

	MAHATMA GANDHI UNIVERSITY Kottayam, Kerala Undergraduate Programmes (HONOURS) 2026 Admission Onwards
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SYLLABUS									
SIGNATURE COURSE									
Name of the College	The Cochin College, Cochin								
Faculty/ Discipline	Chemistry								
Programme	BSc (Hons) Chemistry								
Course Coordinator	Priya M								
Contributors	Dr Zafna Rasheed								
Course Name	Introduction to Forensic Chemistry								
Type of Course	DSE								
Specialization title	Forensic Chemistry								
Course Code	MG3DSECHEA07								
Course Level	200								
Course Summary	This course introduces the fundamentals of forensic science and forensic chemistry, emphasizing crime scene investigation, evidence handling, and analytical techniques used in criminal investigations. It covers forensic laboratory structure, ethical practices, and the application of organic and nuclear chemistry in forensic analysis. The course aims to develop scientific reasoning, analytical skills, and an understanding of modern forensic methodologies relevant to law enforcement and research.								
Semester	3	Credits	4						
Course Details	<table><tr><td>Learning Approach</td><td>Lecture</td><td>Total Hours</td></tr><tr><td>Credits</td><td>4</td><td>60</td></tr></table>			Learning Approach	Lecture	Total Hours	Credits	4	60
	Learning Approach	Lecture	Total Hours						
Credits	4	60							
Pre-requisites, if any									

Course Outcomes (CO)

Number of COs		5	
CO No.	Expected Course Outcome	Learning Domains *	PO No
1	To explain the fundamentals, scope, and organizational framework of forensic science and forensic chemistry	U	PO1, PO2, PO3, PO8, PO10
2	To apply principles of crime scene investigation and evidence collection, preservation, and documentation	A	PO1, PO2, PO4, PO5, PO6, PO7, PO8, PO10
3	To analyze different types of forensic evidence and ethical considerations in forensic practice	An	PO1, PO2, PO3, PO6, PO7, PO8, PO10
4	To explain the principles and applications of organic chemistry in forensic analysis	U	PO1, PO2, PO3, PO8, PO10
5	To analyze nuclear chemistry concepts and their applications in forensic investigations	An	PO1, PO2, PO3, PO8, PO10

CO-PO Articulation Matrix

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10
CO 1	3	2	2	-	-	-	-	2	-	2
CO 2	3	3	-	3	2	2	2	2	-	2
CO 3	3	3	2	-	-	2	2	3	-	2
CO 4	3	2	1	-	-	-	-	1	-	1
CO 5	3	3	2	-	-	-	-	2	-	2

'0' is No Correlation, '1' is Slight Correlation (Low level), '2' is Moderate Correlation (Medium level) and '3' is Substantial Correlation (High level).

Course Content

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs	CO No.
1	Introduction to Forensic Science			
	1.1	Definition and scope of forensic science. History and development of forensic science. Role of forensic science in criminal investigations. Branches of forensic science: Forensic chemistry, Forensic biology, Forensic toxicology, Forensic anthropology Importance of forensic evidence in law enforcement. Career opportunities in Forensic Science	4	["1"]
	1.2	Introduction to Forensic Chemistry. Definition and scope of forensic chemistry. Relationship between forensic science and chemistry. Role of forensic chemists in criminal investigation. Importance of chemical analysis in law enforcement.	4	["1"]
	1.3	Organizational framework and functions of State and Central Forensic Science Laboratories in India (FSL, CFSL, etc.) along with the services offered by related institutions such as GEQD and FPB. Role and operational aspects of Mobile Forensic Science Laboratories. Qualifications, training requirements, and professional ethics of forensic scientists.	7	["1"]
2	Introduction to Crime Scene Investigation and Evidences			
	2.1	Definition and concept of crime scene. Types of crime scenes: Indoor, outdoor, mobile, and water scenes. Classification of crimes: homicide, suicide, accident, theft. Importance of crime scene in forensic investigation	5	["2"]
	2.2	Definition and concept of crime scene. Types of crime scenes: Indoor, outdoor, mobile, and water scenes. Classification of crimes: homicide, suicide, accident, theft. Importance of crime scene in forensic investigation	6	["2"]
	2.3	Types of Forensic Evidence: Classification of Evidence, Physical evidence, Biological evidence, Chemical evidence, Trace evidence, Documentary evidence Ethics in Forensic Science	4	["3"]

