation review.
	Course Responsible	

**Evaluation areas** (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

**Evaluators** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

**Assessment Methods** (Direct, Indirect)

## H. Specification Approval Data

<b>Council / Committee</b>	<b>Chemistry Department Council</b>
<b>Reference No.</b>	<b>1/13</b>
<b>Date</b>	<b>10/05/1443</b>



## Course Specifications (Postgraduate Degree)

<b>Course Title:</b>	<b>Forensic Serology and DNA Fingerprinting</b>
<b>Course Code:</b>	<b>BIO 6209</b>
<b>Program:</b>	<b>Executive Master of Forensic Science</b>
<b>Department:</b>	<b>Biology</b>
<b>College:</b>	<b>Science</b>
<b>Institution:</b>	<b>Imam Mohammad Ibn Saud Islamic University (IMSIU)</b>

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## A. Course Identification

<b>1. Credit hours: 4 (3 Lectures, 2 Lab, 0Tutorials)</b>			
<b>2. Course type</b>			
a.	University <input type="checkbox"/>	College <input type="checkbox"/>	Department <input checked="" type="checkbox"/>
			Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/>	Elective <input type="checkbox"/>	
<b>3. Level/year at which this course is offered: Level 4 / Year 2</b>			
<b>4. Pre-requisites for this course:</b> None			
<b>5. Co-requisites for this course (if any):</b> None			

### 6. Mode of Instruction (mark all that apply)

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

### 4. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	36
2	Laboratory/Studio	24
3	Tutorial	0
4	Others (specify)	0
	<b>Total</b>	<b>60</b>

## B. Course Objectives and Learning Outcomes

### 1. Course Description

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

### 2. Course Main Objectives

*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.

### 3. Course Learning Outcomes

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



## C. Course Content

No	List of Topics	Contact Hours
1	Immune system, immune response, innate and acquired immunity, antigens, antibodies, haptenes and adjuvants, immunoglobulin- types, physicochemical properties and function, raising of anti-sera, Lectins - their forensic significance. Buffers and serological reagents, methods of sterilization employed for serological work.	4
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.	4
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.	4
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 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 universability 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.	5
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

No	List of Topics	Contact Hours
<b>Total</b>		<b>36</b>
No	Laboratories	Contact Hours
1	Serology instrumentation	2
2	Blood identification	2
3	Blood pattern identification	2
4	Urine identification by analysis of blood group antigenic substances, polymorphic proteins, and DNA.	2
5	Immunoassay	2
6	Sweat & Semen identification	2
7	Forensic microscopy of hair and fibres	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	3
<b>Total</b>		<b>24</b>

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge and understanding</b>		
1.1	Outline the basic concepts of forensic serology as it applies to the collection, preservation and testing of biological evidence.	<ul style="list-style-type: none"> <li>▪ Two hour/week lectures.</li> <li>▪ Three hours/week laboratory activity</li> <li>▪ Self-study.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Regular Exams</li> <li>▪ Assignments</li> <li>▪ Lab. reports</li> <li>▪ Short Quizzes</li> <li>▪ Oral Discussion</li> <li>• Participation</li> </ul>
1.2	State the biological evidence in criminal matters using DNA technologies, including the methods routinely used for the isolation of DNA from cells and techniques applied to DNA quantitation, electrophoretic separation, as well as data analysis, interpretation and reporting.	<ul style="list-style-type: none"> <li>▪ Two hours/week lectures.</li> <li>▪ Open discussion.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Midterm.</li> <li>▪ Assignments.</li> <li>▪ Group Discussions.</li> <li>▪ Mini-seminar.</li> <li>▪ Participation.</li> </ul>
1.3	List the forensic serology discipline utilization the genetic markers typing and DNA profiling, in criminal	<ul style="list-style-type: none"> <li>▪ Two hour/week lectures.</li> <li>▪ Three hours/week laboratory activity</li> </ul>	<ul style="list-style-type: none"> <li>▪ Regular Exams</li> <li>▪ Assignments</li> <li>▪ Lab. reports</li> </ul>

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	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.	<ul style="list-style-type: none"> <li>▪ Self-study.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Short Quizzes</li> <li>▪ Oral Discussion</li> <li>• Participation</li> </ul>
1.4	Recognize the significance of maintaining chain-of-custody of the samples and applying the laboratory safety measures.	<ul style="list-style-type: none"> <li>▪ Two hour/week lectures.</li> <li>▪ Three hours/week laboratory activity</li> <li>▪ Self-study.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Regular Exams</li> <li>▪ Assignments</li> <li>▪ Lab. reports</li> <li>▪ Short Quizzes</li> <li>▪ Oral Discussion</li> <li>• Participation</li> </ul>
1.5	Describe the significance and value of quality assurance and quality control.	<ul style="list-style-type: none"> <li>▪ Two hour/week lectures.</li> <li>▪ Three hours/week laboratory activity</li> <li>▪ Self-study.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Regular Exams</li> <li>▪ Assignments</li> <li>▪ Lab. reports</li> <li>▪ Short Quizzes</li> <li>▪ Oral Discussion</li> <li>• Participation</li> </ul>
2.0	<b>Skills</b>		
2.1	Explain the application of experimental techniques and procedures routinely used in this field.	<ul style="list-style-type: none"> <li>▪ Lectures activity</li> <li>▪ Lab. activity</li> <li>▪ Self-study.</li> <li>▪ Deep discussions</li> </ul>	<ul style="list-style-type: none"> <li>▪ Oral discussion</li> <li>▪ Short Quizzes and Exams.</li> <li>▪ Lab. reports</li> <li>▪ Participation</li> <li>▪ Mini -seminar.</li> </ul>
2.2	Interpret DNA data	<ul style="list-style-type: none"> <li>▪ Brainstorming.</li> <li>▪ Self-study</li> </ul>	<ul style="list-style-type: none"> <li>▪ Participation</li> <li>▪ Oral Discussion</li> <li>▪ Short Quizzes.</li> </ul>
2.3	Evaluate reports, review and testimony skills required of a DNA analyst.	<ul style="list-style-type: none"> <li>▪ Lectures Discussions.</li> <li>▪ Lab. Discussions.</li> <li>▪ Brainstorming.</li> <li>▪ Self-study.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Mini-projects.</li> <li>▪ Oral Discussion.</li> <li>▪ Participation.</li> </ul>
3.0	<b>Values</b>		
3.1	Use laboratory instruments and computers.	<ul style="list-style-type: none"> <li>▪ Brainstorms Exercises</li> <li>▪ Group Discussion</li> </ul>	<ul style="list-style-type: none"> <li>▪ Group Discussion</li> <li>▪ Assignments.</li> </ul>
3.2	Write reports and preparation of presentations and the preparation of graphics and models by using technology.	<ul style="list-style-type: none"> <li>▪ Small Group tasks</li> <li>▪ Open discussion at classroom.</li> <li>▪ Office hour guiding.</li> <li>▪ Group Presentation of mini-projects</li> </ul>	<ul style="list-style-type: none"> <li>▪ Participation</li> <li>▪ Assignments.</li> <li>▪ Mini-project(s).</li> </ul>

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Class Activities ( Oral Discussion, Mini-projects, Mini-seminar, Quizzes, Mid-term,	During the semester	30%

#	Assessment task*	Week Due	Percentage of Total Assessment Score
	Oral Presentation, Participation, Assignments, Lab. reports)		
2	Midterm	4 <sup>th</sup> week	30%
3	Final Exam	Around 13 <sup>th</sup> week	40%

\*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

## E. Student Academic Counseling and Support

**Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:**

- Students admitted to the master program will receive the appropriate academic counseling and support from the department graduate committee.
- The lecturer for each course allocates 4-6 office hours per week advertised on his / her own timetable, and reserved as part of his / her teaching schedule to help the students on any academic problems/difficulties.
- Student is able to get individual consultation and academic advice appointment with teaching staff via e-mail or phone calls.
- A list of teaching staff members with their room numbers, their phone numbers and their e-mail addresses is given in the Department website.

## F. Learning Resources and Facilities

### 1. Learning Resources

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

### 2. Educational and research Facilities and Equipment Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> <li>▪ Each classroom should be equipped with a whiteboard and a projector.</li> <li>▪ Laboratories should be equipped with computers and an internet connection.</li> </ul>
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	The rooms are equipped with data show, Smart Board, WI-FI access.

