Sant Gadge Baba Amravati University, Amravati

Semester-wise Course Structure, Course Code and Credit distribution and Syllabus for

Faculty of Science and Technology

Degree of Bachelor of Science with the Forensic Science (Major) and _____ (Minor) Discipline

As per NEP 2020, for Affiliated Colleges

Commencement year: 2024-25

Preamble:

The syllabus of Forensic Science for the First year has been redesigned as per National Education Policy 2020 under Choice based Credit System (CBCS) to be implemented form 2024-2025. In CBCS pattern semester system has been adopted for FY, SY and TY which includes Discipline Specific Core Course (DSC) at F. Y. level, Ability Enhancement Compulsory Course (AEC), Discipline Specific Elective Course (DSE) and Open Elective Course (OE), Skill Enhancement Course (SEC), Indian Knowledge Science (IKS), Vocational Skill course (VSC) etc.

It imbibes the guidelines verbalized by the UGC, UGC LOCF, NEP-2020 and Government of Maharashtra for all its Under Graduate programmes. The Board of Study in Chemistry of the SGB Amravati University prepared the syllabus for the first year of undergraduate programme in Forensic Science. The new curriculum of B. Sc. (Forensic Science) offer courses in the areas of, Forensic Chemistry, Forensic Toxicology, Forensic Physics, Criminology, Forensic Biology, Forensic Serology, Forensic Psychology, Digital and Cyber Forensic, etc. All the courses are having defined objectives and learning outcomes, which will help prospective students in choosing the elective courses to broaden their skills in the field of forensic science and interdisciplinary areas. The courses will train students with sound theoretical and experimental knowledge that suits the need of academia and industry. The courses also offer ample skills to pursue research as career in the field of forensic science and allied areas.

Programme Attributes of a Forensic Science Graduate

Attributes of forensic science graduate under the outcome-based teaching-learning framework may encompass the following:

- **Core competency:** The forensic science graduates are expected to know the basic concepts of forensic science and applied areas of forensic science. These fundamental concepts would reflect the latest understanding of the field, and therefore, are dynamic in nature and require frequent, regular and time-bound revisions.
- **Communication skills:** Forensic Science graduates are expected to possess minimum standards of communication skills expected of a science graduate in the country. They are expected to read and understand documents with in-depth analyses and logical arguments. Graduates are expected to be well-versed in speaking and communicating their idea/finding/concepts to wider audience.
- **Critical thinking:** Forensic Science graduates are expected to know basics of cognitive biases, mental models, scientific methodology and sophisticated techniques.
- **Psychological skills:** Graduates are expected to possess basic psychological skills required to face the world at large, as well as the skills to deal with individuals and students of various sociocultural, economic and educational levels. Psychological skills may include feedback loops, self-compassion, self-reflection, goal-setting, interpersonal relationships, and emotional management. They are also expected to deal with unsound mind people in sensible manner.
- **Problem-solving:** Graduates are expected to be equipped with problem-solving philosophical approaches that are pertinent across the disciplines.
- **Analytical reasoning:** Graduates are expected to acquire formulate cogent arguments and spot logical flaws, inconsistencies, circular reasoning etc.

- **Research-skills:** They are expected to be keenly observant about what is going on in the natural surroundings to awake their curiosity. Graduates are expected to design a scientific experiment through statistical hypothesis testing and other *a priori* reasoning including logical deduction.
- **Teamwork:** Graduates are expected to be team players, with productive cooperations involving members from diverse socio-cultural backgrounds.
- **Digital Literacy:** Graduates are expected to be digitally literate for them to enroll and increase their core competency via e-learning resources such as MOOC and other digital tools for lifelong learning. Graduates should be able to spot data fabrication and fake news by applying rational skepticism and analytical reasoning.
- **Moral and ethical awareness:** Graduates are expected to be responsible citizen of India and be aware of moral and ethical baseline of the country and the world. They are expected to define their core ethical virtues good enough to distinguish what construes as illegal and crime in Indian constitution. Emphasis be given on academic and research ethics, including fair Benefit Sharing, Plagiarism, Scientific Misconduct and so on.
- **Leadership readiness:** Graduates are expected to be familiar with decision making process and basic managerial skills to become a better leader. Skills may include defining objective vision and mission, how to become charismatic inspiring leader and so on.

Qualification Descriptors

The qualification descriptors for a Bachelor's degree in Forensic Science may include following:

i. Systematic and fundamental understanding of forensic science as a discipline.
ii. Skill and related developments for acquiring specialization in the subject.
iii. Identifying forensic science related problems, analysis and application of data using appropriate methodologies and concepts.
iv. Applying subject knowledge and skill to solve complex problems with defined solutions.
v. Finding opportunity to apply subject-related skill for acquiring jobs and self-employment.
vi. Understanding new frontiers of knowledge in forensic science for professional development.
vii. Applying subject knowledge for solving societal problems related to application of forensic science in day-to-day life.
viii. Applying subject knowledge for preventive measures amongst the society.
ix. Applying subject knowledge for new research and technology.

(Source: Learning Outcomes based Curriculum Framework (LOCF) for (B.Sc. with Forensic Science) Undergraduate Programme 2020 https://www.ugc.gov.in/pdfnews/8218435_B.Sc-Hons-Forensic-Science.pdf)

Program Outcomes for BSc:

POs

At the time of graduation, students would be able to

PO1. Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

PO2. Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.

PO3. Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings.

PO4. Effective Citizenship: Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

PO5. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.

PO6. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.

PO7. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes.

Program Specific Outcomes for BSc (Forensic Science)

PSOs:

1. Understand the crime and crime scene management procedure.
2. Describe the various instrumental techniques (Analytical Techniques)
3. Understand the evidence collection and analysis of physical evidence and digital evidence.
4. Analyzed the personality of the person. Assessment of criminal tendency of the person.
5. Understand the legal aspect of crime and criminal activities by studying IPC, CrPC, IEA, etc.
6. Analysis of physical evidence such as soil, paint, dust, glass,etc.

Employability Potential of the Programme:

Forensic Science is recognition, identification, analysis and reporting of physical as well as digital evidence by using various scientific methods and/or techniques for the purpose of justice of administration. In simple word, it is the science which help in solving criminal investigation. From the ancient time crime is non removable part of our society. Every day, every minutes and in every second criminal activity has been taking place and with increase in frequency of crime there is proper procedure for solving crime which is developed by forensic science. Today, in each and every field crime has been taking place such as murder, robbery, rape, cyber-crime, kidnapping, money laundering, etc. Forensic Science has many branches such as Forensic Physics which deals with the glass analysis, soil analysis, etc. Forensic Ballistics includes study of firearms, bullets and cartridges. Forensic Biology includes study of bones, skeleton system, plant material, animal body part, and DNA analysis. Forensic Chemistry and Toxicology includes study of harmful chemicals and Poisons. Forensic Psychology includes study of human behavior. Digital Forensic includes crime related to digital devices such as computer, mobile, internet, etc.

With increase in modernization in today's society, scope of crime also increases. To handle and solve the crime we need specialist peoples and study of forensic science build a very strong manpower for dealing this situation. When a student study forensic science then he/she can do work in following sectors.

- Investigation Agency
- Pharmaceutical Industry
- Chemical Firms
- Biological Firms
- Research Centers
- Public Relations
- Academic Institutions
- Journalism
- Judicial System

Future scope for Forensic Science graduates:

- Students can do Ph.D. at IITs, NITs, IISERs, IISc, BARC, TIFR, CSIR, Universities, Colleges by clearing NET-JRF, GATE or PET examinations.
- Students can do Ph.D. from foreign Universities, students may get scholarships.
- Students can take teaching jobs at Universities or Sr. colleges by clearing SET or NET-LS examinations.
- Research Scientists in various Public Sector Units like ONGC, IOCL, NTPC and Private sector industries.
- Students can become security analyst, penetration tester, software developers in IT industries.
- Students can become Quality Control Chemists/ Food Inspector at Food Co-operation of India, Food Safety and Standards etc.
- Student can become Investigator, Forensic Scientist.