Module	Units	Course Description	Hrs	CO No.
3	Applied Organic Chemistry			
	3.1	Petroleum products: Composition and Classification, definition of flash Point and fire Point, knocking, octane number, aniline Point. Refining of Petroleum- cracking, thermal & catalytic cracking.	5	["4"]
	3.2	Heterocycles: Introduction, 5 and 6-membered heterocycles, structures of pyrrole, furan, thiophene and pyridine.	2	["4"]
	3.3	Dyes: Classification of dyes on the basis of structures, and on the basis of mode of application.	3	["4"]
	3.4	Polymers: Introduction, types of polymers, addition and condensation polymers, introduction to natural products, insecticides and pesticides.	5	["4"]
4	Nuclear Chemistry			
	4.1	Basics of Nuclear Chemistry: Structure of nucleus: protons, neutrons, nuclear forces. Concepts of isotopes, isobars, and isotones. Radioactivity: types of radiation (α , β , γ), Radioactive decay laws and half-life, Units of radioactivity (Becquerel, Curie).	5	["5"]
	4.2	Detection and Measurement of Radiation: Principles of radiation detection. Instruments used in forensic analysis: Geiger-Müller counter, Scintillation counter, Semiconductor detectors (overview). Safety precautions in handling radioactive materials.	5	["5"]
	4.3	Radioisotopes in Forensic Science: Use of radioactive isotopes as tracers. Neutron Activation Analysis: principle and applications. Age determination using radioactive methods (radio carbon dating).	5	["5"]

Teaching and Learning Approach	Classroom Procedure (Mode of transaction) Lecture (chalk & board, PowerPoint presentation) ● Group discussion ● Peer teaching
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Assessment Types	MODE OF ASSESSMENT Mode of Assessment: Theory
	A. Continuous Comprehensive Assessment (CCA) • Theory - 30 Marks Assignments/Seminar/Viva/MCQ/Class test
	B. End Semester Evaluation (ESE) • Theory - 70 Marks Assessment Methods - Written exam Duration of Examination - 2.00 Hrs Pattern of examination for Theory - Non-MCQ Different parts of written examination - Part - A , B , C Answer Type: ◦ PART - A ◦ Short answer - (5 out of 7) - 5 × 4 = 20 ◦ PART - B ◦ Short Essays - (5 out of 7) - 5 × 7 = 35 ◦ PART - C ◦ Essays - (1 out of 2) - 1 × 15 = 15

References

- B.B. Nanda and R.K. Tiwari, Forensic Science in India: A Vision for the Twenty First Century, Select Publishers, New Delhi

(2001).

- R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey (2004).
- Morrison and Boyd, Organic Chemistry, 6th Edition, Prentice Hall of India, New Delhi (2003).
- Arun Bahl and B.S. Bahl, A Textbook of Organic Chemistry, 22nd Edition, S. Chand & Company Ltd., New Delhi (2010).
- V.R. Gowariker, N.V. Viswanathan and J. Sreedhar, Polymer Science, New Age International Publishers, New Delhi (2003).
- H.J. Arnikar, Essentials of Nuclear Chemistry, 4th Edition, New Age International Publishers, New Delhi (2005).
- S.N. Ghoshal, Nuclear Chemistry, S. Chand & Company Ltd., New Delhi (2009).
- J.A. Siegel, Forensic Chemistry: Fundamentals and Applications, Wiley, Hoboken (2007).

Affidavit

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- We, The Cochin College, Cochin, agree to appoint a new course coordinator for the proposed Forensic Chemistry in the event of the unavailability of the currently nominated coordinator. This appointment will ensure the continued coordination of course delivery, assessments, and all related academic responsibilities necessary for the successful implementation of the specialization, for as long as the college offers this programme.
- We, The Cochin College, Cochin and Priya M, declare that no part of this signature course submitted here for approval has been taken from the course content developed by, or from any of the course titles prepared by, the BoS/expert committee in the same discipline under our University.