Item	Resources
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	None

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching	Students	<b>Direct:</b> Questionnaire.
	Course Responsible	<b>Direct:</b> Course e-Portfolio. <b>Indirect:</b> Second examiner checklist-Course report.
	Peer Reviewer	<b>Direct:</b> Questionnaire. <b>Indirect:</b> External assessor report.
Effectiveness of assessment	Program Leaders	<b>Direct:</b> Course e-Portfolio. <b>Indirect:</b> Course report.
Extent of achievement of course learning outcomes	Course Responsible	<b>Direct:</b> Exams - Course e-Portfolio. <b>Indirect:</b> Second examiner checklist-Course report.
	Program Leaders	<b>Indirect:</b> Exams.
Quality of learning resources	Students	<b>Indirect:</b> Second examiner checklist-Course report.
	Faculty ( Academic Advisory-GCC)	<b>Direct:</b> course Entrance/Exit. <b>Indirect:</b> Observations - Accreditation review.
	Program Leaders	<b>Direct:</b> Course e-Portfolio.
	Course Responsible	<b>Indirect:</b> Course evaluation survey- Observations- Syllabus review- Accreditation review.

**Evaluation areas** (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

**Evaluators** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

**Assessment Methods** (Direct, Indirect)

## H. Specification Approval Data

Council / Committee	Biological Department Council
Reference No.	16/1441/1442
Date	5/5/1442 (20/12/2020)



## Course Specifications (Postgraduate Degree)

<b>Course Title:</b>	<b>The Scientific Method in Forensic Science</b>
<b>Course Code:</b>	<b>BIO 6291</b>
<b>Program:</b>	<b>Executive Master of Forensic Science</b>
<b>Department:</b>	<b>Biology</b>
<b>College:</b>	<b>Science</b>
<b>Institution:</b>	<b>Imam Mohammad Ibn Saud Islamic University (IMSIU)</b>

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## A. Course Identification

<b>1. Credit hours:</b> 4 (4 Lectures, 0 Lab, 0 Tutorial)
<b>2. Course type</b> <input checked="" type="checkbox"/> Required <input type="checkbox"/> Elective
<b>3. Level/year at which this course is offered:</b> Level 4/ Year 2
<b>4. Pre-requisites for this course</b> (if any): BIO 601, BIO 605, CHM 651, CHM 638, STA 617
<b>5. Co-requisites for this course</b> (if any): None

### 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	48	100 %
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

### 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
1	Lecture	48
2	Laboratory/Studio	0
3	Seminars	0
4	Others (specify)	0
<b>Total</b>		<b>48</b>

## B. Course Objectives and Learning Outcomes

### 1. Course Description

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

### 2. Course Main Objective

*At the end of the course, the students will be able to*

- Understand the scientific research methodology in Forensic Science
- Recognize various designs and methodologies of Forensic Science.
- Provide suggestions for treatment of investigating challenges in a scientific way.
- Make bibliography about the current state of the art of specific Forensic Scientific subjects
- Read, comment and summarize scientific papers and reports
- Make a critical assessment of investigating work conducted by others.
- Offer scientific oral presentation and writing scientific report relevant to Forensic Evidence



### 3. Course Learning Outcomes

CLOs <i>After completion of the course, The Graduate is able</i>		Aligned PLOs
<b>1</b>	<b>Knowledge and Understanding</b>	
1.1	Recall the fundamentals and application of Biology and Chemistry fields in investigating and solving a Forensic Evidence problem.	K1
1.2	Outline the appropriate methods and routes in formulating a Forensic Evidence problem or topic.	K2; K3; K4
1.3	List in-depth the Forensic Science Progress and development via literatures survey analysis	K1; K4
1.4	Recognize a critical assessment of scientific investigating work conducted by others	K1; K3
<b>2</b>	<b>Skills:</b>	
2.1	Develop experience in searching and assessing current Forensic Science literature.	S1; S2
2.2	Summarize the literature survey the applied methods and techniques used	S1; S3
2.3	Analyze and contrast the literature survey with instructor guidance. To	S2; S4
2.4	Appraise Communication, accompanying writing of mini- Reports, operating electronic mail, and Network in communicating conclusions and recommendations.	S2; S3; S4
<b>3</b>	<b>Values:</b>	
3.1	Demonstrate group leadership skill and to evaluate the responsibility.	V1
3.2	Illustrate the ability to communicate their ideas with the instructor at all times during and after the class.	V2

## C. Course Content

No	List of Topics	Contact Hours
1	Introduction to Scientific Research	5
2	Overview of Forensic Research	5
3	Literature Review	5
4	Formulate Research Problem and Research Objective	5
5	Research Design for the Forensic Science Student and Practitioner	6
6	Research Proposal	6
7	How to Critically Review a Published Scientific articles	6
8	The Importance of Ethics and Impartiality in Forensic Science	5
9	The Key to Effective Communication in Forensic Science	5
<b>Total</b>		<b>48</b>

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge and Understanding</b>		
1.1	Recall the fundamentals and application of Biology and Chemistry fields in investigating and solving a Forensic Evidence problem.	<ul style="list-style-type: none"> <li>▪ Two hours/week lectures.</li> <li>▪ Students are encouraged to make regular visits during office hours where they can ask any question about the course.</li> <li>▪ Self-study</li> </ul>	<ul style="list-style-type: none"> <li>▪ Regular Exams.</li> <li>▪ Assignments</li> <li>▪ Short Quizzes</li> <li>▪ Oral Discussion</li> <li>▪ Participation.</li> </ul>
1.2	Outline the appropriate methods and routes in formulating a Forensic Evidence problem or topic.	<ul style="list-style-type: none"> <li>• 2 hours are weekly containing guidance to gather and formulate the research problem.</li> <li>• Think and talk to conceptualize the research design with optimization.</li> <li>• Open discussion.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Oral Discussion</li> <li>▪ Participation.</li> <li>▪ Written mini-reports for evaluation.</li> </ul>
1.3	List in-depth the Forensic Science Progress and development via literatures survey analysis	<ul style="list-style-type: none"> <li>▪ Evaluate and discuss on chemical literatures survey analysis.</li> <li>▪ Group discussion</li> </ul>	<ul style="list-style-type: none"> <li>▪ Oral Discussion</li> <li>▪ Participation.</li> <li>▪ Mini-reports for evaluation.</li> </ul>
1.4	Recognize a critical assessment of scientific investigating work conducted by others	<ul style="list-style-type: none"> <li>▪ 2 hours /week lectures.</li> <li>▪ Group Discussion on critical assessment of scientific work conducted by others</li> </ul>	<ul style="list-style-type: none"> <li>▪ Oral Discussion</li> <li>▪ Participation.</li> <li>▪ Mini-reports for evaluation</li> </ul>

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
		using available references (SDL) online.	
2.0	<b>Skills</b>		
2.1	Develop experience in searching and assessing current Forensic Science literature.	<ul style="list-style-type: none"> <li>▪ Lectures activity.</li> <li>▪ Self-study</li> <li>▪ Evaluate weekly Independent developing through Group discussion</li> </ul>	<ul style="list-style-type: none"> <li>▪ Continuous evaluation- written test.</li> <li>▪ Written report</li> <li>▪ Oral discussion</li> </ul>
2.2	Summarize the literature survey the applied methods and techniques used	<ul style="list-style-type: none"> <li>▪ Lectures activity.</li> <li>▪ Self-study.</li> <li>▪ Follow up independent development in preparing a research topic or scientific presentation.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Continuous evaluation - written test.</li> <li>▪ Written report</li> <li>▪ Oral discussion</li> <li>▪ Presentation</li> </ul>
2.3	Analyze and contrast the literature survey with instructor guidance.	<ul style="list-style-type: none"> <li>▪ Independent and group literature survey analysis</li> </ul>	<ul style="list-style-type: none"> <li>▪ Continuous evaluation</li> <li>▪ Written report</li> <li>▪ Oral discussion</li> </ul>
2.4	Appraise Communication, accompanying writing of mini- Reports, operating electronic mail, and Network in communicating conclusions and recommendations.	<ul style="list-style-type: none"> <li>▪ Group Discussion and Assignments</li> <li>▪ Suggest several examples of research topics, which will require reading, writing, and oral presentation.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Oral Discussion.</li> <li>▪ Quizzes, and Exams.</li> <li>▪ Giving marks for Oral Discussion in Lectures.</li> <li>▪ Written test.</li> </ul>
3.0	<b>Values</b>		
3.1	Demonstrate group leadership skill and to evaluate the responsibility.	<ul style="list-style-type: none"> <li>▪ Brainstorms</li> <li>▪ Group Discussion.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Continuous evaluation via Oral Presentation with marks.</li> <li>▪ Written report.</li> </ul>
3.2	Illustrate the ability to communicate their ideas with the instructor at all times during and after the class.	<ul style="list-style-type: none"> <li>▪ Small Group tasks</li> <li>▪ Open discussion at classroom.</li> <li>▪ Office hour guiding.</li> <li>▪ Group Presentation of mini-projects.</li> <li>▪ Reading IMSIU ethical standards and Scanning any product for plagiarism.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Continuous evaluation</li> <li>▪ Written report</li> <li>▪ Oral discussion</li> <li>▪ Presentation.</li> </ul>