- Laboratory technicians to look after sophisticated instruments like NMR, Mass Spectrometer, UV-Visible Spectrophotometer, Single crystal machines, XRD, SEM, AAS, TEM etc.
- Technician for repairing sophisticated instruments
- Student can become medico legal officer
- Research Scientist/ Operations Manager/ Chemists / Quality Manager / Research Manager at various industries like Pharmaceuticals, Cement, Plastic, Drugs, Paint, Dyes, Agricultural sector etc.
- Student can become small or medium scale entrepreneur (own industry) for investigation purpose and for preventive forensic.
- Students can become Government officers by clearing UPSC, MPSC, Bank Probationary officers, other competitive examinations
- Employee at Security Printing and Minting co-operation of India
- Employee at Office in Indian Army, Navy and Air force.
- Forensic Science graduate work for police system and also work as an investigator.
- Forensic Science graduates also work in central investigative agency like CBI, IB, NIA and for other force like BSF, NSG, BPRD, NCRB.
- Forensic Science graduate also work in journalism.
- Forensic science graduates work in judicial process.
- Free-lancer as educational you tube videos maker
- Educational-aid maker

Government jobs:
There are a variety of career prospects waiting to be tapped at the government level. Because there is also a wide scope of research. Some of the government positions that can be considered are-

- Senior Research Associate
- Laboratory Technologist
- Research Analyst
- Research Officer
- Warehouse Supervisor
- Scientist
- Assistant Professor
- Development Supervisor
- Quality Management Analyst
- Software Developer
- Investigator

Scope for further studies:

1. If the candidates do not wish to pursue job opportunities after M.Sc. Forensic Science, they can opt for higher education to polish their skills and gain a higher level of experience. They can go on to pursue PhD at premier institutes in India and abroad. They can appear for various competitive exams like NET/ GATE (in India) and JRE/ TOEFEL (Abroad) and avail fellowship for PhD. A significant amount of fellowship is available for pursuing PhD.
2. Candidates can acquire education in management and then can join industry or can start their own business or industry.
    - Opportunities to the students who are interested in opting for a challenging career in

the field, leading to the award of B.Sc. Forensic.

- Which on completion will be professionals to police agencies, doctors, detectives, lawyers, judges and often provide expert testimony during trials in the Hon'ble Courts?
- The courses are aimed at creating informed citizenry as well as a workforce that would be able to stand up to the ever rising stature of crime and criminals in the society.
- Our comprehensive syllabi, practical oriented & skill based teaching-learning (would) enable(s) our students to be useful and ready (for) to the investigation agencies (Police, CID, CBI, etc.); to the Forensic Science Laboratories (District, Regional, State & Mobile units); to colleges &/or institutions (as qualified teachers for the subject i.e. Forensic Science); various laboratories (undertaking quality control, quality assurance, analytical work, research, etc.); as forensic experts (to give 'expert witness' as an aid to the court & lawyers as amicus curiae, etc.) to name a few!
- In addition to this the students will develop the qualities such as logical and critical thinking of the problems.
- The participation of students in various extracurricular and extension activities will lead to develop the multifaceted personality which will be observed in his effective communication and social interactions.

The students will also have developed qualities such as ethical behavior, integrity, self-learner etc. In summary this will help him in his life to become a good citizen and will be asset to the country.

Sant Gadge Baba Amravati University, Amravati

FACULTY: Science and Technology

Teaching and Learning Scheme: for the Degree of Bachelor of Science (Forensic Science)

(Three Years- Six Semesters Bachelor's Degree Programme)

FIRST YEAR: SEMESTER – I

Mode of Teaching	Vertical No.	The Vertical	Type of Course	Course Code	Course Name	Credits	Workload (Hrs/W k)	Vertical Workload (Hrs /Wk)
Class room Teaching / Lab Work (Practical)/ Outdoor / Field	a	Major /Minor	Theory 1	117200	**Basics of Forensic Science**	2	2	6
			Lab / Practical-1	117201	Basics of Forensic Science Practical-Lab 1	2	4	
	b	Minor/ Major	Theory 1			2	2	6
			Lab / Practical -1			2	4	
	c	**Generic/ Open Elective**	**Theory1**	**117202**	**Criminology I**	**2**	**2**	**4**
			Theory2	**117203**	**Applied Forensic Science**	**2**	**2**	
	d	**VSC**	-	-	-	-	-	**4**
		SEC	**Lab/ Practical-2**	**117204**	**Lab 2- (Advanced Forensic Science Practical)**	**2**	**4**	
	e	AEC - English	Theory			1	1	6
		AEC –MIL	Theory			1	1	
		IKS- Generic	Theory			2	2	
		VEC	Theory			2	2	
		CC	**Outdoor**			**2**	**4**	**4**
		TOTAL				**22**	**24**	**30**

FIRST YEAR: SEMESTER – II

Mode of Teaching	Ver. No	The Vertical	Type of Course	Course Code	Course Name	Credits	Workload (Hrs/Week)	Vertical Workload (Hrs/Week)
Classroom Teaching / Lab Work (Practical) / Outdoor / Field	a	Major/Minor	Theory 2	117205	**Basics of Forensic Chemistry and Toxicology**	2	2	6
			Lab / Practical-3	117206	Basics of Forensic Chemistry and Toxicology Practical - Lab 3	2	4	
	b	Minor/ Major	Theory 2			2	2	6
			Lab / Practical-2			2	4	
	c	**Generic/ Open Elective**	**Theory3**	**117207**	**Applied Forensic Chemistry and Toxicology**	**2**	**2**	**4**
			Theory4	**117208**	**Criminology II**	**2**	**2**	
	d	**VSC**	**Lab/ Practical-4**	**117209**	**(Lab 4- Applied Forensic Science Practical)**	**2**	**4**	**8**
		SEC	**Lab/ Practical-5**	**117210**	**Lab 5- (Applied Forensic Chemistry and Toxicology Practical)**	**2**	**4**	
	e	AEC - English	Theory			1	1	4
		AEC –MIL	Theory			1	1	
		IKS-Generic	Theory			-	-	
		VEC	Theory			2	2	
		CC	**Outdoor**			**2**	**4**	**4**
		TOTAL				**22**	**32**	**32**

Course Category: Major / Minor (Theory)-1

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	I	117200	Basics of Forensic Science	2	30	2 Hrs	30+20 = 50