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SYLLABUS									
SIGNATURE COURSE									
Name of the College	The Cochin College, Cochin								
Faculty/ Discipline	Chemistry								
Programme	BSc (Hons) Chemistry								
Course Coordinator	Priya M								
Contributors	Dr Zafna Rasheed								
Course Name	Analytical Techniques in Forensic Chemistry								
Type of Course	DSE								
Specialization title	Forensic Chemistry								
Course Code	MG4DSECHEA07								
Course Level	200								
Course Summary	This course introduces fundamental and advanced analytical techniques used in forensic chemistry for the examination of chemical evidence. It covers chromatographic, spectroscopic, extraction, and microscopic methods applied to biological, chemical, and trace samples. Emphasis is placed on principles, instrumentation, and interpretation of results in forensic investigations.								
Semester	4	Credits	4						
Course Details	<table><tr><td>Learning Approach</td><td>Lecture</td><td>Total Hours</td></tr><tr><td>Credits</td><td>4</td><td>60</td></tr></table>			Learning Approach	Lecture	Total Hours	Credits	4	60
	Learning Approach	Lecture	Total Hours						
Credits	4	60							
Pre-requisites, if any									

Course Outcomes (CO)

Number of COs		6	
CO No.	Expected Course Outcome	Learning Domains *	PO No
1	To explain the principles, steps, and quality aspects of forensic analytical methods.	U	PO1, PO2
2	To apply paper, column, and thin layer chromatographic techniques in forensic sample analysis.	A	PO1, PO2, PO3, PO10
3	To analyze solvent extraction methods and factors affecting extraction efficiency.	An	PO1, PO2, PO3
4	To explain the principles and forensic applications of basic spectroscopic techniques.	U	PO1, PO2
5	To analyze advanced chromatographic and hyphenated techniques used in forensic toxicology and drug analysis.	An	PO1, PO2, PO3, PO4

Number of COs		6	
CO No.	Expected Course Outcome	Learning Domains *	PO No
6	To evaluate microscopic techniques for forensic examination of residues and trace materials.	E	PO1, PO2, PO4, PO6, PO8

*Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)

CO-PO Articulation Matrix

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10
CO 1	3	2	-	-	-	-	-	-	-	-
CO 2	3	3	2	-	-	-	-	-	-	2
CO 3	3	3	2	-	-	-	-	-	-	-
CO 4	3	2	-	-	-	-	-	-	-	-
CO 5	3	3	2	2	-	-	-	-	-	-
CO 6	3	2	-	3	-	2	-	2	-	-

'0' is No Correlation, '1' is Slight Correlation (Low level), '2' is Moderate Correlation (Medium level) and '3' is Substantial Correlation (High level).

Course Content

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs	CO No.
1	Introduction to Analytical Methods in Forensic Analysis			
	1.1	Overview of Analytical Methods in Forensic Laboratories: Role of analytical chemistry in forensic science. Types of forensic samples: Biological (blood, urine, tissues), Chemical (drugs, poisons), Trace evidence (glass, fibres, soil). Steps in forensic analysis: Sampling, Preservation, Analysis, Interpretation. Concepts of accuracy, precision, sensitivity, and selectivity. Quality control, validation, and reliability in forensic laboratories.	9	["1"]
2	Basic Chromatographic Techniques			
	2.1	Paper Chromatography : Introduction and principle. Types of paper chromatography: Ascending, Descending, Radial. Experimental procedure. Factors affecting separation. Applications in forensic science: Ink analysis, Dye separation, Preliminary drug identification	6	["2"]
	2.2	Column Chromatography: Introduction and principle (adsorption chromatography). Components: stationary phase, mobile phase, Adsorbents: silica gel, alumina. Selection of solvents, Working and elution techniques. Factors affecting column efficiency: Particle size, Flow rate, Solvent polarity. Applications in separation of forensic samples	6	["2"]
	2.3	Thin Layer Chromatography (TLC) Introduction and principle. Stationary phase and mobile phase, Solvent system selection, Procedure of plate development, Visualization techniques. Rf value and its significance. Applications in forensic science: Drug and poison analysis, Ink and pigment identification.	6	["2"]

