

Date: 05/09/2019

To
The Principal,
Shri. Mohatadevi Shikshan Sanstha,
Pragati Mahavidyalaya,
Sawkheda, Tq. Sillod,
Dist. Aurangabad

Subject: Proposal to Run a Certificate Course in "*Forensic Chemistry*" for the Academic Year 2019-20

Respected Sir/Madam,

I, , Head of the Chemistry Department, am writing to propose the introduction of a certificate course entitled "*Forensic Chemistry*" for our students during the academic year 2019-20. The course is designed to be of 30 hours duration and aims to provide an overview and understanding of forensic chemical analysis and its applications in crime investigation.

Course Objectives:

- To provide students with foundational knowledge of forensic chemistry and its significance in modern crime investigation.
- To enhance analytical and problem-solving skills through practical case studies and laboratory experiments.
- To prepare students for future opportunities in the field of forensic science and related industries.


The course will cover various topics, including but not limited to:

- Introduction to Forensic Chemistry
- Analysis of Chemical Evidence
- Toxicology
- Arson Investigation Techniques
- Drugs and Narcotics Identification

Therefore, I kindly request your approval and support for conducting this course. We are confident that with your encouragement and the resources of our institution, we can successfully implement this program and offer our students a unique learning opportunity.

Thank you for considering this proposal. We look forward to your favorable response.

Yours sincerely,


Dr. Rizwan Sayed Ali
HOD, Chemistry Department
Pragati Mahavidyalaya,
Sawkheda, Tq. Sillod, Dist. Aurangabad



Shri Mohatadevi Shikshan Sanstha, Aurangabad.

PRAGATI MAHAVIDYALAYA

Sawkheda, Tq. Sillod, Dist. Aurangabad.

Affiliated to: S.N.D.T. Women's University, Mumbai

College Code: 442 Exam. Center Code: 291

Website: www.pragatisawkheda.co.in

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Contact: 9822021784, 8888611717



Mrs. Kaveri Palkar
President

Mrs. Archana Mukhekar
Secretary

Dr. Varsha Phalke
Principal

Ref No.: PMS/2019-2020/04

Date: 06/09/2019

To
The Head of Department,
Chemistry Department,
Pragati Mahavidyalaya,
Sawkheda, Tq. Sillod,
Dist. Aurangabad

Subject: Sanction of Certificate Course in "*Forensic Chemistry*" for the Academic Year 2019-20

Respected Sir,

With reference to your proposal dated [Date of Proposal], I am pleased to inform you that the college management has approved the introduction of the certificate course titled "*Forensic Chemistry*" for the academic year 2019-20.

The course, as outlined in your proposal, will be conducted for a total duration of 30 hours and is aimed at enhancing the knowledge and skills of the students in the field of forensic chemistry. We believe that this course will provide valuable learning opportunities and greatly benefit our students.

You are hereby granted permission to proceed with the necessary arrangements to implement the course. Please ensure that all necessary preparations, including the course curriculum, faculty allocation, and resource management, are completed in a timely manner. Additionally, any further requirements or assistance needed from the administration should be communicated at the earliest.

We look forward to the successful execution of this course and are confident it will be a valuable addition to our academic offerings.

Thank you for your initiative in proposing this course and for your continuous efforts to enrich the educational experience of our students.

Yours sincerely,

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Ref No.: PMS/20 19-20 20 / 04

Date : 06 / 09 / 2019

NOTICE

This is to inform all students of the Chemistry Department that a new certificate course titled "*Forensic Chemistry*" has been approved and will be offered in the academic year 2019-20.

This course is a 30-hour program specifically designed to provide students with specialized knowledge and practical skills in forensic chemistry, including the analysis of chemical evidence and toxicology.

Interested students are encouraged to register for this course at the earliest. For any further information or clarification, please contact the department HOD.

We believe this course will be highly beneficial for those looking to enhance their academic and professional skills in the field of forensic science.

We look forward to your enthusiastic participation.