Course Objective:	After studying this paper, the students will know – 1. The basic principles on which the science of fingerprinting is based. 2. Fingerprints are the most infallible means of identification. 3. The world's first fingerprint bureau was established in India. 4. The working of the forensic establishments in India and abroad. 5. The importance of detecting frauds and forgeries by analyzing questioned documents. 6. The importance of examining questioned documents in crime cases. 7. The significance of comparing hand writing samples.			
Course Outcomes:	Students will be able to – 1. Understand the development, history, growth and scope of forensic science. 2. Understand the establishments of FSL and significance of blood stain spatter analysis. 3. Analyze the crime and crime scene management procedure. 4. Analyze the different methods of prints and impressions. 5. Determine the significance of document analysis in forensic science. 6. Explain the medico-legal importance of various crimes.			
Unit System	**Contents**	**Work load Allotted**	**Weightage of Marks Allotted**	**Incorporation of Pedagogies**
Unit I	***Introduction to Forensic Science*** ***A)*** Definition, Historical aspects (Indian & World), Principles, Needs & Functions of Forensic Science. ***B)*** Branches of Forensic Science. Divisions in Forensic Science Laboratories	8 Hrs	8 Marks	1. **Interactive Lectures:** Use multimedia presentations, interactive slides, and animations to illustrate complex concepts. 2. **Hands-On Models**: Use digital modeling software for virtualthree-dimensional visualization. 3. **Problem-Solving Sessions**: Organize regular problem- solving sessions wherestudents can apply theoretical knowledge to solve doubts. 4. Explore virtual labs and simulations to enhance proper practical understanding. 5. **Flip-Class:**Assign
Unit II	***Taxonomy of Crime Scene Investigation*** ***A)*** Crime scene and it's types. Classification of Crime Scene Evidence. Frye case and Daubert standard. ***B)*** Duties of Forensic Scientist, Code of Conduct, Qualifications. Legal Considerations (ethics) at Crime Scene	7 Hrs	7 Marks	
Unit III	***Basics of Fingerprint*** ***A)*** Introduction and history, with special reference to India. Biological basis of fingerprints. Formation of ridges. Fundamental	8 Hrs	8 Marks	

	principles of fingerprinting. Types of fingerprints. Fingerprint patterns. Fingerprint characters/minutiae. Plain and rolled fingerprints. Latent prints. Constituents of sweat residue			readings or video lectures as homework and use class time for interactive discussions and problem-solving. 6. Ask students to create concept maps that illustrate the relationships between different concepts in forensic science. 7. **Inquiry-Based Learning:** Explore topics through questioning, investigation, and research. 8. **Case-Based Learning:** Analyze and discuss real cases to apply theoretical knowledge. 9. **Any other innovative pedagogy as applicable**
Unit IV	***Questioned Documents*** ***A)*** Definition of questioned documents. Types of questioned documents. Preliminary examination of documents. Basic tools needed for forensic documents' examination. ***B)*** Comparison of handwriting. Development of individuality in handwriting. Natural variations and fundamental divergences in handwritings. Class and individual characteristics. Comparison of paper, ink, printed documents, typed documents, Xeroxed documents. ***C)*** Alterations in documents, including erasures, additions, over-writings and obliterations. Indented and invisible writings. Charred documents. Disguised writing and anonymous letters.	7 Hrs	7 Marks	
References:	1. M. Byrd, Crime Scene Evidence: A Guide to the Recovery and Collection of Physical Evidence, CRC Press, Boca Raton (2001). 2. T.J. Gardener and T.M. Anderson, Criminal Evidence, 4th Ed., Wadsworth, Belmont (2001). 3. O. Hilton, Scientific Examination of Questioned Documents, CRC Press, Boca Raton (1982). 4. A.A. Moenssens, J. Starrs, C.E. Henderson and F.E. Inbau, Scientific Evidence in Civil and Criminal Cases, 4th Edition, Foundation Press, New York (1995). 5. C. Champod, C. Lennard, P. Margot an M. Stoilovic, Fingerprints and other Ridge Skin Impressions, CRC Press, Boca Raton (2004). 6. Lee and Gaensleen's, Advances in Fingerprint Technology, 3rd Edition, R.S. Ramotowski (Ed.), CRC Press, Boca Raton (2013) **Weblinks**:- 1. https://www.pbs.org/wgbh/nova/interactive/create-dna-fingerprint/ 2. https://www.public.asu.edu/~langland/forensics.html 3. https://www.thirteen.org/edonline/ntti/resources/lessons/ladder/			

Model Questions:	**Short Type** 1) Enlist the duties of forensic scientist. 2) Write a note on Alterations in document. 3) Define: Chance Prints. 4) Describe Frye case and Daubert standard. 5) Discuss about the functions of Forensic Science 6) What is Forensic Science? Enlist the branches in Forensic Science. 7) Give the class and individual characteristics of handwriting. 8) Write about Questioned Documents. 9) Discuss about crime scene and it's types. 10) Give fundamental principle of fingerprint.
	Long Type 1) Discuss the principles of forensic science. 2) Enlist different divisions in forensic science laboratories. 3) Write about different patterns of Fingerprint. 4) What is questioned documents. Enlist its types. 5) Enlist the types of photography of crime scene.
	MCQs for Internal Assessment 1) The sub-classification of fingerprint is found in how many percentage a. 30-35% b. 50-60% c. 10-20% d. 40-50% 2) Who is father of fingerprint in India a. Dr.Francis Galton b. Dr. Lalji Singh c. Edmond Locard d. Albert Osborn 3) Who gave law of exchange? a. Edmond Locard b. Alphonse Bertilon c. William Henry d. William Blackstone 4) Gait Patten is also called as a. khoje'spatten b. lip pattern c. foot pattern d. fingerprint pattern 5) Science of identification of through the examination of fingerprint is known as a. photography b. cheiloscopy c. dactyloscopy d. microscopy 6) The study of lip prints are called as a. Cheiloscopy b. serology c. spectroscopy d. toxicology 7) 1st state forensic science laboratory at Calcutta was established in the years a. 1957 b. 1952 c. 1898 d. 1888 8) Which of the following evidence will be sent to forensic biology lab for analysis a. DNA sample b. hair sample c. blood sample d. both b and c

Course Category: Major LAB- I

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	I	117201	Basics of Forensic Science Practical-Lab I	2	60	4 Hrs	25+25=50

Course Objectives:	The objective of this practical paper is to have practical knowledge about crime scene preservation, finger printing, different search methods sketching and reconstruction of different crime scenes.
Course Outcomes:	After completion of the practical students will know about: 1. The working and functioning of Forensic science laboratories 2. Search methods used in outdoor, indoor and mobile crime scene. 3. Documentation of outdoor crime scene 4. Sketching of indoor crime scene. 5. Crime scene reconstruction methods. 6. Students will able to learn how the Principles of Forensic science used to solve criminal cases. 7. Understand the Fingerprints and how Fingerprint helps in identification of criminal. 8. Students will acquire skills to search and collect the evidences, finding individual characteristics in different evidences.
Unit System	**Contents**
Tutorial and Discussion	Introductory knowledge about different microscopes and photography technique required in evidence collection. How different evidences are analyzed using various methods.
Basics of Forensic Science Practical	1. To prepare report of FSL/ police station visit. 2. To perform investigation of indoor crime scene. 3. To perform investigation of outdoor crime scene. 4. To record plain and rolled fingerprints. 5. To identify core and delta of the given fingerprint sample. 6. To enumerate the patterns of fingerprints. 7. To examine ridge characteristics of the given fingerprint pattern. 8. To examine forgery of the given samples. 9. To identify class characteristics of the given handwriting sample. 10. To identify individual characteristics of the given handwriting sample.
References:	1. M. Byrd, Crime Scene Evidence: A Guide to the Recovery and Collection of PhysicalEvidence, CRC Press, Boca Raton (2001). 2. T.J. Gardener and T.M. Anderson, Criminal Evidence, 4th Ed., Wadsworth, Belmont (2001). 3. O. Hilton, Scientific Examination of Questioned Documents, CRC Press, Boca Raton (1982). 4. C. Champod, C. Lennard, P. Margot an M. Stoilovic, Fingerprints and other Ridge SkinImpressions, CRC Press, Boca Raton (2004). 5. Lee and Gaensleen's, Advances in Fingerprint Technology, 3rd Edition, R.S. Ramotowski(Ed.), CRC Press, Boca Raton (2013) 6. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey (2004). 7. W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's Techniques of Crime Scene Investigation,CRC Press, Boca Raton (2013).