Module	Units	Course Description	Hrs	CO No.
3	Solvent Extraction and Basic Spectroscopic Techniques			
	3.1	Solvent Extraction Techniques: Introduction and principle of solvent extraction. Types of extraction: Batch extraction, Continuous extraction, Counter-current extraction. Distribution law and percentage extraction, Separation factor and its significance, Factors affecting solvent extraction efficiency. Applications in chemical and industrial analysis.	6	["3"]
	3.2	Basic Spectroscopic Techniques: UV-Visible Spectroscopy, Infrared (IR) Spectroscopy, Atomic Absorption Spectroscopy (AAS), Fluorescence Spectroscopy (Basic Concepts). Forensic Applications of Spectroscopy: Detection of heavy metals (Pb, Hg, Cd), applications in toxicology.	7	["4"]
4	Advanced Analytical Techniques in Forensic Chemistry			
	4.1	Gas Chromatography, HPLC and Hyphenated Techniques : Gas Chromatography (GC) , High Performance Liquid Chromatography (HPLC), Mass Spectrometry (MS), Introduction to High Performance TLC (HPTLC), Ultra Performance Liquid Chromatography (UPLC), Chiral chromatography, Hyphenated Techniques: GC-MS and LC-MS (Basic Principle only). Applications in forensic toxicology and drug analysis.	12	["5"]
	4.2	Microscopic Techniques in Forensic Chemistry Scanning Electron microscopy (SEM), Transmission Electron Microscopy (TEM) (intro), SEM-EDX for elemental mapping, Atomic Force microscopy. Applications in GSR analysis and analysis of biological fluids.	8	["6"]

Teaching and Learning Approach	Classroom Procedure (Mode of transaction) Lecture (chalk & board, PowerPoint presentation) ● Group discussion ● Peer teaching, Case studies
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Assessment Types	MODE OF ASSESSMENT Mode of Assessment: Theory
	A. Continuous Comprehensive Assessment (CCA) • Theory - 30 Marks Assignments/Seminar/Viva/MCQ/Class test
	B. End Semester Evaluation (ESE) • Theory - 70 Marks Assessment Methods - Written exam Duration of Examination - 2.00 Hrs Pattern of examination for Theory - Non-MCQ Different parts of written examination - Part - A , B , C Answer Type: ◦ PART - A ◦ Short answer - (5 out of 7) - 5 × 4 = 20 ◦ PART - B ◦ Short Essays - (5 out of 7) - 5 × 7 = 35 ◦ PART - C ◦ Essays - (1 out of 2) - 1 × 15 = 15

References

- S. Bell, Forensic Chemistry, CRC Press, Boca Raton (2022).
- D. A. Skoog, F. J. Holler and S. R. Crouch, Principles of Instrumental Analysis, Cengage Learning, New Delhi (2018).
- R. M. Silverstein, F. X. Webster and D. J. Kiemle, Spectrometric Identification of Organic Compounds, Wiley India Pvt. Ltd.,

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- B. R. Sharma, Forensic Science in Criminal Investigation and Trials, LexisNexis, New Delhi (2020).
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- C. N. Banwell and E. M. McCash, Fundamentals of Molecular Spectroscopy, McGraw Hill Education, New Delhi (2017).

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SYLLABUS			
SIGNATURE COURSE			
Name of the College	The Cochin College, Cochin		
Faculty/ Discipline	Chemistry		
Programme	BSc (Hons) Chemistry		
Course Coordinator	Priya M		
Contributors	Dr. Zafna Rasheed		
Course Name	The Chemistry of Arson, Ballistics and Narcotics		
Type of Course	DSE		
Specialization title	Forensic Chemistry		
Course Code	MG5DSECHEA07		
Course Level	300		
Course Summary	This course provides a comprehensive understanding of forensic chemistry with emphasis on arson investigation, explosives analysis, and forensic ballistics. It covers the detection and analysis of gunshot residues, narcotic drugs, and psychotropic substances. The course also introduces forensic examination of alcoholic beverages, dyes, inks, polymers, and environmental toxicology.		
Semester	5	Credits	4
Course Details	Learning Approach		Total Hours
	Credits	4	60
Pre-requisites, if any			

Course Outcomes (CO)

Number of COs		5	
CO No.	Expected Course Outcome	Learning Domains *	PO No
1	To explain arson and explosives investigation.	U	PO1, PO2, PO6
2	To apply and analyze ballistics and gunshot residue (GSR) evidence.	A, An	PO1, PO2, PO3, PO4, PO5
3	To explain narcotic drugs and their detection methods.	U	PO1, PO2, PO6, PO8
4	To analyze dyes, inks, alcohol, and bribe trap cases.	An	PO1, PO2, PO3, PO4, PO8
5	To evaluate polymers and environmental toxicology in forensic investigations.	E	PO1, PO2, PO4, PO6, PO8

*Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)

CO-PO Articulation Matrix

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10
CO 1	3	2	-	-	-	2	-	-	-	-
CO 2	3	3	2	3	2	-	-	-	-	-
CO 3	3	2	-	-	-	2	-	2	-	-
CO 4	3	3	2	3	-	-	-	2	-	-
CO 5	3	3	-	3	-	2	-	2	-	-

'0' is No Correlation, '1' is Slight Correlation (Low level), '2' is Moderate Correlation (Medium level) and '3' is Substantial Correlation (High level).

Course Content

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs	CO No.
1	Arson and Explosives			
	1.1	Introduction to arson and fire-related crimes. Classification of fires and common causes of fire outbreaks, Study of fire patterns and their interpretation. Types of incendiary materials: liquid and solid accelerants, incendiary bombs - Time bomb, Analysis of fire debris with special reference to petroleum products. Classification and chemical nature of explosives. Types of improvised explosive devices (IEDs), Examination and analysis of explosive materials and post-blast residues.	9	["1"]
	1.2	Case studies: Investigation of accidental vs. intentional fires using burn pattern analysis, Analysis of petroleum residues in fire debris samples, Forensic examination of explosion residues to identify the type of explosive used.	6	["1"]
2	Introduction to Ballistics in Forensic Chemistry			
	2.1	Introduction to Ballistics: Definition and scope of forensic ballistics, History and development of firearms, Classification of ballistics: Internal ballistics, External ballistics, Terminal ballistics, Types of firearms: Rifled and smoothbore firearms, Handguns, rifles, shotguns.	5	["2"]
	2.2	Ammunition and Firearm Mechanism: Components of ammunition, Cartridge case, primer, propellant, bullet. Types of ammunition. Firing mechanism of firearms. Chemical composition of propellants and primers, Smokeless powder vs black powder.	5	["2"]
	2.3	Gunshot Residue (GSR) and Chemical Analysis: Definition and formation of gunshot residue Chemical composition of GSR (lead, barium, antimony), Collection of GSR samples from hands, clothes, and surfaces.	5	["2"]
3	Narcotic Drugs and Psychotropic Substance			
	3.1	Introduction to controlled drugs and regulated substances. Classification of controlled substances. Overview of narcotic drugs and psychotropic substances as defined under the NDPS Act. Commonly abused drugs and their classification. Drugs of abuse in sports and their implications, Date rape drugs and their forensic detection. Concept and examples of designer drugs and examination. Concepts of drug dependence and drug tolerance.	9	["3"]
	3.2	Alcoholic and Non-Alcoholic Beverages in Forensic Context: Classification of alcoholic beverages: country-made liquor, illicit liquor, and medicinal preparations containing alcohol and drugs, Identification and forensic relevance of illicit liquor, Composition and misuse of medicinal alcohol-containing preparations, Forensic significance of non-alcoholic beverages in investigations Case Study: Detection of banned substances in athletes, Identification of synthetic (designer) drugs .	6	["4"]

Module	Units	Course Description	Hrs	CO No.
4	Dyes, Inks, Polymers, and Environmental Toxicology in Forensics			
	4.1	Introduction to dyes: classification and their forensic significance, Forensic analysis of dyes in evidence examination, Bribe trap investigations: examination of chemicals used in bribe trap cases (e.g., phenolphthalein and related reagents) Inks: Forensic examination of inks using various analytical techniques, Methods for dating and aging of inks .	8	["4"]
	4.2	Polymers: Introduction to plastics and adhesives. Forensic examination and identification of polymeric materials	4	["5"]
	4.3	Introduction to environmental toxicology. Forensic importance of environmental pollutants and toxic substances	3	["5"]