## 2. Assessment Tasks for Students:

- Tasks of The Scientific Method in Forensic Science BIO 691 are individually processed, and the instructor, weekly evaluate the final effort deployed by the students separately.
- The students frequently prepare a written mini report parallel with open discussion and seminars in most of the course topics.
- The students will be divided into small groups, and each one will have a selected chemistry problem to build up research methodology, concepts, experiment planning, end up with a research presentation

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	<b><u>The First Report</u></b> for research process Set up, Scientific research designs and methodology. Oral presentation associated with written report.	3 <sup>th</sup> week	15%
2	<b><u>The Second Report:</u></b> selected problem (References Types, Bibliographies, initial research proposal, applied methodology to build up experimental part) oral presentation associated with report (10% Oral presentation with written report, , 5% class room activity)	6 <sup>th</sup> week	20 %
3	<b><u>Research Summary</u></b> (e.g. Research article critique, participation) (group discussion and evaluation of their work)	Around 10 <sup>th</sup> – 11 <sup>th</sup> week	25%
4	<b><u>Final Presentation:</u></b> a selected research methods topic announced in 10 <sup>th</sup> week (15% writing, 25% presentation)	13 <sup>th</sup> week	40 %
4	<b>Total</b>		<b>100%</b>

\*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

## E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

- Students will be assigned an academic advisor The Joint Commission of the Executive Master's Program in Forensic Evidence (FEGC) Council to give them the appropriate academic counseling and support.
- The lecturer for each course allocates 6 office hours per week advertised on his own timetable and reserved as part of his teaching schedule to help the students on any academic problems/difficulties.
- Student is able to get individual consultation and academic advice appointment with teaching staff via e-mail or phone calls and department website.
- A list of teaching staff members with their room numbers, their phone numbers and their e-mail addresses is given in the Executive MSc in Forensic Evidence Handbook and website.
- Course handbook.
- Departmental websites  
(<http://units.imamu.edu.sa/colleges/science/Admission/Pages/default.aspx>) and <https://units.imamu.edu.sa/colleges/science/Admission/Pages/default.aspx> with details of all degree programs, lecture courses, and projects, as well as staff contact details and other information and electronic resources.
- Induction talks and meetings in the first week.
- Occasional meetings about course structure, option choices, etc. spread throughout the program;

## F. Learning Resources and Facilities

### 1. Learning Resources

<b>Required Textbooks</b>	<ul style="list-style-type: none"> <li>▪ <b>Mike Illes &amp; Paul Wilson (2020) The Scientific Method in Forensic Science A Canadian Handbook.</b> Toronto, Canada ISBN-13: 9781773381633.</li> <li>▪ <b>Igwenagu, Chinelo. (2016). Fundamentals of research methodology and data collection.</b> URL: <a href="https://www.researchgate.net/publication/303381524_Fundamentals_of_research_methodology_and_data_collection">https://www.researchgate.net/publication/303381524_Fundamentals_of_research_methodology_and_data_collection</a></li> <li>▪ <b>Marczyk, Geoffrey R. (2014) Essentials of research design and methodology.</b> Wiley. 290 p.</li> </ul>
<b>Essential Reference Materials</b>	NONE
<b>Electronic Materials</b>	<p><b>IMSIU Ethical Standards rules</b>  <a href="https://units.imamu.edu.sa/deanships/SR/Documents//الأخلاقيات%20العلمية%20لائحة-الحماية.pdf">https://units.imamu.edu.sa/deanships/SR/Documents//الأخلاقيات%20العلمية%20لائحة-الحماية.pdf</a> .</p> <ul style="list-style-type: none"> <li>• Saudi Digital Library.</li> <li>• Available database.</li> </ul>
<b>Other Learning Materials</b>	<ul style="list-style-type: none"> <li>• Blackboard</li> <li>• Multimedia associated with the text book and the relevant websites</li> </ul>

### 2. Educational and research Facilities and Equipment Required

Item	Resources
<p><b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)</p>	Each of the classroom should be equipped with a <b>whiteboard and a projector, with a maximum of 20 students.</b>
<p><b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)</p>	The rooms are equipped with data show, Smart Board, WI-FI access.
<p><b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)</p>	None

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching	Students	<b>Direct:</b> Questionnaire.
	Course Responsible	<b>Direct:</b> Course e-Portfolio. <b>Indirect:</b> Second examiner checklist-Course report.
	Peer Reviewer	<b>Direct:</b> Questionnaire. <b>Indirect:</b> External assessor report.
Effectiveness of assessment	Program Leaders	<b>Direct:</b> Course e-Portfolio. <b>Indirect:</b> Course report.
Extent of achievement of course learning outcomes	Course Responsible	<b>Direct:</b> Exams - Course e-Portfolio. <b>Indirect:</b> Second examiner checklist-Course report.
	Program Leaders	<b>Indirect:</b> Exams.
Quality of learning resources	Students	<b>Indirect:</b> Second examiner checklist-Course report.
	Faculty ( Academic Advisory-GCC)	<b>Direct:</b> course Entrance/Exit. <b>Indirect:</b> Observations - Accreditation review.
	Program Leaders	<b>Direct:</b> Course e-Portfolio.
	Course Responsible	<b>Indirect:</b> Course evaluation survey- Observations- Syllabus review- Accreditation review.

**Evaluation areas** (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

**Evaluators** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

**Assessment Methods** (Direct, Indirect)

## H. Specification Approval Data

Council / Committee	Biology Department Council
Reference No.	16/1441/1442
Date	5/5/1442 (20/12/2020)



## Course Specifications (Postgraduate Degree)

<b>Course Title:</b>	<b>Entomology and Microbial Forensics</b>
<b>Course Code:</b>	<b>BIO 6210</b>
<b>Program:</b>	<b>Executive Master of Forensic Science</b>
<b>Department:</b>	<b>Biology</b>
<b>College:</b>	<b>Science</b>
<b>Institution:</b>	<b>Imam Mohammad Ibn Saud Islamic University (IMSIU)</b>

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## A. Course Identification

<b>1. Credit hours: 3(2 Lecture, 2 Lab, 0 Tutorial)</b>			
<b>2. Course type</b>			
a.	University <input type="checkbox"/>	College <input type="checkbox"/>	Department <input checked="" type="checkbox"/>
			Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/>	Elective <input type="checkbox"/>	
<b>3. Level/year at which this course is offered: Level 5/ second year</b>			
<b>4. Pre-requisites for this course:</b> None			
<b>5. Co-requisites for this course (if any):</b> None			

### 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	48	100%
2	Blended	0	
3	E-learning	0	
4	Distance learning	0	
5	Other	0	

### 7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	24
2	Laboratory/Studio	24
3	Tutorial	0
4	Others (specify)	0
	<b>Total</b>	<b>48</b>

## B. Course Objectives and Learning Outcomes

### 1. Course Description

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

### 2. Course Main Objectives

*At the end of the course, the students will be able to*

- Students will be expected to recognize, recall, and synthesize information pertaining to the application of entomology to criminal and civil litigation.
- Provide invaluable aid in death cases where human remains are colonized by insects and in the overall investigation.
- Be familiar to identify the arthropods associated with such cases and to analyze entomological data for interpreting insect evidence.