Model Questions:	**NA**

Distribution of Marks and the scheme of Practical Examination is as follows:

Section 1: Internal Assessment

• Active participation in activities	10 Marks
• Continuous Assessment Tests (CAT) (At least three tests) *	10 Marks
• Submission of duly certified practical record	05 Marks
Total	**25 Marks**

*Note: Total Performance in CAT (i.e. 40 %) shall be based on the best two out of three in CAT examinations

Section 2: External Assessment

• Exercise 1	10 Marks
• Exercise 2	10 Marks
• Viva-Voce (external)	05 Marks
Total	**25 Marks**

Course Category: GE/OE (Theory)-1

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	**I**	**117202**	**Criminology I**	2	30	2 Hrs	30+20=50

<table>
<tr><td>Course Objectives:</td><td colspan="4">After studying this paper, the students will know –
1. The importance of criminology.
2. The causes of criminal behavior.
3. The significance of criminal profiling to mitigate crime.
4. The consequences of crime in society.
5. The elements of criminal justice system.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="4">Students will able to-
1. Understand basic concepts of criminology.
2. Understand various crimes and the related terminologies.
3. Understand the process of police system after any crime.
4. Define the taxonomies and procedures related to criminology.</td></tr>
<tr><td>Unit System</td><td>Contents</td><td>Workload Allotted</td><td>Weightage of Marks Allotted</td><td>Incorporation of Pedagogies</td></tr>
<tr><td>Unit I</td><td>Basic Concepts of Criminology
Definition, aims and scope. Theories of criminal behavior. Criminal anthropology. Criminal profiling.</td><td>8 Hrs</td><td>8 Marks</td><td rowspan="4">Interactive Lectures: Use multimedia presentations, interactive slides, and animations to illustrate complexconcepts.
Hands-On Models: Use digital modeling software for virtual three-dimensional visualization.
Problem-Solving Sessions: Organize regular problem-solving sessions where students can apply theoretical knowledge to solve doubts.
Explore virtual labs and simulations to enhance proper practicle understanding.
Flip-Class: Assignreadings or video lectures as homework and use class time for interactive discussions and problem-solving.
Ask students to create concept maps that illustrate the relationships between different concepts in forensic science.</td></tr>
<tr><td>Unit II</td><td>Introduction to Crime
Elements, nature, causes and consequences of crime. Deviant behavior. Hate crimes, organized crimes and public disorder.</td><td>7 Hrs</td><td>7 Marks</td></tr>
<tr><td>Unit III</td><td>Investigative Criminology
Social change and crime. Understanding modus operandi. Investigative strategy. Police’s power of investigation. Filing of criminal charges. Correctional measures and rehabilitation of offenders. Role of Media</td><td>8 Hrs</td><td>8 Marks</td></tr>
<tr><td>Unit IV</td><td>Taxonomy of Criminology
FIR, case diary, Summon, warrant, charge sheet, and it’s procedure, custody, parole probation.</td><td>7 Hrs</td><td>7 Marks</td></tr>
</table>

References:	1. S.H. James and J.J. Nordby, Forensic Science: An Introduction to Scientific andInvestigative Techniques, 2nd Edition, CRC Press, Boca Raton (2005). 2. D.E. Zulawski and D.E. Wicklander, Practical Aspects of Interview andInterrogation, CRC Press, Boca Raton (2002). 3. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey (2004). 4. J.L. Jackson and E. Barkley, Offender Profiling: Theory, Research and Practice,Wiley, Chichester (1997). 5. R. Gupta, Sexual Harassment at Workplace, LexisNexis, Gurgaon (201
Model Questions:	**Short Type** 1) Write a note on Criminology. 2) Define FIR. 3) State the procedure of summon. 4) What is parole ? 5) Discuss about types of crime. 6) Write a note on Criminal Profiling. 7) Discuss about warrant. 8) Enlist the Elements of Crime. 9) Give a note on Organized crime. 10) What is deviant behaviour?
	Long Type 1) What is criminology? Discuss the theories of criminal behavior. 2) Discuss about understanding the Modus Operandi and Investigative Strategy. 3) Give a brief account on Correctional Measures and rehabilitation of Offenders. 4) Write about the Police's Power of Investigation and Filing of the CriminalCharges. 5) Write a note on: Criminal anthropology. 6) Elaborate the Role of Media. 7) Explain criminal profiling.
	MCQs for Internal Assessment 1) Definition of crime includes ____ a. Actus Reus b. Mens Rhea c. Both a and b d. None 2) Penology is study of ______ a. Crimes b. Punishments c. Victims d. Jailors 3) Juvenile delinquency is related to crime against _____ a. Children b. Adults c. Infants d. Animals 4) Article 51 A of Indian Constitution deals with a. Fundamental Rights b. Fundamental duties

	c. Directive Principles of State Policy d. None 5. FIR stands for ____ a. First Investigation Report b. First Information Report c. Fake Investigation Report d. Fake Information Report 6. Social variables in crime victimization includes ____ a. Social class, age, gender b. ethnicity, economic background c. Age, gender, economic background d. ethnicity, elegance, social class 7. The highest court in the land of India is_____court. a. Supreme b. High c. Session d. District 8. Summons’ procedure is mentioned in______. a. CrPC b. IPC c. IEA d. None

Course Category: GE/OE-2

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	**I**	**117203**	**Applied Forensic Science**	2	30	2 Hrs	30+20=50

Course Objectives:	After studying this paper, the students will know – 1.The fundamental principles on which the science of fingerprinting is based. 2. Fingerprints are the most infallible means of identification. 3.The method of classifying criminal record by fingerprints was worked out in India, and by Indians. 4.The methods of securing, searching and documenting crime scenes 5.The art of collecting, packaging and preserving different types of physical and trace evidence at crime scenes 6.The divisions in a forensic science laboratory. 7. The working of the forensic establishments in India and abroad. 8. The significance of foot, palm, ear and lip prints
Course Outcomes:	Students will be able to- 1. Understand the development, history, growth and scope of forensic science. 2. Understand the establishments of FSL and significance of blood stain spatter analysis. 3. Analyze the crime and crime scene management procedure. 4. Analyze the different methods of prints and impressions. 5. Explain the medicolegal importance of various crimes.

Unit System	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
Unit I	***Organizational setup of Forensic Science*** ***A)*** Forensic science in International perspectives, including set up of INTERPOL and FBI. Scopes of Forensic Science. ***B)*** Hierarchical set up of Central Forensic Science Laboratories, State Forensic Science Laboratories, Government Examiners of Questioned Documents, Fingerprint Bureaus, National Crime Records Bureau, Police & Detective Training Schools,Bureau of Police Research & Development, Directorate of Forensic Science and Mobile Crime Laboratories. Police Academies. Police dogs. Services of crime laboratories. Basic services and optional services.	8 Hrs	8 Marks	**1. InteractiveLectures:** Use multimedia presentations, interactive slides, and animations to illustrate complex concepts. **2. Hands-On Models**: Use digital modeling software for virtualthree-dimensional visualization. **3.Problem-SolvingSessions**: Organize regular problem-solving sessions where students can apply theoretical knowledgeto solve doubts.
Unit II	***Criminalistics*** ***A)*** The evaluation of 5Ws (who?, what?,			

	when?, where?, why?) and 1H (how?). Crime scene logs. Crime Scene Management. Crime Scene Reconstruction. ***B)*** Securing and isolating the crime scene. Crime scene search methods. Safety measures at crimescenes. Legal considerations at crime scenes. Documentation of crime scenes – photography, videography, sketching and recording notes. Duties of first responders at crime scenes. Coordination between police personnel and forensic scientists at crime scenes.	7 Hrs	7 Marks	4. Explore virtual labsand simulations to enhance proper practical understanding. **5. Flip-Class:** Assign readings or video lectures as home work and useclass time for interactive discussions and problem-solving. 6. Ask students to create concept maps that illustrate the relationships between different concepts inforensic science. 7. **Role playing:** Act out scenarios.
Unit III	***Classification and Development of Fingerprint*** ***A)*** Classification method for fingerprint record keeping. Automated Fingerprint Identification System Latent fingerprints' detection by physical and chemical techniques. ***B)*** Mechanism of detection of fingerprints by different developing reagents. Application of light sources in fingerprint detection. Preservation of developed fingerprints.	8 Hrs	8 Marks	
Unit IV	***Other Impressions*** ***A)*** Importance of footprints. Casting of foot prints, Electrostatic lifting of latent foot prints. ***B)*** Lip prints - Nature, location, types, collection and examination of lip prints. ***C)*** Ear prints and their significance. ***D)*** Palm prints and their historical importance.	7 Hrs	7 Marks	