HOD

Chemistry Department



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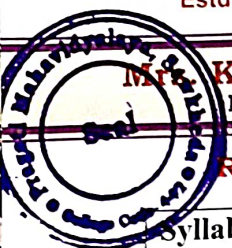
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Syllabus for Certificate Course in Forensic Chemistry

Duration: 30 Hours

Academic Year: 2019-20

Course Overview:

The Certificate Course in *Forensic Chemistry* is designed to provide students with a comprehensive understanding of the role of chemistry in forensic science. The course covers various aspects of forensic chemistry, including the analysis of physical and chemical evidence, toxicology, drug identification, and the application of chemical principles in criminal investigations.

Course Structure:

Module 1: Introduction to Forensic Chemistry (4 hours)

- Overview of Forensic Science and Forensic Chemistry
- History and Evolution of Forensic Chemistry
- Role of Forensic Chemists in Criminal Investigations
- Laboratory Safety and Ethics in Forensic Chemistry

Module 2: Physical Evidence Analysis (5 hours)

- Types of Physical Evidence (Soil, Glass, Paint, Fibers, etc.)
- Chemical and Physical Properties of Evidence
- Techniques for Collecting, Preserving, and Analyzing Physical Evidence
- Case Studies: Analysis of Physical Evidence in Real-Life Scenarios

Module 3: Chemical Evidence and Toxicology (6 hours)

- Introduction to Toxicology and Poisons
- Types of Chemical Evidence (Biological Samples, Poisons, Controlled Substances, etc.)
- Methods of Detection and Analysis (Chromatography, Spectroscopy, etc.)
- Interpretation of Toxicological Findings in Forensic Investigations

Module 4: Drug Analysis and Controlled Substances (5 hours)

- Classification of Drugs and Controlled Substances
- Analytical Techniques for Drug Identification (GC-MS, FTIR, HPLC, etc.)
- Drug Metabolism and Pharmacokinetics
- Case Studies: Drug Identification and Analysis in Forensic Cases

Module 5: Forensic Serology and DNA Analysis (5 hours)

- Basics of Forensic Serology (Blood Typing, Bloodstain Pattern Analysis)
- DNA Structure and Function in Forensic Science

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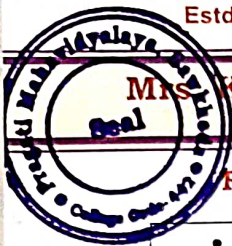
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- Techniques for DNA Extraction, Amplification, and Analysis (PCR, STR Analysis, etc.)
- Applications of DNA Profiling in Criminal Cases

Module 6: Advanced Analytical Techniques in Forensic Chemistry (3 hours)

- Advanced Instrumental Methods (NMR, XRF, Mass Spectrometry)
- Application of Nanotechnology in Forensic Science
- Emerging Trends and Innovations in Forensic Chemistry

Module 7: Case Studies and Practical Applications (2 hours)

- Review of Notable Forensic Chemistry Cases
- Interactive Discussions and Problem Solving
- Application of Learned Concepts in Mock Crime Scene Investigations

Module 8: Course Review and Assessment (Final 2 hours)

- Recap of Key Concepts and Techniques
- Final Assessment (Written Test/Practical Demonstration)
- Feedback and Course Evaluation

Assessment and Evaluation:

- Continuous Assessment: 30% (Assignments, Quizzes, Class Participation)
- Final Assessment: 70% (Written Exam and/or Practical Test)

Recommended Textbooks and Resources:

1. "Introduction to Forensic Chemistry" by Suzanne Bell
2. "Forensic Chemistry" by David E. Newton
3. "Analytical Techniques in Forensic Science" by Barbara Stuart
4. Journals: *Forensic Science International*, *Journal of Forensic Sciences*
5. Online Resources: [Access Forensic Chemistry Research Articles and Case Studies]

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Certificate Course in Forensic Chemistry

Final Examination: Multiple Choice Questions (MCQs)

Total Marks: 30

Duration: 1 Hour

Instructions:

- Each question carries 1 mark.
- Choose the correct option from the given choices.
- No negative marking for wrong answers.