### 3. Course Learning Outcomes

CLOs		Aligned-PLOs
1	<b>Knowledge and Understanding</b>	
1.1	Outline the connection between insects and forensic entomology	K1
1.2	Name the arthropods and insects associated to criminal and civil litigation	K1; K2
2	<b>Skills:</b>	
2.1	Justify the cause of death using forensic entomology	S2
2.2	Evaluate and identify the relationship between cause and consequence in the different mechanisms.	S1; S2
2.3	Compare organs of the body and the interpretation of its mechanisms.	S3
3	<b>Values:</b>	
3.1	Appraise team work and management of resources and time.	V1
3.2	Demonstrate the operation and use of computers and means of modern technology.	V2

### C. Course Content

No	List of Topics	Contact Hours
1	<b>Unit - I</b> 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 humour, post mortem lividity, fluidity of blood,. Late changes – putrefaction- external and internal changes. Adipocere, 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, moulds . Sudden death, post-mortem demonstration of myocardial infarction Medico legal aspects of death- Asphyxia, syncope, coma, death by starvation, drowning, hanging and	6

No	List of Topics	Contact Hours
	strangulation. Causes and mechanism of traumatic death, manner of death. Classification of traumatic deaths.	
2	Unit - II Mechanical Injuries: Abrasions, Bruises, Lacerations, Incised wounds, Stab wounds, Firearm injuries, Defence 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 vessels, diaphragm, oesophagus, abdomen, stomach, liver, intestine, pancreas, spleen, kidneys, adrenals urinary bladder, rectum external genitalia, muscles, bones and joints.	6
3	Unit - III Forensic Entomology- History, significance, determination of time since death- Dipterean 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.	6
4	Unit – IV 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.	6
<b>Total</b>		<b>24</b>
<b>Topics to be covered (Laboratories)</b>		
No	Laboratories	Contact Hours
1	Insect orders & families, Beetles, mosquitos & houseflies	2
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	2
6	Use of microscopes, Gram-staining technique.	2
7	Streak plate method of bacterial cell isolation.	3
8	Types and identification of microbial organisms of forensic significance.	3
9	Human microbiota as a fingerprint: potential use as trace evidence	3
10	Microbiology of decomposition: applications in forensics.	3

No	List of Topics	Contact Hours
	<b>Total</b>	<b>24</b>

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
<b>1.0</b>	<b>Knowledge and understanding</b>		
1.1	Outline the connection between insects and forensic entomology	<ul style="list-style-type: none"> <li>▪ Two hour/week lectures.</li> <li>▪ Three hours/week laboratory activity</li> <li>▪ Self-study.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Regular Exams</li> <li>▪ Assignments</li> <li>▪ Lab. reports</li> <li>▪ Short Quizzes</li> <li>▪ Oral Discussion</li> <li>• Participation</li> </ul>
1.2	Name the arthropods and insects associated to criminal and civil litigation	<ul style="list-style-type: none"> <li>▪ Two hour/week lectures.</li> <li>▪ Open discussion.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Midterm.</li> <li>▪ Assignments.</li> <li>▪ Group Discussions.</li> <li>▪ Mini seminar.</li> <li>▪ Participation.</li> </ul>
<b>2.0</b>	<b>Skills</b>		
2.1	Justify the cause of death using forensic entomology	<ul style="list-style-type: none"> <li>▪ Lectures activity</li> <li>▪ Lab. activity</li> <li>▪ Self-study.</li> <li>▪ Deep discussions</li> </ul>	<ul style="list-style-type: none"> <li>▪ Oral discussion</li> <li>▪ Short Quizzes and Exams.</li> <li>▪ Lab. reports</li> <li>▪ Participation</li> <li>▪ Mini seminar.</li> </ul>
2.2	Evaluate and identify the relationship between cause and consequence in the different mechanisms.	<ul style="list-style-type: none"> <li>▪ Brainstorming.</li> <li>▪ Self-study</li> </ul>	<ul style="list-style-type: none"> <li>▪ Participation</li> <li>▪ Oral Discussion</li> <li>▪ Short Quizzes.</li> </ul>
2.3	Compare organs of the body and the interpretation of its mechanisms.	<ul style="list-style-type: none"> <li>▪ Lectures Discussions.</li> <li>▪ Lab. Discussions.</li> <li>▪ Brainstorming.</li> <li>▪ Self-study.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Mini projects.</li> <li>▪ Oral Discussion.</li> <li>▪ Participation.</li> </ul>
<b>3.0</b>	<b>Values</b>		
3.1	Appraise team work and management of resources and time.	<ul style="list-style-type: none"> <li>▪ Brainstorms Exercises</li> <li>▪ Group Discussion</li> </ul>	<ul style="list-style-type: none"> <li>▪ Group Discussion</li> <li>▪ Assignments.</li> </ul>
3.2	Demonstrate the operation and use of computers and means of modern technology.	<ul style="list-style-type: none"> <li>▪ Small Group tasks</li> <li>▪ Open discussion at classroom.</li> <li>▪ Office hour guiding.</li> <li>▪ Group Presentation of mini-projects</li> </ul>	<ul style="list-style-type: none"> <li>▪ Participation</li> <li>▪ Assignments.</li> <li>▪ Mini-project(s).</li> </ul>

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Class Activities ( Oral Discussion, Mini-projects, Mini-seminar, Quizzes, Mid-term, Oral Presentation, Participation, Assignments, Lab. reports)	During the semester	30%
2	Midterm	4 <sup>th</sup> week	30%
3	Final Exam	Around 13 <sup>th</sup> week	40%

\*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

## E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

- Students admitted to the master program will receive the appropriate academic counseling and support from the Joint Commission of the Executive Master's Program in Forensic Evidence Council (FEGC).
- The lecturer for each course allocates 4-6 office hours per week advertised on his / her own timetable, and reserved as part of his / her teaching schedule to help the students on any academic problems/difficulties.
- Student is able to get individual consultation and academic advice appointment with teaching staff via e-mail or phone calls.
- A list of teaching staff members with their room numbers, their phone numbers and their e-mail addresses is given in the Department website.

## F. Learning Resources and Facilities

### 1. Learning Resources

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

## 2. Educational and research Facilities and Equipment Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> <li>▪ Each classroom should be equipped with a whiteboard and a projector.</li> <li>▪ Laboratories should be equipped with computers and an internet connection.</li> </ul>
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	The rooms are equipped with data show, Smart Board, WI-FI access.
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	None.

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching	Students	<b>Direct:</b> Questionnaire.
	Course Responsible	<b>Direct:</b> Course e-Portfolio. <b>Indirect:</b> Second examiner checklist-Course report.
	Peer Reviewer	<b>Direct:</b> Questionnaire. <b>Indirect:</b> External assessor report.
Effectiveness of assessment	Program Leaders	<b>Direct:</b> Course e-Portfolio. <b>Indirect:</b> Course report.
Extent of achievement of course learning outcomes	Course Responsible	<b>Direct:</b> Exams - Course e-Portfolio. <b>Indirect:</b> Second examiner checklist-Course report.
	Program Leaders	<b>Indirect:</b> Exams.
Quality of learning resources	Students	<b>Indirect:</b> Second examiner checklist-Course report.
	Faculty ( Academic Advisory-GCC)	<b>Direct:</b> course Entrance/Exit. <b>Indirect:</b> Observations - Accreditation review.
	Program Leaders	<b>Direct:</b> Course e-Portfolio.
	Course Responsible	<b>Indirect:</b> Course evaluation survey- Observations- Syllabus review- Accreditation review.