References:	1. M. Byrd, Crime Scene Evidence: A Guide to the Recovery and Collection of Physical Evidence, CRC Press, Boca Raton (2001). 2. T.J. Gardener and T.M. Anderson, Criminal Evidence, 4th Ed., Wadsworth, Belmont (2001). 3. O. Hilton, Scientific Examination of Questioned Documents, CRC Press, Boca Raton (1982). 4. A.A. Moenssens, J. Starrs, C.E. Henderson and F.E. Inbau, Scientific Evidence inCivil and Criminal Cases, 4th Edition, Foundation Press, New York (1995). 5. C. Champod, C. Lennard, P. Margot an M. Stoilovic, Fingerprints and other RidgeSkin Impressions, CRC Press, Boca Raton (2004). 6. Lee and Gaensleen’s, Advances in Fingerprint Technology, 3rd Edition, R.S. 7. Ramotowski (Ed.), CRC Press, Boca Raton (2013)
Model Questions:	**Short Type** 1. Write a note on Forensic Science in International perspective. 2. Discuss the Hierarchical setup of Central Forensic Science Laoratories. 3. Discuss about the evaluation of 5Ws. 4. What is a Lip print? Enlist its types. 5. What is Fingerprint? Write about AFIS. 6. Discuss about Earprints. 7. Write a note on latent fingerprint. 8. State the searching methods of crime scene. 9. Write a note on sketching of crime scene.
	Long Type 1. Write a note on : a. Mobile Crime laboratories. 2. Explain gait pattern analysis. 3. Give detailed account on scope of Forensic Science. 4. Give a brief note on Crime scene management. 5. Discuss about crime scene management. 6. Elaborate about various techniques used for detection of latent prints.

	MCQs for Internal Assessment 1) Which of the following is searching method for finding physical evidence a. midrange b. baseline c. grid d. polar co ordinate 2) Which step is following after the collection of physical evidence done a. chain of custody b. documentation of crime scene c. searching of physical evidence d. collection of physical evidence 3) Chemical method used for development of fingerprint a. powder test b. cynoacrylate test c. silver nitrate test d. iodine fuming test 4) What are the types of photography a. over views b. midrange c. lose up d. all of the above 5) Blood stain from crime scene can be collected a. casting b. tape lifting c. swabbing d. photography 6) Which of the following comes under biological evidence a. cartilage case b. hair sample c. pesticides d. none 7) Central forensic science laboratory is not present at a. Pune b. Hyderabad c. Chandigarh d. Mumbai 8) Prints found on pliable surface are called a. visible print b. plastic print c. latent print d. fingerprint

Course Category: Skill Enhancement Course SEC-1

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	I	117204	Lab 2- (Advanced Forensic Science Practical)	2	60	--	50

Course Objectives:	The intended objectives are: 1. Aware the students about the essential safety protocols in a forensic laboratory. 2. Develop proficiency in fundamental forensic laboratory techniques. 3. Follow established SOPs for various forensic experiments. 4. Analyze experimental data and draw meaningful conclusions. 5. Apply critical thinking to troubleshoot and optimize experimental procedures.	
Course Outcomes:	At the end of this course students will be able: 1. To implement fundamental safety protocols, ensuring a secure working environment in the forensic laboratory. 2. To consistently follow established SOPs for various forensic experiments. 3. Students will maintain accurate and thorough records of experimental data, and analyze results to draw meaningful conclusions. 4. To maintain accurate and thorough records of experimental data, and analyze results to draw meaningful conclusions. 5. To apply critical thinking skills to identify and address challenges that may arise during experiments, showcasing the ability to troubleshoot and optimize procedures. 6. To gain insights into how forensic lab practices are applied in professional research or industrial settings, preparing them for future careers in diverse scientific and industrial fields. 7. Students will demonstrate ethical conduct in all aspects of laboratory work, emphasizing integrity, responsibility, and professionalism. 8. To gain insights into how forensic lab practices are applied in professional research or industrial settings, preparing them for future careers in diverse scientific and industrial fields.	
Unit System	**Contents**	**Incorporation of Pedagogies**
Experiments	1. To reconstruct the crime scene. 2. To study security features of Indian currency notes. 3. To develop fingerprint using powder method. 4. To develop fingerprint using chemical method. 5. To lift fingerprint using transparent tape. 6. To examine secret writing. 7. To perform gait pattern analysis. 8. To examine different lip prints. 9. To perform casting of footprint. 10. To perform tracing of footprints.	By combining hands-on experiments, discussions, and real-world applications, students will gain a comprehensive understanding of forensic lab practices. A few suggested pedagogies are: • **Hands-On Laboratory Sessions:** Provide regular hands-on laboratory sessions where students can directly apply theoretical knowledge to practical experiments. • **Demonstrations and Simulations:** Use virtual simulations for certain experiments to enhance accessibility and understanding of forensic applications. • **Flipped Classroom Model:** Encourage

		students to come to class prepared, promoting active participation. • **Interactive Workshops:** Provide opportunities for students to engage in discussions, ask questions, and seek clarification. • **Technology Integration:** Incorporate proper tools and techniques for forensic analysis and presentation. • **Guest Lectures and Industry Connections:** Establish connections with professionals in the field to provide students with a broader perspective on forensic lab practices. • **Inquiry based Learning:** Explore topics through questioning, investigation and research • **Case based Learning:** Analyze and discuss real cases to apply theoretical knowledge • **Any other innovative pedagogy as applicable**
References:	1. Ordway, H. Scientific Examination of Questioned Documents-Forensic and Police Science Series. Elsevier: New York; (1981). 2. Hardless, H.R. and Rao, C.S. Disputed Documents, Handwriting and Thumbprint Identification: Profusely Illustrated. Law Book Publishing: Allahabad; (1988) 3. Lerinson, J. Questioned Documents-A Lawer's Handbook. Academic Press: London; (2000). 4. Bridges, B.C. Criminal Investigation, Practical Fingerprinting, Thumb Impressions, Handwriting Expert Testimony, Opinion Evidence. University book Agency: Allahabad; (2000).	
Model Questions:	**NA**	

Distribution of Marks and the scheme of (SEC) Practical Examination is as follows:

Internal Assessment

• Active participation in activities	15 Marks
• Continuous Assessment Tests (CAT) (At least three tests) *	20 Marks
• Submission of duly certified practical record	10 Marks
• Internal examiner viva-voce	05 Marks
Total	**50 Marks**

*Note: Total Performance in CAT (i.e. 40 %) shall be based on the best two out of three in CAT examinations

Course Category: Major (Theory)-2

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	II	**117205**	**Basics of Forensic Chemistry and Toxicology**	2	30	2 Hrs.	30 +20 =50

Course Objectives:	After studying this paper the students will know – 1. The classification and characteristics of the narcotics, drugs and psychotropic substances. 2. The methods of identifying narcotics, drugs and psychotropic substances. 3. The forensic identification of illicit liquors. 4. The significance of toxicological studies in forensic science. 5. The absorption of poisons in body fluids.
Course Outcomes:	Students will be able to – 1. Collect and preserve chemical evidences. 2. Investigate arson crime scene. 3. Classify the poisons and their modes of actions. 4. Identify the illicit liquors with forensically sound techniques. 5. Characterize the narcotics, drugs and psychotropic substances.

