Course Specification

(Postgraduate Programs)

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

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A. General information about the course:

1. Course Identification:

1. Credit hours:					
3 (2 Lectures, 0 Lab, 2 Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Program	☐Track	
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (2/1)					
4. Course General Description:					
This course covers forensic toxicology and drug analysis over one semester. The study of drugs and poisons for legal purposes is called forensic toxicology. In addition to regularly encountered drugs and toxins, the course will cover the three key fields of postmortem forensic toxicology, human performance toxicology, and forensic drug testing. Students will learn about the origins, history, forms, physicochemical features, pharmacology, and effects of a variety of drugs, including CNS stimulants, CNS depressants, opioids (natural and manufactured narcotic analgesics), cannabinoids, hallucinogens, and other drugs of interest. Sample handling and pre-treatment, drug isolation from matrices employing solid phase and liquid-liquid extraction, chemical derivatization, donor manipulation, result interpretation, and quality assurance challenges will all be covered.					
5. Pre-requirements for this course (if any):					
None					
6. Pre-requirements for this course (if any):					
None					
7. Course Main Objective(s):					
At the end of the course, the students will be able to: • Familiarize with the three major disciplines of forensic toxicology • Familiarize with the most frequently encountered substances in forensic toxicology and drug-related casework. • Apply important chemical and physical properties of drugs to explain how drugs are extracted or isolated from non-biological and biological evidence, including blood, urine, and human tissues. Explain also how drugs are distributed throughout the body. • Compare and contrast different drugs within the same classification and discuss analytical approaches' relative advantages and disadvantages. • Apply knowledge of methods and techniques to detect substances such as benzodiazepines, barbiturates, narcotics, cocaine, methamphetamine, cannabinoids, and other abused drugs in the laboratory. • Evaluate analytical methods and/or published research in the scientific literature and present those findings in writing.					

2. Teaching Mode: (mark all that apply)

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

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

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

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

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

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

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	Action.			
2.4	**To demonstrate Oral Communication for Postmortem Forensic Toxicology and applied techniques and methods, accompanying writing of mini-report, operating electronic mail, and networking in communicating with others.**	**S3; S4; V1**	▪ Group Discussion and Assignments ▪ Introduce several examples of Postmortem Forensic Toxicology to elucidate and justify used techniques in an investigation, which will require reading, writing, and oral presentation. ▪ Encourage students to use electronic mail to submit Home Exams and Assignments.	▪ Oral Discussion, Quizzes, and Exams. ▪ Giving marks for Oral Discussion in Lectures. ▪ Marks given for Assignments
3.0	**Values, autonomy, and responsibility**			
3.1	**To perform a scientific presentation, research, and work independently and integrate with a collaborated group, Using IT to acquire, analyze, and communicate information.**	**V1**	▪ Brainstorming. ▪ Exercises ▪ Group Discussion. Team work.	▪ Oral Discussion. ▪ Group Discussion ▪ Assignments
3.2	**To appraise effectively the collaboration and inter-professionalism in class discussions or team works, as well as independently.**	**V1; V2**	▪ Small Group tasks ▪ Open discussion at classroom. ▪ Office hour guiding. ▪ Group Presentation of	▪ Participation ▪ Homework's ▪ Mini-project(s).

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

C. Course Content:

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

D. Students Assessment Activities:

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

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

E. Learning Resources and Facilities:

1. References and Learning Resources:

Essential References	**Principles of Forensic Toxicology,** Barry S. Levine, Sarah Kerrigan, Springer Nature, 5th Edition, Gewerbestrasse 11, 6330 Cham, Switzerland, Switzerland AG. 2020. ISBN 978-3-030-42916-4.
Supportive References	NONE
Electronic Materials	https://www.sciencedirect.com/topics/pharmacology-toxicology-and-pharmaceutical-science/forensic-toxicology
Other Learning Materials	• Blackboard Multimedia associated with the text book and the relevant websites.

2. Educational and Research Facilities and Equipment Required:

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

F. Assessment of Course Quality:

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

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

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

G. Specification Approval Data:

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