**Evaluation areas** (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

**Evaluators** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

**Assessment Methods** (Direct, Indirect)

## H. Specification Approval Data

<b>Council / Committee</b>	<b>Biology Department Council</b>
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<b>Reference No.</b>	<b>16/1441/1442</b>
<b>Date</b>	<b>5/5/1442</b>



## Course Specifications (Postgraduate Degree)

<b>Course Title:</b>	<b>Advanced Analytical Chemistry</b>
<b>Course Code:</b>	<b>CHM 6231</b>
<b>Program:</b>	<b>Executive Master of Forensic Science</b>
<b>Department:</b>	<b>Chemistry</b>
<b>College:</b>	<b>Science</b>
<b>Institution:</b>	<b>Imam Mohammad Ibn Saud Islamic University</b>



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## A. Course Identification

<b>1. Credit hours:</b> 5 (3 Lectures, 4 Lab, 0 Tutorial)
<b>2. Course type</b> <input checked="" type="checkbox"/> Required <input type="checkbox"/> Elective
<b>3. Level/year at which this course is offered:</b> Level 5/ Year 2
<b>4. Pre-requisites for this course (if any):</b> None
<b>5. Co-requisites for this course (if any):</b> None

### 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	84	100 %
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

### 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
1	Lecture	36
2	Laboratory/Studio	48
3	Tutorials	0
4	Others (specify)	0
<b>Total</b>		<b>84</b>

## B. Course Objectives and Learning Outcomes

### 1. Course Description

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

### 2. Course Main Objective

*At the end of the course, the students will be able to*

1. Recognize the required techniques for a variety of sampling types.
2. Develop awareness with handlings samples preparation in an appropriate way.
3. Be familiar with volumetric and gravimetric analysis and their application in different fields.
4. Develop awareness with spectral, electrochemical, and chromatographic methods; and choosing the appropriate technique.

### 3. Course Learning Outcomes

CLOs <i>After completion of the course, The Graduate is able</i>		Aligned PLOs
1	<b>Knowledge and Understanding</b>	
1.1	Recall the principles of a wide range of modern analytical methods of sampling types.	K1; K3; K4
1.2	List principles in Analytical Chemistry.	K1; K2
1.3	Describe Spectral Methods applications in Analytical Chemistry.	K1; K4
1.4	Outline the Chromatographic and Electrochemical Methods.	K1; K4
2	<b>Skills:</b>	
2.1	Analyze problems and explore strategies for Volumetric and Gravimetric Methods applications.	S1 ; S2
2.2	Interpret the obtained data from different Spectral Methods.	S2 ; S3
2.3	Justify the appropriate techniques in Electrochemical analytical methods for a specific sample.	S2 ; S4
2.4	Appraise oral Communication on applying analytical chemistry techniques in the industry and their impact in KSA, accompanying mini- Reports, operating electronic mail, and Network in communicating with others.	S1; S4; V1
3	<b>Values:</b>	
3.1	Demonstrate scientific communication, data analysis, thinking, planning and decision-making skills.	V1
3.2	Appraise self-confidence attitudes through single and team work practical sessions, presentations, and discussions.	V1 ; V2

### C. Course Content

No	List of Topics	Contact Hours
1	<b>Various sampling techniques of organic, inorganic analytes.</b>	<b>14</b>
2	<b>Scientific principles in analytical chemistry</b>	<b>14</b>
3	<b>Volumetric and Gravimetric Methods:</b> Principle, Stoichiometric calculations in Volumetric and Gravimetric Analysis and their application	<b>14</b>
4	<b>Spectral Methods:</b> Recent techniques in spectroscopic methods of analysis, Infrared spectroscopy (Definition - Theory – Infrared instruments), Ultraviolet/Visible spectroscopy (Principle – Instrumentation – Applications), and Atomic spectroscopy (Principle – Instrumentation – Applications).	<b>14</b>
5	<b>Electrochemical Methods:</b> Simple introduction, Potentiometry, conductometry, coulometry, polarography, amperometry, voltammetry.	<b>14</b>
6	<b>Chromatographic Methods:</b> Principles, Theory and different types.	<b>14</b>
<b>Total</b>		<b>84</b>

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge and Understanding</b>		
1.1	Recall the principles of a wide range of modern analytical methods of sampling types.	<ul style="list-style-type: none"> <li>▪ Five hours/week lectures.</li> <li>▪ Self-study.</li> <li>▪ Home-exam.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Regular Exams</li> <li>▪ Assignments</li> <li>▪ Short Quizzes</li> <li>▪ Oral Discussion</li> <li>▪ Participation.</li> </ul>
1.2	List principles in Analytical Chemistry.	<ul style="list-style-type: none"> <li>▪ Five hours/week lectures.</li> <li>▪ Think, to justify the principles of analytical chemistry, available references (SDL) online.</li> <li>▪ Open discussion.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Oral Discussion marks</li> <li>▪ Literatures Survey</li> <li>▪ Mini-seminar.</li> <li>▪ Participation.</li> </ul>
1.3	Describe Spectral Methods applications in Analytical Chemistry.	<ul style="list-style-type: none"> <li>▪ Five hours/week lectures.</li> <li>▪ Group Discussion using available references (SDL) online.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Midterm.</li> <li>▪ Assignments.</li> <li>▪ Group Discussions.</li> <li>▪ Literatures Survey</li> <li>▪ Mini-seminar.</li> <li>▪ Participation.</li> </ul>
1.4	State the Chromatographic and Electrochemical Methods.	<ul style="list-style-type: none"> <li>▪ Five hours/week lectures.</li> <li>▪ Group Discussion Analytical methods for separation using available references online.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Assignments</li> <li>▪ Open Discussions.</li> <li>▪ Literatures Survey</li> <li>▪ Mini-seminars.</li> <li>▪ Participation.</li> </ul>
2.0	<b>Skills</b>		
2.1	Analyze problems and explore strategies for Volumetric and Gravimetric Methods applications.	<ul style="list-style-type: none"> <li>▪ Lectures activity</li> <li>▪ Self-study.</li> <li>▪ Deep discussions on the Volumetric and Gravimetric Methods applications.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Questions in Lectures.</li> <li>▪ Short Quizzes and Exams.</li> <li>▪ Open Discussions.</li> <li>▪ Participation</li> <li>▪ Mini -seminar.</li> </ul>
2.2	Interpret the obtained data from different Spectral Methods.	<ul style="list-style-type: none"> <li>▪ Practice examples Spectral Methods interpretation.</li> <li>▪ Brainstorming.</li> <li>▪ Self-study</li> </ul>	<ul style="list-style-type: none"> <li>▪ Questions in Lectures.</li> <li>▪ Participation</li> <li>▪ Oral Discussion</li> <li>▪ Short Quizzes.</li> </ul>
2.3	Justify the appropriate techniques in Electrochemical analytical methods for a specific sample.	<ul style="list-style-type: none"> <li>▪ Lectures and Oral Discussions.</li> <li>▪ Brainstorming.</li> <li>▪ Self-study.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Questions in Lectures.</li> <li>▪ Short Quizzes and Exams.</li> <li>▪ Oral Discussion.</li> <li>▪ Participation.</li> </ul>

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.4	Appraise oral Communication on applying analytical chemistry techniques in the industry and their impact in KSA, accompanying mini-Reports, operating electronic mail, and Network in communicating with others.	<ul style="list-style-type: none"> <li>▪ Group Discussion and Assignments.</li> <li>▪ Suggest application of analytical chemistry techniques in the industry and its impact in KSA, which will require reading, writing, and oral presentation.</li> <li>▪ Encourage students to use electronic mail to submit Home Exams and Assignments.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Oral Discussion.</li> <li>▪ Quizzes, and Exams.</li> <li>▪ Giving marks for Oral Discussion in Lectures.</li> <li>▪ Marks given for Assignments.</li> </ul>
3.0	<b>Values</b>		
3.1	Demonstrate scientific communication, data analysis, thinking, planning and decision-making skills.	<ul style="list-style-type: none"> <li>▪ Brain Storms Exercises</li> <li>▪ Group Discussion</li> </ul>	<ul style="list-style-type: none"> <li>▪ Oral Discussion.</li> <li>▪ Group Discussion</li> <li>▪ Assignments.</li> </ul>
3.2	Appraise self-confidence attitudes through single and team work practical sessions, presentations, and discussions.	<ul style="list-style-type: none"> <li>▪ Small Group tasks</li> <li>▪ Open discussion at classroom.</li> <li>▪ Office hour guiding.</li> <li>▪ Group Presentation of mini-projects</li> </ul>	<ul style="list-style-type: none"> <li>▪ Participation</li> <li>▪ Homework's</li> <li>▪ Mini-project(s).</li> </ul>

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Class Activities ( Oral Discussion, Mini-projects, Mini-seminar, Quizzes, Mid-term, Oral Presentation, Participation, Assignments)	During the semester	30%
2	Midterm	4 <sup>th</sup> week	30%
3	Final Exam	Around 13 <sup>th</sup> week	40%
4	<b>Total</b>		<b>100%</b>

\*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

## E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

- Students will be assigned an academic advisor by the Joint Commission of the Executive Master's Program in Forensic Evidence Council (FEGC) to give them the appropriate academic counselling and support;
- The lecturer for each course allocates 6 office hours per week advertised on his /her own timetable, and reserved as part of his/her teaching schedule to help the students on any academic problems/difficulties.
- Student is able to get individual consultation and academic advice appointment with teaching staff via e-mail or phone calls and department website.
- A list of teaching staff members with their room numbers, their phone numbers and their e-mail addresses is given in the MSc Chemistry Handbook and Department website.