Unit System	Contents	Workload Allotted	Weightageof Marks Allotted	Incorporation of Pedagogies
Unit I	***Forensic Chemistry division and Chemical Evidences:*** Introduction to forensic chemistry and forensic chemistry division at FSL Food and food products, cement, pharmaceutical drugs, beverages, dyes, paints, fibres and ink as chemical evidences found at crime scene, their collection, preservation and analysis, interpretation of findings.	8 Hrs	8 Marks	**1. Interactive Lectures:** Use multimedia presentations, interactive slides, and animations to illustrate complex concepts. **2. Hands-On Models**: Use digital modeling software for virtual three-dimensional visualization. **3. Problem-Solving Sessions**: Organize regular problem- solving sessions where students can apply theoretical knowledge to solve doubts. 4. Explore virtual labsand simulations to enhance proper practical understanding. **5. Flip-Class:** Assign readings or video lectures as home work and useclass time for interactive discussions and problem-solving. 6. Ask students to create
Unit II	***Cases Involving Arson:*** Chemistry of fire. Conditions for fire. Fire scene patterns. Location of point of ignition. Recognition of type of fire. Searching the fire scene. Collection and preservation of arson evidence. Analysis of fire debris. Analysis of ignitable liquid residue. Post-flashover burning. Scientific investigation and evaluation of clue materials. Information from smoke staining.	7 Hrs	7 Marks	

				concept maps that illustrate the relationships between different concepts in forensic science. 7. **Role playing:** Act out scenarios.
Unit III	***Poisons and Beverages:*** ***A)*** Classification of poisons. Physico-chemical characteristics and mode of action of poisons. Accidental, suicidal and homicidal poisonings. Signs and symptoms of common poisoning and their antidotes. Collection and preservation of viscera, blood and urine for various poison cases. Identification of biocides and metal salts in body fluids. Metabolism and excretion of poisons. Application of immunoassays in forensic work. Animal poisons. Snake venom. Mode of action. Carbon monoxide poisoning. Vegetable poisons. Poisonous seeds, fruits, root and mushrooms. ***B)*** Beverages. Alcoholic and non-alcoholic illicit liquors. Analysis and identification of ethyl alcohol. Estimation of ethyl alcohol in blood and urine. Proof spirit. Crime scene management in illicit liquor cases.	8 Hrs	8 Marks	
Unit IV	***Narcotic Drugs, Psychotropic Substances*:** ***A)*** Definition of narcotics, drugs and psychotropic substances. Broad classification – Narcotics, stimulants, depressants and hallucinogens. General characteristics and common example of each classification. Natural, synthetic and semi- synthetic narcotics, drugs and psychotropic substances. Designer drugs. Tolerance, addiction and withdrawal symptoms of narcotics, drugs and psychotropic substances.	7 Hrs	7 Marks	

References	1. A. A. Moenssens, J. Starrs, C.E. Henderson and F.E. Inbau, Scientific Evidence in Civil and Criminal Cases, 4th Edition, The Foundation Press, Inc., New York (1995). 2. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey (2004). 3. W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's, Techniques of Crime Scene Investigation, CRC Press, Boca Raton (2013). 4. F.G. Hofmann, A Handbook on Drug and Alcohol Abuse, 2nd Edition, Oxford University Press, New York (1983). **Weblinks**: • https://www.sciencedirect.com/journal/forensic-chemistry • https://www.acs.org/careers/chemical-sciences/fields/forensic-chemistry.html • http://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/forensic_science/05._forensic_chemistry_and_explosives/31._explosives introduction/et/4742_et_4742_et_31et.pdf • https://www.legalserviceindia.com/legal/article-13434-arson-investigation-unveiling-truth-in-the-flames.html
Model Questions:	**Short Type** 1) Write about forensic chemistry and the forensic chemistry division in FSL. 2) Explain cement analysis. 3) Define : Psychotropic substances 4) State the example of Synthetic drugs. 5) Enlist the significance of toxicological findings. 6) Discuss Testing of Narcotics.
	Long Type 1) Discuss various chemical evidences and their findings. 2) Write about Fire, its conditions, patterns and location of ignition. 3) Discuss about the investigation of Narcotic drugs and Psychotropic substances. 4) Give a broad classification of narcotic drugs with proper examples. 5) Write about collection, preservation and testing of Narcotic drugs.

	MCQs for Internal Assessment 1) The most common cause for arson is a. Insurance Fraud b. Pyromania c. Revenge d. Vandalism 2) The fundamental chemical reaction for fire initiation is a. Hydroxylation b. Oxidation c. Combustion d. Ignition 3) Debris material collected from arson crime scene should be packed in a. Sealed paper bag b. Plastic bag c. Cloth bag d. Metal box with tight lid 4) Adulteration of gasoline with kerosene oil can be detected by: a. TLC b. GLC c. HPLC d. HPTLC 5) Which of the body secretion is not involved in drug detection? a. urine b. blood c. saliva d. ear wax 6) Which is not a feature of aconite poisoning? a. Chest pain b. Increased blood pressure c. Tingling and numbness d. Hyper salivation 7) Blindness can be caused by a. Ethyl alcohol b. Methyl alcohol c. Glycol d. Propanol 8) Which is a feature of chronic poisoning? a. Chest pain b. Increased blood pressure c. Tingling and numbness d. Hyper salivation

Course Category: Major Lab 3

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	II	**117206**	**Basics of Forensic Chemistry and Toxicology Practical- Lab 3**	2	60	--	25+25=50

Course Objectives:	The intended objectives are: 1. To introduce techniques and methods used in a forensic practical. 2. To understand the importance of security measures while performing any analysis. 3. To identify and comprehend the major methods and techniques applied during the practices. 4. To gain knowledge about various applications employed in commercial forensic analysis.	
Course Outcomes:	At the end of this course students will be able: 1. Provide services in forensic science laboratories 2. Create case report for arson and explosive cases. 3. Analyse cement samples. 4. Use chromatographic techniques to separate different samples. 5. Perform food adulteration test. 6. Learn how the Principles of Forensic science used to analyze different samples.	
Unit System	**Contents**	**Incorporation of Pedagogies**
Content/Experiments	1. To analyze the cement samples. 2. To prepare a case report on arson case. 3. To carry out analysis of explosive substances. 4. To separate explosive substances using thin layer chromatography. 5. To perform adulteration testing of various food samples. 6. To prepare a case report on bomb blast case. 7. To examine petroleum products. 8. To examine ink sample using paper chromatography. 9. To examine ink sample using thin layer	By combining hands-on experiments, discussions, and real-world applications, students will gain a comprehensive understanding of various applications and methods of forensic analysis. A few suggested pedagogies are: • **Guest Lectures**: Invite experts in forensic and inspection to discuss real-world scenarios and challenge • **Practical Experiments**: Hands-on experiments on forensic lab practices • **Lab Reports:** Students prepare

	chromatography. 10. To carry out qualitative estimation of arson samples.	
		detailed lab reports on their findings. • **Discussion Sessions**: Group discussions on the implications of different adulterants. • **Case Studies:** Analyze case studies on the related forensic topics. • **Group Projects**: Assign group projects to research specific forensic subjects. • **Class Debates**: Discuss various significances of forensic branches. • **Interdisciplinary Approach**: Discuss the interdisciplinary nature of applications of the methods involved.
References:	1. A. A. Moenssens, J. Starrs, C.E. Henderson and F.E. Inbau, Scientific Evidence in Civil and Criminal Cases, 4th Edition, The Foundation Press, Inc., New York (1995). 2. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey (2004). 3. W. J. Tilstone, M.L. Hastrup and C. Hald, Fisher's, Techniques of Crime Scene Investigation, CRC Press, Boca Raton (2013). 4. Beveridge, A: Forensic Investigation of Explosives, Taylor & Francis, 2000. 5. Yallop, H. J: Explosion Investigation, Forensic Science Society & Scottish Academic Press, (1980). 6. Yinon, J. and Zitrin, S: The Analysis of Explosives, Oxford: Pergamon, (1981).	
Model Questions:	**NA**	

