

**UNIVERSITY OF MADRAS**  
**B.Sc. DEGREE PROGRAMME IN CHEMISTRY**  
 SYLLABUS WITH EFFECT FROM 2023-2024

<b>Title of the Course</b>	<b>FORENSIC SCIENCE</b>						
<b>Paper No.</b>	<b>SEC-7 (Discipline Specific)</b>						
<b>Category</b>	<b>Skill Enhancement Course</b>	<b>Year Semester</b>	<b>II IV</b>	<b>Credits</b>	<b>2</b>	<b>Course Code</b>	<b>224S4B</b>
<b>Instructional hours per week</b>	<b>Lecture</b>	<b>Tutorial</b>	<b>Lab Practice</b>		<b>Total</b>		
	1	-	-		1		
<b>Prerequisites</b>	General Chemistry						
<b>Objectives of the course</b>	This course aims at giving an overall view of <ul style="list-style-type: none"> <li>• crime detection through analytical instruments</li> <li>• forgery and its detection</li> <li>• medical aspects involved</li> </ul>						
<b>Course Outline</b>	<b>UNIT I</b>  <b>Poisons</b> Poisons - types and classification - diagnosis of poisons in the living and the dead -clinical symptoms - postmortem appearances. Heavy metal contamination (Hg, Pb, Cd) of sea foods - use of neutron activation analysis in detecting arsenic in human hair. Treatment in cases of poisoning – use of antidotes for common poisons.						
	<b>Unit-II</b>  <b>Crime Detection</b> Accidental explosion during manufacture of matches and fireworks (as in Sivakasi). Human bombs - possible explosives (gelatin sticks and RDX) - metal detector devices and other security measures for VVIP-composition of bullets and detecting powder burns.						
	<b>UNIT-III</b>  <b>Forgery and Counterfeiting</b> Documents - different types of forged signatures - simulated and traced forgeries -inherent signs of forgery methods - writing deliberately modified - uses of ultraviolet rays -comparison of type written letters – checking silver line water mark in currency notes – alloy analysis using AAS to detect counterfeit coins – detection of gold purity in 22 carat ornaments – detecting gold plated jewels -authenticity of diamond.						

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**UNIT-IV**

**Tracks and Traces**

Tracks and traces - small tracks and police dogs - foot prints - costing of

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	<p>foot prints -residue prints, walking pattern or tyre marks – miscellaneous traces and tracks – glass fracture - tool marks - paints - fibres - Analysis of biological substances - blood, semen, saliva, urine and hair - Cranial analysis (head and teeth) DNA Finger printing for tissue identification in dismembered bodies - detecting steroid consumption in athletes and racehorses.</p>
	<p><b>UNIT-V</b></p> <p><b>Medical Aspects</b></p> <p>Aids - causes and prevention - misuse of scheduled drugs - burns and their treatment by plastic surgery. Metabolite analysis using mass spectrum - Gas chromatography-Arson -natural fires and arson - burning characteristics and chemistry of combustible materials -nature of combustion. Ballistics - classification - internal and terminal ballistics - small arms -laboratory examination of barrel washing and detection of powder residue by chemical tests.</p>
<p><b>Recommended Text</b></p>	<ol style="list-style-type: none"> <li>1. SA Iqbal, M Liviu, Textbook of forensic chemistry, Discovery publishing house private limited,2011.</li> <li>2. Kelly M. Elkins, Introduction to Forensic Chemistry, CRC Press, Taylor &amp; Francis Group,2019.</li> <li>3. Javed I. Khan, Thomas J. Kennedy, Donnell R. Christian, Jr., Basic principles of Forensic chemistry, Humana Press, firstedition,2012.</li> <li>4. Bapuly AK, (2006) Forensic Science – Its application in crime investigation, Paras Medical Publisher, Hyderabad.</li> <li>5. Sharma B. R.,(2006) Scientific Criminal Investigation, Universal Law Publishing Co. Pvt. Ltd, New Delhi.</li> </ol>
<p><b>Reference Books</b></p>	<ol style="list-style-type: none"> <li>1. Richard Saferst in and Criminalistics-An Introduction to Forensic Science (College Version), Sopfestein, Printice hall, eighth edition,2003</li> <li>2. Suzanne Bell, Forensic Chemistry, Pearson, second international edition,2014.</li> <li>3. Jay Siegel, Forensic chemistry: Fundamentals and applications, Wiley- Blackwell, first edition,2015.</li> <li>4. Max M. Houck &amp; Jay A. Segal, (2006) Fundamentals of Forensic Science, Elsevier Academic press.</li> <li>5. Henry C. Lee, Timothy Palmbach, Marilyn T. Miller, (2006) Henry Lee’s Crime Scene Book Elsevier Academic press.</li> </ol>

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<b>Website and e-learning source</b>	1. <a href="http://www.library.ucsb.edu/ist/03-spring/internet.html">http://www.library.ucsb.edu/ist/03-spring/internet.html</a> 2. <a href="http://www.wonderhowto.com/topic/forensic-science/">http://www.wonderhowto.com/topic/forensic-science/</a>
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**Course Learning Outcomes (for Mapping with POs and PSOs)**

**On completion of the course the students should be able to**

- CO 1:** learn about the Poisons - types and classification of poisons in the living and the dead organisms and also get information about Postmortem.
- CO 2:** get awareness on Human bombs, possible explosives (gelatin sticks and RDX) and metal defector devices and other security measures for VVIP - composition of bullets and detecting powder burns
- CO 3:** detect the forgery documents, different types of forged signatures
- CO4:** have an idea about how to tracks and trace using police dogs, foot prints identification and gain the knowledge in analyzing biological substances - blood, semen, saliva, urine and hair-DNA Fingerprinting for tissue identification in dismembered bodies
- CO 5:** get the awareness on Aids - causes and prevention and also have an exposure on handling fire explodes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M
CO5	S	M	S	S	S	S	S	M	M	S

**CO-PO Mapping (Course Articulation Matrix)**

CO /PO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
<b>Weightage</b>	15	15	15	15	15
<b>Weighted percentage of Course Contribution to Pos</b>	3.0	3.0	3.0	3.0	3.0

**Level of Correlation between PSO's and CO's**

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