## F. Learning Resources and Facilities

### 1. Learning Resources

<b>Required Textbooks</b>	<b>Fundamentals of analytical chemistry</b> , Douglas A. Skoog, Donald M. West, F. James Holler, Stanley R. Crouch. 9th Edition. ISBN-13: 978-0-495-55828-6. <b>Analytical Chemistry</b> , Gary D. Christian, Purnendu K. (Sandy) Dasgupta, Kevin A. Schug., 7th Edition. ISBN: 978-0-470-88757-8
<b>Essential Reference Materials</b>	None
<b>Electronic Materials</b>	<ul style="list-style-type: none"> <li>• The Journal of Analytical Chemistry</li> <li>• Saudi Digital Library</li> </ul>
<b>Other Learning Materials</b>	<b>Blackboard</b> Multimedia associated with the text book and the relevant websites.

### 2. Educational and research Facilities and Equipment Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	Each of the classroom should be equipped with a whiteboard and a projector, with a maximum of 20 students.
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	The rooms are equipped with data show, Smart Board, WI-FI access.
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	None

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching	Students	<b>Direct:</b> Questionnaire.
	Course Responsible	<b>Direct:</b> Course e-Portfolio. <b>Indirect:</b> Second examiner checklist-Course report.
	Peer Reviewer	<b>Direct:</b> Questionnaire. <b>Indirect:</b> External assessor report.
Effectiveness of assessment	Program Leaders	<b>Direct:</b> Course e-Portfolio. <b>Indirect:</b> Course report.
Extent of achievement of course learning outcomes	Course Responsible	<b>Direct:</b> Exams - Course e-Portfolio. <b>Indirect:</b> Second examiner checklist-Course report.
	Program Leaders	<b>Indirect:</b> Exams.
Quality of learning resources	Students	<b>Indirect:</b> Second examiner checklist-Course report.
	Faculty (Academic Advisory - FEGC)	<b>Direct:</b> course Entrance/Exit. <b>Indirect:</b> Observations - Accreditation review.
	Program Leaders	<b>Direct:</b> Course e-Portfolio. <b>Indirect:</b> Course evaluation survey- Observations- Syllabus review- Accreditation review.
	Course Responsible	

**Evaluation areas** (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

**Evaluators** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

**Assessment Methods** (Direct, Indirect)

## H. Specification Approval Data

Council / Committee	Chemistry Department Council
Reference No.	1/13
Date	10/05/1443





## Course Specifications (Postgraduate Degree)

<b>Course Title:</b>	<b>Anatomy and Physiology</b>
<b>Course Code:</b>	<b>BIO 6211</b>
<b>Program:</b>	<b>Executive Master of Forensic Science</b>
<b>Department:</b>	<b>Biology</b>
<b>College:</b>	<b>Science</b>
<b>Institution:</b>	<b>Imam Mohammad Ibn Saud Islamic University (IMSIU)</b>

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## A. Course Identification

<b>1. Credit hours: 4 (3 Lecture, 2 Lab, 0 Tutorial)</b>			
<b>2. Course type</b>			
a.	University <input type="checkbox"/>	College <input type="checkbox"/>	Department <input checked="" type="checkbox"/>
			Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/>	Elective <input type="checkbox"/>	
<b>3. Level/year at which this course is offered: Level 6/ Year 2</b>			
<b>4. Pre-requisites for this course:</b> None			
<b>5. Co-requisites for this course (if any):</b> None			

### 6. Mode of Instruction (mark all that apply)

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

### 4. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	36
2	Laboratory/Studio	24
3	Tutorial	0
4	Others (specify)	0
	<b>Total</b>	<b>60</b>

## B. Course Objectives and Learning Outcomes

### 1. Course Description

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

## 2. Course Main Objectives

*At the end of the course, the students will be able to*

- Use anatomical terminology to identify and describe locations of major organs of each system covered.
- Explain interrelationships among molecular, cellular, tissue, and organ functions in each system.
- Describe the interdependency and interactions of the systems.
- Explain contributions of organs and systems to the maintenance of homeostasis and Identify causes and effects of homeostatic imbalances.
- Describe modern technology and tools used to study anatomy and physiology.

## 3. Course Learning Outcomes

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

## C. Course Content

No	List of Topics	Contact Hours
1	Unit - I 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, 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 tumours.	9
2	Unit - II 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.	9
3	Unit - III 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, fibres of connective tissues, cells of connective tissues- adipose tissue. Functions of	9

No	List of Topics	Contact Hours
	connective tissues. Cartilage, structure, types of cartilage, gross structure of bones, elements 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	Unit – IV 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. Muscleskeletal, striated, non-striated, voluntary, involuntary. Organization of muscle fibres in muscle. Tendons. Nerves tissues- neuron structure, type of neurons, synapse, grey and white matter, peripheral nerves and ganglia.	9
<b>Total</b>		<b>36</b>
No	Laboratories	Contact Hours
1	The Biometry: (fingerprints, palm prints, footprints, ear prints and lip prints)	3
2	Osteology	2
3	Odontology	2
4	Inspection of the crime scene for different cases of death	2
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	2
9	Human remains	2
10	Histological identifications of human tissues and traces	2
<b>Total</b>		<b>24</b>

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge and understanding</b>		
1.1	Describe the general body organization and anatomical terminology.	<ul style="list-style-type: none"> <li>▪ Two hour/week lectures.</li> <li>▪ Three hours/week laboratory activity</li> <li>▪ Self-study.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Regular Exams</li> <li>▪ Assignments</li> <li>▪ Lab. reports</li> <li>▪ Short Quizzes</li> <li>▪ Oral Discussion</li> <li>• Participation</li> </ul>
1.2	Outline the structure and function of cell, tissues, skin, skeletal system, muscular system.	<ul style="list-style-type: none"> <li>▪ Two hours/week lectures.</li> <li>▪ Open discussion.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Midterm.</li> <li>▪ Assignments.</li> <li>▪ Group Discussions.</li> <li>▪ Mini-seminar.</li> <li>▪ Participation.</li> </ul>
2.0	<b>Skills</b>		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.1	Explain in-depth understanding the principles of anatomy and physiology and their interrelationships.	<ul style="list-style-type: none"> <li>▪ Lectures activity</li> <li>▪ Lab. activity</li> <li>▪ Self-study.</li> <li>▪ Deep discussions</li> </ul>	<ul style="list-style-type: none"> <li>▪ Oral discussion</li> <li>▪ Short Quizzes and Exams.</li> <li>▪ Lab. reports</li> <li>▪ Participation</li> <li>▪ Mini -seminar.</li> </ul>
2.2	Interpret a basic understanding of the integration of organ systems to maintain homeostasis	<ul style="list-style-type: none"> <li>▪ Brainstorming.</li> <li>▪ Self-study</li> </ul>	<ul style="list-style-type: none"> <li>▪ Participation</li> <li>▪ Oral Discussion</li> <li>▪ Short Quizzes.</li> </ul>
2.3	Summarize practical knowledge of physiological techniques.	<ul style="list-style-type: none"> <li>▪ Lectures Discussions.</li> <li>▪ Leb. Discussions.</li> <li>▪ Brainstorming.</li> <li>▪ Self-study.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Mini-projects.</li> <li>▪ Oral Discussion.</li> <li>▪ Participation.</li> </ul>
3.0	<b>Values</b>		
3.1	Demonstrate the ability to condense raw data into meaningful values and then assessing the resulting trends is a key skill in a number of vocations, both within science and in other areas.	<ul style="list-style-type: none"> <li>▪ Brainstorms Exercises</li> <li>▪ Group Discussion</li> </ul>	<ul style="list-style-type: none"> <li>▪ Group Discussion</li> <li>▪ Assignments.</li> </ul>
3.3	Illustrate skills of group discussions. Work dynamically as a team member and be effective in sharing ideas and engaging in fruitful discussion.	<ul style="list-style-type: none"> <li>▪ Small Group tasks</li> <li>▪ Open discussion at classroom.</li> <li>▪ Office hour guiding.</li> <li>▪ Group Presentation of mini projects</li> </ul>	<ul style="list-style-type: none"> <li>▪ Participation</li> <li>▪ Assignments.</li> <li>▪ Mini-project(s).</li> </ul>

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Class Activities ( Oral Discussion, Mini-projects, Mini-seminar, Quizzes, Mid-term, Oral Presentation, Participation, Assignments, Lab. reports)	During the semester	30%
2	Midterm	4 <sup>th</sup> week	30%
3	Final Exam	Around 13 <sup>th</sup> week	40%

\*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

## E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

- Students admitted to the master program will receive the appropriate academic counseling and support from the Joint Commission of the Executive Master's Program in Forensic Evidence Council (FEGC).
- The lecturer for each course allocates 4-6 office hours per week advertised on his / her own timetable, and reserved as part of his / her teaching schedule to help the students on any academic problems/difficulties.