1. Forensic Chemistry primarily deals with:

- a) Analysis of DNA
- b) Examination of fingerprints
- c) Analysis of chemical substances related to crimes
- d) Psychological profiling of criminals

2. The term 'toxicology' refers to the study of:

- a) Plant-based poisons
- b) Insects
- c) Poisons and their effects on the body
- d) Blood spatter patterns

3. Which of the following is not a commonly used technique in forensic chemistry?

- a) Gas Chromatography-Mass Spectrometry (GC-MS)
- b) Fingerprinting
- c) Infrared Spectroscopy (IR)
- d) High-Performance Liquid Chromatography (HPLC)

4. The process of separating chemical substances based on their different interactions with a stationary and mobile phase is known as:

- a) Spectroscopy
- b) Microscopy
- c) Chromatography
- d) Electrophoresis

5. Which type of evidence would a forensic chemist most likely analyze?

- a) Latent fingerprints
- b) Ballistic trajectories
- c) Unknown chemical substances
- d) Witness statements

6. A common method for analyzing drugs and poisons in biological samples is:

- a) Nuclear Magnetic Resonance (NMR)
- b) Liquid-Liquid Extraction
- c) Thin-Layer Chromatography (TLC)
- d) Mass Spectrometry

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What does PCR stand for in forensic DNA analysis?

- ☐ a) Protein Chain Reaction
- ☐ b) Polymerase Chain Reaction
- ☐ c) Polymorphism Coded Response
- ☐ d) Polypeptide Coding Region

8. Which of the following is an example of a biological sample used in toxicology?

- ☐ a) Soil
- ☐ b) Blood
- ☐ c) Glass fragments
- ☐ d) Paint chips

9. The analysis of blood spatter patterns can help determine:

- ☐ a) The age of a suspect
- ☐ b) The type of weapon used
- ☐ c) The motive for the crime
- ☐ d) The number of witnesses

10. Which analytical technique is particularly useful for identifying organic compounds in forensic chemistry?

- ☐ a) X-Ray Fluorescence (XRF)
- ☐ b) Gas Chromatography-Mass Spectrometry (GC-MS)
- ☐ c) Atomic Absorption Spectroscopy (AAS)
- ☐ d) Scanning Electron Microscopy (SEM)

11. A substance that can be used to distinguish between different types of blood is known as:

- ☐ a) Hemoglobin
- ☐ b) Antibody
- ☐ c) Enzyme
- ☐ d) Alkaloid

12. What is the main purpose of forensic DNA profiling?

- ☐ a) To identify unknown chemical substances
- ☐ b) To determine the cause of death
- ☐ c) To establish genetic relationships
- ☐ d) To detect explosives

13. Which of the following is a qualitative method in forensic chemistry?

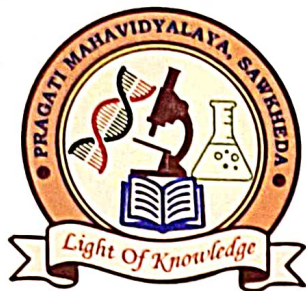
- ☐ a) Mass Spectrometry
- ☐ b) Gas Chromatography
- ☐ c) Color Test
- ☐ d) High-Performance Liquid Chromatography (HPLC)

14. The toxicological analysis of a biological sample is typically conducted to determine:

- ☐ a) The presence of specific drugs or toxins
- ☐ b) The blood type of an individual
- ☐ c) The source of a DNA sample
- ☐ d) The pH level of the sample