Teaching and Learning Approach	Classroom Procedure (Mode of transaction) Lecture (chalk & board, PowerPoint presentation) , Case study, Group discussion ,Peer teaching.
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Assessment Types	MODE OF ASSESSMENT Mode of Assessment: Theory
	A. Continuous Comprehensive Assessment (CCA) • Theory - 30 Marks Assignments/Seminar/Viva/MCQ/Class test
	B. End Semester Evaluation (ESE) • Theory - 70 Marks Assessment Methods - Written exam Duration of Examination - 2.00 Hrs Pattern of examination for Theory - Non-MCQ Different parts of written examination - Part - A , B , C Answer Type: ◦ PART - A ◦ Short answer - (5 out of 7) - $5 \times 4 = 20$ ◦ PART - B ◦ Short Essays - (5 out of 7) - $5 \times 7 = 35$ ◦ PART - C ◦ Essays - (1 out of 2) - $1 \times 15 = 15$

References

- Suzanne Bell, Forensic Chemistry, 2nd Edition, Pearson Education, Upper Saddle River (2013).
- Jay A. Siegel and Pekka J. Saukko, Encyclopedia of Forensic Sciences, 2nd Edition, Academic Press, London (2013).
- J. D. DeHaan and D. J. Iovine, Kirk's Fire Investigation, 7th Edition, Pearson, Boston (2011).
- Keith Inman and Norah Rudin, Principles and Practice of Criminalistics: The Profession of Forensic Science, CRC Press, Boca Raton (2001).
- Barry A. J. Fisher, Techniques of Crime Scene Investigation, 8th Edition, CRC Press, Boca Raton (2012).

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SYLLABUS				
SIGNATURE COURSE				
Name of the College	The Cochin College, Cochin			
Faculty/ Discipline	Chemistry			
Programme	BSc (Hons) Chemistry			
Course Coordinator	Priya M			
Contributors	Dr. Zafna Rasheed			
Course Name	The Chemistry of Fingerprints and Bio-markers			
Type of Course	DSE			
Specialization title	Forensic Chemistry			
Course Code	MG6DSECHEA07			
Course Level	300			
Course Summary	This course introduces forensic toxicology, DNA analysis, and fingerprint examination. It covers classification and effects of poisons, extraction and analysis of toxic substances, DNA sources and profiling techniques, and fingerprint chemistry. Emphasis is given to modern analytical methods and their applications in forensic investigations for identification and evidence interpretation in criminal cases.			
Semester	6	Credits	4	
Course Details				
	Learning Approach	Lecture	Practical/Lab-P	Total Hours
	Credits	3	1	75
Pre-requisites, if any				

Course Outcomes (CO)

Number of COs		7	
CO No.	Expected Course Outcome	Learning Domains *	PO No
1	To explain classification, action, and effects of poisons in forensic toxicology	U	PO1, PO2
2	To apply techniques for collection, preservation, and extraction of poisons	A	PO2, PO3, PO4
3	To analyze DNA sources, extraction methods, and typing systems	An	PO1, PO2, PO3
4	To evaluate DNA profiling and its forensic applications	E	PO2, PO4, PO5
5	To explain chemistry of fingerprint formation and development	U	PO1, PO2
6	To analyze advanced techniques in fingerprint and trace analysis	An	PO2, PO3, PO4, PO5
7	o apply basic forensic chemistry laboratory techniques.	A	PO2, PO3, PO4, PO5

*Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)

CO-PO Articulation Matrix

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10
CO 1	3	2	-	-	-	-	-	-	-	-
CO 2	-	3	3	2	-	-	-	-	-	-
CO 3	3	3	2	-	-	-	-	-	-	-
CO 4	-	2	-	2	3	-	-	-	-	-
CO 5	3	2	-	-	-	-	-	-	-	-
CO 6	-	2	3	2	3	-	-	-	-	-
CO 7	-	2	3	2	3	-	-	-	-	-