- Student is able to get individual consultation and academic advice appointment with teaching staff via e-mail or phone calls.
- A list of teaching staff members with their room numbers, their phone numbers and their e-mail addresses is given in the Department website.

## F. Learning Resources and Facilities

### 1. Learning Resources

<b>Required Textbooks</b>	<b>Human Anatomy and Physiology</b> , Marieb and Hoehn , 11st edition ISBN-13 : 978-0134580999, ISBN-10 : 0134580990  <b>Textbook of Medical Physiology</b> Guyton and Hall Date of Publication: 06/2020 Elsevier ISBN Number 9780323597128
<b>Essential References Materials</b>	None
<b>Electronic Materials</b>	None
<b>Other Learning Materials</b>	None

### 2. Educational and research Facilities and Equipment Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> <li>▪ Each classroom should be equipped with a whiteboard and a projector.</li> <li>▪ Laboratories should be equipped with computers and an internet connection.</li> </ul>
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	The rooms are equipped with data show, Smart Board, WI-FI access.
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	None.

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching	Students	<b>Direct:</b> Questionnaire.
	Course Responsible	<b>Direct:</b> Course e-Portfolio. <b>Indirect:</b> Second examiner checklist-Course report.

Evaluation Areas/Issues	Evaluators	Evaluation Methods
	Peer Reviewer	<b>Direct:</b> Questionnaire. <b>Indirect:</b> External assessor report.
Effectiveness of assessment	Program Leaders	<b>Direct:</b> Course e-Portfolio. <b>Indirect:</b> Course report.
Extent of achievement of course learning outcomes	Course Responsible	<b>Direct:</b> Exams - Course e-Portfolio. <b>Indirect:</b> Second examiner checklist-Course report.
	Program Leaders	<b>Indirect:</b> Exams.
Quality of learning resources	Students	<b>Indirect:</b> Second examiner checklist-Course report.
	Faculty ( Academic Advisory-GCC)	<b>Direct:</b> course Entrance/Exit. <b>Indirect:</b> Observations - Accreditation review.
	Program Leaders	<b>Direct:</b> Course e-Portfolio.
	Course Responsible	<b>Indirect:</b> Course evaluation survey- Observations- Syllabus review- Accreditation review.

**Evaluation areas** (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

**Evaluators** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

**Assessment Methods** (Direct, Indirect)

## H. Specification Approval Data

<b>Council / Committee</b>	<b>Biology Department Council</b>
<b>Reference No.</b>	<b>16/1441/1442</b>
<b>Date</b>	<b>5/5/1442</b>





## Course Specifications (Postgraduate Degree)

<b>Course Title:</b>	<b>Research Project</b>
<b>Course Code:</b>	<b>BIO 6299</b>
<b>Program:</b>	<b>Executive Master of Forensic Science</b>
<b>Department:</b>	<b>Biology- Chemistry</b>
<b>College:</b>	<b>Science</b>
<b>Institution:</b>	<b>Imam Mohammad Ibn Saud Islamic University (IMSIU)</b>

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## A. Course Identification

<b>1. Credit hours:</b> 4 (0 Lecture, 5 Lab, 0 Tutorial)
<b>2. Course type</b> <input checked="" type="checkbox"/> Required <input type="checkbox"/> Elective
<b>3. Level/year at which this course is offered:</b> Level 6 / Year 2
<b>4. Pre-requisites for this course (if any):</b> BIO 691
<b>5. Co-requisites for this course (if any):</b> None

### 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom		
2	Blended		
3	E-learning		
4	Distance learning		
5	Other (Laboratories)	60	100 %

### 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
1	Lecture	0
2	Laboratory/Studio	60
3	Seminars	0
4	Others (specify)	0
<b>Total</b>		<b>60</b>

## B. Course Objectives and Learning Outcomes

### 1. Course Description

Research Project is an independent task to be carried out by each student individually and accomplished according to a specific timetable duration. Research Project is a solo act based on one major Forensic topic (Biology and Chemistry) and supervised by one of the staff members. The Joint Commission of the Executive Master's Program in Forensic Evidence Council (FEGC) assigns a scientific committee with the project supervisor to evaluate and discuss 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 graduation project title; the selected topic will focus on and follow 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.

### 2. Course Main Objective

After completing the project, the student is supposed to acquire the necessary skills in the following:

- Make bibliography about the current state of the art of specific Forensic Evidence subjects.
- Able to read, comment and summarize scientific reports relevant for Forensic Evidence.
- Be adept for the development of innovative ideas in the Forensic Evidence investigation.
- Gain an understanding of the importance of the development of Forensic Science in specific problems and their limitations and applications.

- Be adept at the application of biological and chemicals fundamentals to solve real Forensic Evidence problems in the considered domain.
- Be familiar with new strategic ideas promising in the near future for the scientific community relevant to Forensic Science.
- Practice in writing reports from research investigation works.
- Improve laboratory skills

Be able to develop his intellectual abilities in Forensic Evidence.



### 3. Course Learning Outcomes

CLOs <i>After completion of the course, The Graduate is able</i>		Aligned PLOs
<b>1</b>	<b>Knowledge and Understanding</b>	
1.1	Recall advanced application of in-depth and up-to-date technical knowledge and research principles in Forensic Science.	K1; K3
1.2	Describe appropriately judged professional solutions to Forensic Evidence problems.	K3; K4
1.3	Describe a required understanding of the basic concepts about Forensic Evidence in relevant topics and fields.	K3; K4
1.4	List the essential processes and procedures for the investigation in Forensic Evidence and present it inclusively.	K1; K3
<b>2</b>	<b>Skills:</b>	
2.1	Analyze criminal samples and evidence to make decisions based on the knowledge gained.	S1; S2; S4
2.2	Compare the professional instruments, highly sensitive equipment, hazardous and non-hazardous materials with full capability to analyze Forensic Evidence Samples and cases, and problems.	S1; S3
2.3	Summarize and analyze existing academic literature serving the Forensic Evidence arguments.	S2; S4
2.4	justify laboratory instruments and perform biological and chemical experiments and analysis, handle chemicals and operate tools.	S4
<b>3</b>	<b>Values:</b>	
3.1	Demonstrate ability to deal with various sources of knowledge and the ability to exploit and to estimate the time.	V1
3.2	Analyze the results with other colleagues and with supervisors	S4; V1; V2

## C. Course Content

No	List of Topics	Contact Hours
1	Plan and execute a 16-week project in experimental or theoretical forensic (or a mixture of both) and might involve substantial computing, construction and design, theory, measurements, and numerical modeling or analysis.	7
2	Planning report: Project topic selection and accompanying justification.	6
3	Planning report: Proposed project outline.	6
4	Planning report: Project schedule individual or as a team member task identified.	6
5	Setting and meeting deadlines and dealing with changes to the project plan as they arise.	7
6	Weekly reports.	7
7	Regular interaction and discussion with student's project supervisor and the outcome results and experimentations.	7
8	Undertake a literature review on a topic of relevance to the overall project.	7
9	Deliver a final report presentation, structure and supported appropriate drawings, figures, characteristics curves, experimental equipment's and tests, calculations and appendices) and oral presentation of student's project work summarizing the essential scientific and practical aspects and outcomes of the project at the end of semester.	7
<b>Total</b>		<b>60</b>