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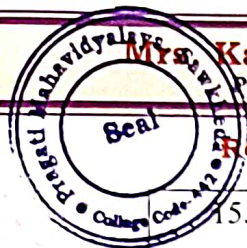
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15. Which forensic technique is used to identify the presence of a specific substance in a sample based on light absorption?
- ☐ a) Infrared Spectroscopy (IR)
 - ☐ b) Ultraviolet-Visible Spectroscopy (UV-Vis)
 - ☐ c) X-Ray Diffraction (XRD)
 - ☐ d) Scanning Electron Microscopy (SEM)
16. What type of chromatography is commonly used to separate volatile substances?
- ☐ a) High-Performance Liquid Chromatography (HPLC)
 - ☐ b) Thin-Layer Chromatography (TLC)
 - ☐ c) Gas Chromatography (GC)
 - ☐ d) Column Chromatography
17. Which of the following is a primary application of forensic serology?
- ☐ a) Blood typing and bloodstain analysis
 - ☐ b) DNA fingerprinting
 - ☐ c) Drug detection
 - ☐ d) Explosive residue analysis
18. Which instrument would be most appropriate for analyzing metallic elements in forensic samples?
- ☐ a) Mass Spectrometer
 - ☐ b) Atomic Absorption Spectrometer (AAS)
 - ☐ c) Gas Chromatograph
 - ☐ d) High-Performance Liquid Chromatograph (HPLC)
19. The main goal of forensic toxicology is to:
- ☐ a) Determine the structure of unknown substances
 - ☐ b) Identify potential poisons and their effects on the human body
 - ☐ c) Assess crime scene patterns
 - ☐ d) Classify types of explosives
20. Which technique is useful for DNA amplification in forensic investigations?
- ☐ a) HPLC
 - ☐ b) GC-MS
 - ☐ c) PCR
 - ☐ d) IR
21. What type of evidence would a forensic chemist analyze to detect traces of accelerants?
- ☐ a) Soil samples
 - ☐ b) Bloodstains
 - ☐ c) Fire debris
 - ☐ d) Fiber samples
22. Infrared Spectroscopy (IR) is used in forensic chemistry to:
- ☐ a) Identify organic compounds
 - ☐ b) Measure the mass of a substance
 - ☐ c) Determine the isotope composition
 - ☐ d) Visualize fingerprints

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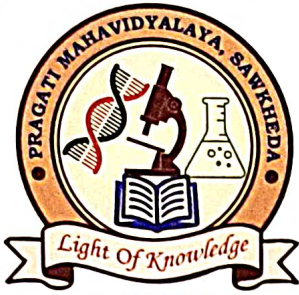
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23. A reagent commonly used in presumptive blood tests is:
- a) Benzidine
 - b) Potassium chloride
 - c) Sodium hydroxide
 - d) Hydrogen peroxide
24. Which forensic analysis technique separates components of a mixture based on molecular size and charge?
- a) Chromatography
 - b) Spectroscopy
 - c) Electrophoresis
 - d) Microscopy
25. What is the primary function of a forensic chemist in a criminal investigation?
- a) Interview witnesses
 - b) Testify in court
 - c) Analyze physical evidence and substances
 - d) Conduct autopsies
26. What is the first step in processing a chemical sample for forensic analysis?
- a) Data interpretation
 - b) Sample collection
 - c) Chromatography
 - d) Reporting
27. Which chemical reagent is used in the Kastle-Meyer test to indicate the presence of blood?
- a) Phenolphthalein
 - b) Hydrochloric acid
 - c) Iodine solution
 - d) Potassium permanganate
28. What kind of evidence is most often analyzed using mass spectrometry in forensics?
- a) Fibers
 - b) Biological samples
 - c) Drug residues
 - d) Fingerprints
29. The scientific study of poisons and their effects on living organisms is known as:
- a) Pharmacology
 - b) Toxicology
 - c) Pathology
 - d) Cytology

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20. Which of the following materials is least likely to be considered trace evidence in forensic chemistry?

- a) Hair
- b) Soil
- c) Document ink
- d) Heavy metals

Answer Key:

1. c) Analysis of chemical substances related to crimes
2. c) Poisons and their effects on the body
3. b) Fingerprinting
4. c) Chromatography
5. c) Unknown chemical substances
6. d) Mass Spectrometry
7. b) Polymerase Chain Reaction
8. b) Blood
9. b) The type of weapon used
10. b) Gas Chromatography-Mass Spectrometry (GC-MS)
11. b) Antibody
12. c) To establish genetic relationships
13. c) Color Test
14. a) The presence of specific drugs or toxins
15. b) Ultraviolet-Visible Spectroscopy (UV-Vis)
16. c) Gas Chromatography (GC)
17. a) Blood typing and bloodstain analysis
18. b) Atomic Absorption Spectrometer (AAS)
19. b) Identify potential poisons and their effects on the human body
20. c) PCR
21. c) Fire debris
22. a) Identify organic compounds
23. a) Benzidine
24. c) Electrophoresis
25. c) Analyze physical evidence and substances
26. b) Sample collection
27. a) Phenolphthalein
28. c) Drug residues
29. b) Toxicology
30. d) Heavy metals

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