Distribution of Marks and the scheme of Practical Examination is as follows:

Section 1: Internal Assessment

• Active participation in activities	10 Marks
• Continuous Assessment Tests (CAT) (At least three tests) *	10 Marks
• Submission of duly certified practical record	05 Marks
Total	**25 Marks**

*Note: Total Performance in CAT (i.e. 40 %) shall be based on the best two out of three in CAT examinations

Section 2: External Assessment

• Exercise 1	10 Marks
• Exercise 2	10 Marks
• Viva-Voce (external)	05 Marks
Total	**25 Marks**

Course Category: Open Elective-3

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	**II**	**117207**	**Applied Forensic Chemistry and Toxicology**	2	30	2 Hrs	30+20 =50

Course Objectives:	After studying this paper, the students will know- 1. The methods of analyzing contaminants in petroleum products. 2. The classification and characteristics of the narcotics, drugs and psychotropic substances. 3. The methods of identifying narcotics, drugs and psychotropic substances. 4. The forensic identification of illicit liquors. 5. The significance of bomb scene management.			
Course Outcomes:	At the end of this course students will be able: 1. Analyze trace amounts of petroleum products in crime scene evidence. 2. Collect and preserve chemical evidences. 3. Investigate bomb blast crime scene. 4. Classify explosives, including the synthesis and characterization of representative analogs.			
Unit System	**Contents**	**Workload Allotted**	**Weightage of Marks Allotted**	**Incorporation of Pedagogies**
Unit I	***Petroleum and Petroleum Products:*** Distillation and fractionation of petroleum. Commercial uses of different petroleum fractions. Analysis of petroleum products. Analysis of traces of petroleum products in forensic exhibits. Comparison of petroleum products. Adulteration of petroleum products.	8 Hrs	8 Marks	**Interactive Lectures:** Use multimedia presentations, interactive slides, and animations to illustrate complex concepts. **Hands-On Models**: Making of models of dummy crime scenes. **Problem-Solving Sessions**: Organize regular problem-solving sessions where students can apply theoretical knowledge to solve problems. Explore forensic science laboratories and understanding working and organization of forensic chemistry and toxicology division. **Flip-Class:** Assign readings or video
Unit II	***Explosives*:** Classification of explosives –low explosives and high explosives. Homemade explosives. Military explosives. Blasting agents. Synthesis and characteristics of TNT, PETN and RDX. Explosion process. Blast waves. Bomb scene management. Searching the scene of explosion.	7 Hrs	7 Marks	
Unit III	***Concepts of Toxicology:*** Significance of toxicological findings. Techniques used in toxicology. Toxicological analysis and chemical intoxication tests. Postmortem Toxicology. Dose-response	8 Hrs	8 Marks	

	relationship. Lethal dose 50 and effective dose 50.			lectures as homework and use class time for interactive discussions and problem-solving. Ask students to create concept maps that illustrate the relationships between different concepts in forensic chemistry.
Unit IV	***Investigation of Narcotic Drugs, Psychotropic Substances*****:** Crime scene search for narcotics, drugs and psychotropic substances – searching a suspect, searching a dwelling, searching a vehicle. Clandestine drug laboratories. Collection and preservation of drug evidence. Testing of narcotics, drugs and psychotropic substances. Isolation techniques for purifying narcotics, drugs and psychotropic substances – thin layer chromatography, gas-liquid chromatography and high performance liquid chromatography. Presumptive and screening tests for narcotics, drugs and psychotropic substances. Microcrystalline testing of drugs of abuse. Analysis of narcotics, drugs and psychotropic substances in breast milk, saliva, urine, hair and antemortem blood. Drugs and driving. Dope tests. Analysis of narcotics, drugs and psychotropic substances in postmortem blood. Postmortem changes affecting the analysis of narcotics, drugs and psychotropic substances.	7 Hrs	7 Marks	

References:	1. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey (2004). 2. F.G. Hofmann, A Handbook on Drug and Alcohol Abuse, 2nd Edition, Oxford University Press, New York (1983). 3. S.B. Karch, The Pathology of Drug Abuse, CRC Press, Boca Raton (1996). 4. A. Poklis, Forensic toxicology in, Introduction to Forensic Sciences, 2nd Edition, W.G. Eckert (Ed.), CRC Press, Boca Raton (1997). 5. A.W. Jones, Enforcement of drink-driving laws by use of per se legal alcohol limits: Blood and/or breath concentration as evidence of impairment, Alcohol, Drug and Driving, 4, 99 (1988). 6. W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's, Techniques of Crime Scene Investigation, CRC Press, Boca Raton (2013). **Weblinks:** http://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/forensic_science/05._forensic_chemistry_and_explosives/03._cases_encountered_in_forensic_chemistry_drugs/et/4731_et_4731_et_03et.pdf
Model Questions:	**Short Type** 1) What is Forensic Toxicology? Discuss its significance. 2) Give a brief account on thin layer chromatography. 3) Define : Psychotropic substances. 4) State the example of Synthetic drugs. 5) Enlist the significance of toxicological findings. 6) Discuss testing of narcotics. 7) State the Dope test. 8) Enlist the Classification of Explosives.
	Long Type 1) Discuss various chemical evidences and their findings. 2) Write a note on Synthesis and Characteristics of various explosives. 3) Discuss about Bomb scene management and searching of the screen of explosion. 4) Explain principle of gas liquid chromatography.

	MCQs for Internal Assessment 1) Which enzyme converts alcohol to acetaldehyde in body? a. Peptase b. Alcohol dehydrogenase c. Alcohol hydrogenase d. Aldehyde hydrogenase 2) A device that uses breath sample for determining BAC is a. Respirometer b. Breath analyzer c. Kozelkahine apparatus d. Respiratory detection apparatus 3) The brick red colour of postmortem lividity is seen in poisoning due to a. Carbon monoxide b. Hydrogen sulphide c. Phosphorous d. Cyanide 4) Which of the following is not a petroleum product? a. Bitumen b. Wax c. Petrol d. TATP 5) Adulteration of gasoline with kerosene oil can be detected by: a. TLC b. GLC c. HPLC d. HPTLC 6) TNT stands for a. TriNitro toluene b. tetra nitro toluene c. tri nano tree d. tetra nano toluene 7) Which is not an explosive ? a. TNT b. PETN c. Nitrogen d. RDX 8) Dope test for sports persons is performed by ______ a. TADA b. NATA c. WADA d. None

Course Category: Generic/ Open Elective - 4

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	**II**	**117208**	**Criminology II**	2	30	2 Hrs	30+20 = 50