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge and Understanding</b>		
1.1	Recall advanced application of in-depth and up-to-date technical knowledge and research principles in Forensic Science.	<ul style="list-style-type: none"> <li>• Weekly contact hours containing literature survey with supervisor guidance.</li> <li>▪ Students are encouraged to make regular visits during office hours where they can ask any question about the course.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Continuous evaluation of the research supervisor</li> <li>▪ Written the collected the literature survey</li> <li>▪ Oral Discussion</li> </ul>
1.2	Describe appropriately judged professional solutions to Forensic Evidence problems.	<ul style="list-style-type: none"> <li>• Weekly contact hours containing laboratory activities under supervisor guidance.</li> <li>• Think and talk to interpret the obtained results.</li> </ul>	<ul style="list-style-type: none"> <li>• Continuous evaluation of the research supervisor</li> <li>• Self-interpreting check with the supervisor</li> <li>• Oral Discussion</li> </ul>
1.3	Describe a required understanding of the basic concepts about Forensic Evidence in relevant topics and fields.	<ul style="list-style-type: none"> <li>• Think and talk about the Research Project topic</li> </ul>	<ul style="list-style-type: none"> <li>• Laboratory reports</li> <li>• Continuous evaluation of the research supervisor</li> <li>• Written report</li> <li>• Oral Discussion</li> </ul>
1.4	List the essential processes and procedures for the investigation in Forensic Evidence and present it inclusively.	<ul style="list-style-type: none"> <li>• Students are encouraged to make regular visits during office hours where they can ask any question about the course.</li> </ul>	<ul style="list-style-type: none"> <li>• Continuous evaluation of the research supervisor</li> <li>• Written the collected the literature survey</li> <li>• Oral Discussion</li> </ul>
2.0	<b>Skills</b>		
2.1	Analyze criminal samples and evidences to make decisions based on the knowledge gained.	laboratory experiments and investigating research relevant for research project topics	<ul style="list-style-type: none"> <li>• Continuous evaluation of the research supervisor</li> <li>• Written report</li> <li>• Oral discussion</li> </ul>
2.2	Compare the professional instruments, highly sensitive equipment, hazardous and non-hazardous materials with full capability to analyze Forensic Evidence Samples and cases, and problems.	Independent data analysis under the guidance of the research supervisor including further discussion.	<ul style="list-style-type: none"> <li>• Continuous evaluation of the research supervisor</li> <li>• Written report</li> <li>• Oral discussion</li> </ul>

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.3	Summarize and analyze existing academic literature serving the Forensic Evidence arguments	<ul style="list-style-type: none"> <li>▪ laboratory experiments and investigating research relevant for research project topics</li> </ul>	<ul style="list-style-type: none"> <li>▪ Laboratory reports</li> <li>▪ Oral discussion</li> </ul>
2.4	Justify laboratory instruments and perform biological and chemical experiments and analysis, handle chemicals and operate tools.	<ul style="list-style-type: none"> <li>▪ Independent developing under the guidance of the research supervisor through under discussion weekly.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Continuous evaluation of the research supervisor</li> <li>▪ Written report</li> <li>▪ Oral discussion</li> </ul>
3.0	<b>Values</b>		
3.1	Demonstrate ability to deal with various sources of knowledge and the ability to exploit and to estimate the time.	<ul style="list-style-type: none"> <li>▪ Supervisor Evaluation.</li> <li>▪ Referees reports on written Research Project.</li> <li>▪ Defense committee evaluation</li> </ul>	<ul style="list-style-type: none"> <li>▪ Supervisor Evaluation.</li> <li>▪ Referees reports on written Research Project.</li> <li>▪ Discussion committee evaluation</li> </ul>
3.2	Analyze the results with other colleagues and with supervisors	<ul style="list-style-type: none"> <li>• Supervisor Evaluation.</li> <li>• Referees reports on written Research Project</li> <li>▪ Discussion committee evaluation</li> </ul>	<ul style="list-style-type: none"> <li>▪ Supervisor Evaluation.</li> <li>▪ Referees reports on written Research Project</li> <li>▪ Discussion committee evaluation</li> </ul>

## 2. Assessment Tasks for Students

- Tasks of Research Project are individuality processed, and the Supervisor (Instructor), weekly evaluate the final effort deployed by the student.
- The student frequently prepares a written mini report parallel with open discussion and seminars in the Research Project Progress with Supervisor (Instructor).



## E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

- Students will be assigned an academic advisor The Joint Commission of the Executive Master's Program in Forensic Evidence (FEGC) Council to give them the appropriate academic counselling and support;
- Weekly meeting and discussions with the research supervisor
- The lecturer for each course allocates 6 office hours per week advertised on his own timetable, and reserved as part of his teaching schedule to help the students on any academic problems/difficulties.
- Student is able to get individual consultation and academic advice appointment with teaching staff via e-mail or phone calls and department website.
- A list of teaching staff members with their room numbers, their phone numbers and their e-mail addresses is given in the Forensic Evidence Master Program Handbook and Departments website of Biology and Chemistry.
- Departments and Master's Program in Forensic Evidence website (<http://units.imamu.edu.sa/colleges/science/Admission/Pages/default.aspx>) with details of all degree programs, lecture courses, and projects, as well as staff contact details and other information and electronic resources.
- Induction talks and meetings in the first week;
- Occasional meetings about course structure, option choices, etc. spread throughout the program.
- The health Centre and student counsellors available on site;
- A central library containing multiple copies of all course texts and giving access to a wide range of electronic resources.
- Well-equipped postgraduate laboratories with demonstrator support and staffed by technicians;

## F. Learning Resources and Facilities

### 1. Learning Resources

<b>Required Textbooks</b>	According to the needs of selected topic, A specified Books, journal articles and references from University Central Library and Saudi Digital Library will be delivered.
<b>Essential Reference Materials</b>	According to the needs of selected topic, A specified Books, journal articles and references from University Central Library and Saudi Digital Library will be delivered.
<b>Electronic Materials</b>	<ul style="list-style-type: none"> <li>• Saudi Digital Library.</li> <li>• Available database.</li> </ul>
<b>Other Learning Materials</b>	<ul style="list-style-type: none"> <li>• Blackboard</li> <li>• Multimedia associated with the text book and the relevant websites</li> </ul>

### 2. Educational and research Facilities and Equipment Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> <li>▪ Each of the classroom should be equipped with a whiteboard and a projector, with a maximum of 20 students.</li> </ul>

Item	Resources
	<ul style="list-style-type: none"> <li>▪ Laboratories should be equipped with computers and an internet connection.</li> </ul>
<p><b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)</p>	<ul style="list-style-type: none"> <li>▪ The rooms are equipped with data show, Smart Board, WI-FI access.</li> </ul>
<p><b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)</p>	<p>Reagents, instrument, and consumables for wet lab needed to achieve objectives of this course</p>

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching	Students	<b>Direct:</b> Questionnaire.
	Course Responsible	<b>Direct:</b> Course e-Portfolio. <b>Indirect:</b> Second examiner checklist-Course report.
	Peer Reviewer	<b>Direct:</b> Questionnaire. <b>Indirect:</b> External assessor report.
Effectiveness of assessment	Program Leaders	<b>Direct:</b> Course e-Portfolio. <b>Indirect:</b> Course report.
Extent of achievement of course learning outcomes	Course Responsible	<b>Direct:</b> Exams - Course e-Portfolio. <b>Indirect:</b> Second examiner checklist-Course report.
	Program Leaders	<b>Indirect:</b> Exams.
Quality of learning resources	Students	<b>Indirect:</b> Second examiner checklist-Course report.
	Faculty ( Academic Advisory-FEGC)	<b>Direct:</b> course Entrance/Exit. <b>Indirect:</b> Observations - Accreditation review.
	Program Leaders	<b>Direct:</b> Course e-Portfolio. <b>Indirect:</b> Course evaluation survey- Observations- Syllabus review- Accreditation review.
	Course Responsible	

**Evaluation areas** (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

**Evaluators** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

**Assessment Methods** (Direct, Indirect)

## Specification Approval Data

Council / Committee	Biology Department Council	Chemistry Department Council
Reference No.	16/1441/1442	1/13
Date	5/5/1442 (20/12/2020)	10/05/1443