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Course Content

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs	CO No.
1	Forensic Toxicology			
	1.1	Introduction and classification of poisons, Mode of action of poisons and their physiological effects, Signs and symptoms associated with different classes of poisons, Concepts of fatal dose and fatal period, General treatment measures and common antidotes, Post-mortem findings in poisoning cases, Collection, preservation, and handling of viscera and other biological samples.	8	["1"]
	1.2	Isolation and extraction of poisons from biological material, Viscera, Blood and urine, Gastric contents (stomach wash, vomit), Food samples. Analysis of decomposed materials, Methods used in toxicological analysis (overview), Safe handling and disposal of toxicological samples	7	["2"]
2	Forensic DNA Analysis			
	2.1	Sources of DNA in forensic investigations, Extraction and isolation of DNA from various biological samples, including: Blood, semen, and buccal swabs, Tissues, hair, and nails, Stains and other trace evidence, Use of FTA cards for collection, preservation, and isolation of DNA	7	["3"]
	2.2	DNA typing systems: Length polymorphisms, Short Tandem Repeats (STRs), Single Nucleotide Polymorphisms (SNPs)	4	["3"]
	2.3	Introduction to DNA profiling and its forensic applications, Overview of mitochondrial DNA (mtDNA) and its significance in forensic analysis	4	["4"]
3	Finger printing			
	3.1	Introduction to Fingerprints: Types of fingerprints: Patent, Plastic, Latent prints, Fingerprint patterns and Fingerprint characters, Formation of fingerprints: friction ridge skin, Chemical composition of fingerprint residue:, Eccrine secretions (water, salts, amino acids), Sebaceous secretions (lipids, fatty acids, wax esters), Factors affecting fingerprint composition: Age, diet, environment, contamination Chemistry of Latent Fingerprint Development: Chemical Methods: Ninhydrin method, Silver nitrate method, Iodine fuming, Cyanoacrylate fuming.	10	["5"]
	3.2	Mass spectrometry in fingerprint analysis, Detection of drugs/explosives in fingerprints, Use of fluorescent dyes in fingerprint analysis. Significance of Poroscopy and edgeoscopy.	5	["6"]

Module	Units	Course Description	Hrs	CO No.
4	Forensic Chemistry practicals			
	4.1	Determination of pH of unknown samples Detection of adulterants in food samples Separation of ink components by paper chromatography Separation of dyes by thin layer chromatography (TLC) Detection of alcohol in a given sample Detection of toxic substances by spot tests Simple distillation of liquid mixtures Separation of drug/dye mixtures by chromatography	30	["7"]

Teaching and Learning Approach	Classroom Procedure (Mode of transaction) • Lecture (chalk & board, PowerPoint presentation) • Group Discussion • Peer interaction • Demonstration of Experiments • Hands on Training
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Assessment Types	MODE OF ASSESSMENT Mode of Assessment: Both
	A. Continuous Comprehensive Assessment (CCA) • Theory - 25 Marks Quiz/Assignment/Class test • Practical - 15 Marks Lab involvement and Lab Report
	B. End Semester Evaluation (ESE) • Theory - 50 Marks Assessment Methods - Written exam Duration of Examination - 1.50 Hrs Pattern of examination for Theory - Non-MCQ Different parts of written examination - Part - A , B , C , D Answer Type: • PART - A • One Sentence - (10 out of 10) - $10 \times 1 = 10$ • PART - B • Short answer - (4 out of 6) - $4 \times 3 = 12$ • PART - C • Short Essays - (2 out of 3) - $2 \times 7 = 14$ • PART - D • Essays - (1 out of 2) - $1 \times 14 = 14$ • Practical - 35 Marks Assessment Methods - Viva, Experiment, Writing Procedure, Certified Lab Report Duration of Examination - 2.00 Hrs

References

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- J. M. Butler, Fundamentals of Forensic DNA Typing, Academic Press, London (2010).
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- R. Baselt, Disposition of Toxic Drugs and Chemicals in Man, 11th Edition, Biomedical Publications, Seal Beach (2017).
- B. N. B. Nanda and R. K. Tiwari, Forensic Science in India: A Vision for the Twenty First Century, Select Publishers, New Delhi (2001).

Affidavit

- We, The Cochin College, Cochin and Priya M, retain the copyright of this syllabus and expressly prohibit its distribution in complete form to any institution outside our own.
- We, The Cochin College, Cochin, agree to appoint a new course coordinator for the proposed Forensic Chemistry in the event of the unavailability of the currently nominated coordinator. This appointment will ensure the continued coordination of course delivery, assessments, and all related academic responsibilities necessary for the successful implementation of the specialization, for as long as the college offers this programme.
- We, The Cochin College, Cochin and Priya M, declare that no part of this signature course submitted here for approval has been taken from the course content developed by, or from any of the course titles prepared by, the BoS/expert committee in the same discipline under our University.

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