Course Objectives:	After studying this paper the students will know- 1. The importance of criminology. 2. The causes of criminal behavior. 3. The significance of criminal profiling to mitigate crime. 4. The consequences of crime in society. 5. The elements of criminal justice system.			
Course Outcomes:	Students will be able to- 1. Understand basic concepts of criminology. 2. Understand various crimes and the related terminologies. 3. Understand the process of police system after any crime. 4. Define the taxonomies and procedures related to criminology.			
Unit System	**Contents**	**Workload Allotted**	**Weightage of Marks Allotted**	**Incorporation of Pedagogies**
Unit I	***Laws and Constitution of India*** A) Indian Evidence Act – Evidence and rules of relevancy in brief. Expert witness. Cross examination and re-examination of witnesses. B) Sections 32, 45, 46, 47, 57, 58, 60, 73, 135, 136, 137, 138, 141. C) Criminal Procedure Code. Section 293 in the code of criminal procedure. Preamble, Fundamental Rights, Directive Principles of State Policy. – Articles 14, 15, 20, 21, 22, 51A.	8 Hrs	8 Marks	**Interactive Lectures:** Use multimedia presentations, interactive slides, and animations to illustrate complex concepts. **Hands-On Models**: Making ofmodels of dummy crime scenes. **Problem-Solving Sessions**: Organize regular

Unit II	***Types of offences*** A) Classification – civil, criminal cases. Essential elements of criminal law. Cognizable and non- cognizable offences. Bailable and non-bailable offences. compoundable and non- compoundable offences. B) Organized crime, professional crime, occupational crime, crime against women, juvenile delinquency.	7 Hrs	7 Marks	problem-solving sessions where students can apply theoretical knowledge to solve problems. Explore forensic science laboratories and understanding working and organization of forensic chemistry and toxicology division. **Flip-Class:** Assign readings or video lectures as homework and use class time for interactive discussions and problem-solving. Ask students to create concept maps that illustrate the relationships between different concepts in forensic chemistry.
Unit III	***Penology*** Punishments, Capital punishments in India, IPC (Indian penal code), Indian police system, Hierarchy of Indiancourts.	8 Hrs	8 Marks	
Unit IV	***Victimology*** Victims, Survivors and it's types.Social variables in crime victimization (social class, age, gender, ethnicity). Impact of Crime.	7 Hrs	7 Marks	
References:	1. S.H. James and J.J. Nordby, Forensic Science: An Introduction to Scientificand Investigative Techniques, 2nd Edition, CRC Press, Boca Raton (2005). 2. D.E. Zulawski and D.E. Wicklander, Practical Aspects of Interview andInterrogation, CRC Press, Boca Raton 2002). 3. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey (2004). 4. J.L. Jackson and E. Barkley, Offender Profiling: Theory, Research andPractice, Wiley, Chichester (1997). 5. R. Gupta, Sexual Harassment at Workplace, LexisNexis, Gurgaon (2014)			

Model Questions:	**Short Type** 1) Write about the social variables in crime victimization. 2) Differentiate between civil and criminal cases. 3) Discuss about criminal procedure code. 4) Differentiate between cross examination and re-examination. 5) Define : Victimology. 6) What is penology ? 7) Give the definition of Juvenile delinquency. 8) State Sec 293 in CrPC. 9) What is Professional crime? 10) Discuss about the Impact of Crime. 11) What is Expert Witness?
	Long Type 1) Write a note on Indian Evidence Act and Rules of relevancy in brief. 2) Discuss about offences and enlist its types. 3) Classify different types of crime. 4) Elaborate Criminal Procedure Code and write about Sec. 293 in the Code of Criminal Procedure. 5) Write a note on: Capital punishments in India 6) State the Directive Principles of State policy in brief.
	MCQs for Internal Assessment 1) The study of the personality of the offenders in physical terms is a. Criminal sociology b. Penology c. Criminal Anthropology d. All of the above 2) Halocaust is considered as a. Crime against humanity b. International crime c. Crime against property d. Cyber crime 3) Who coined the term Criminology? a. Adler b. Sutherland c. Lombroso d. Becker 4) When did Indian Penal Code received the Governor General's Assent/ a. October 3, 1850 b. October 5, 1852 c. October 6, 1860 d. October 7, 1865 5) Theories of criminal behaviour are ____ a. Biological b. Psychological c. Sociological d. All of the above 6) Service of summons is given in ____ a. 31 A CrPC b. 31 A IPC c. 51 IPC d. 51 CrPC 7) Leading questions can be asked during a. Re-examination b. Examination in chief c. Cross examination d. None of the above 8) Constitution of India was enacted in the year_____. a. 1950 b. 1949 a. c. 1990 d. 2000

Course Category: Vocational Skill Course VSC-1

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	II	117209	(Lab 4- Applied Forensic Science Practical)	2	60	--	50

Course Objectives:	The objective of this practical paper is to have practical knowledge about various examination techniques.	
Course Outcomes:	At the end of this course students will be able to: 1. Provide services in forensic science laboratories. 2. Create case report for criminal cases. 3. Analyse questioned document samples. 4. Use sophisticated techniques to separate different samples. 5. Make sketches of crime scene . 6. Learn how the Principles of Forensic science used to analyze different samples.	
Unit System	**Contents**	**Incorporation of Pedagogies**
Tutorial and Discussion	1. Introduction to knowledge about different examination techniques to analyse various samples. 2. Importance of evidence analysis.	By combining hands-on experiments, discussions, and real-world applications, students will gain a comprehensive understanding of forensic chemistry lab practices. A few suggested pedagogies are: • **Hands-On Laboratory Sessions:** Provide regular hands-on laboratory sessions where students can directly apply theoretical knowledge to practical experiments. • **Demonstrations and Simulations:** Use virtual simulations for certain experiments to enhance accessibility and understanding. • **Flipped Classroom Model:** Encourage students to come to class prepared, promoting active participation. • **Interactive Workshops:** Provide opportunities for students to engage in discussions, ask questions, and seek clarification. • **Technology Integration:** Incorporate digital tools for data analysis and presentation. • **Guest Lectures and Industry Connections:** Establish connections with professionals in the field to provide students with a broader perspective on forensic chemical lab practices.
Forensic Chemistry Practical	1. To prepare fingerprint chart. 2. To make druggist fold. 3. To make numbering blocks for crime scene practical. 4. To examine security features of passport. 5. To examine security features of plastic money. 6. To study primary classification of fingerprints. 7. To write a case study on crime. 8. To study types of searching methods of crime scene evidence. 9. To study types of photography. 10. To study methods of sketching.	

References:	1. A. A. Moenssens, J. Starrs, C.E. Henderson and F.E. Inbau, Scientific Evidence in Civil and Criminal Cases, 4th Edition, The Foundation Press, Inc., New York (1995). 2. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey (2004). 3. W. J. Tilstone, M.L. Hastrup and C. Hald, Fisher's, Techniques of Crime Scene Investigation, CRC Press, Boca Raton (2013). 4. Beveridge, A: Forensic Investigation of Explosives, Taylor & Francis, 2000. 5. Yallop, H. J: Explosion Investigation, Forensic Science Society & Scottish Academic Press, (1980). 6. Yinon, J. and Zitrin, S: The Analysis of Explosives, Oxford: Pergamon, (1981).	
Model Questions:	**NA**	

Distribution of Marks and the scheme of (VSC) Practical Examination is as follows:

Internal Assessment

• Active participation in activities	15 Marks
• Continuous Assessment Tests (CAT) (At least three tests) *	20 Marks
• Submission of duly certified practical record	10 Marks
• Internal examiner viva-voce	05 Marks
Total	**50 Marks**

*Note: Total Performance in CAT (i.e. 40 %) shall be based on the best two out of three in CAT examinations

Course Category: Skill
Enhancement Course SEC-2

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	II	117210	(Lab 5- Applied Forensic Chemistry and Toxicology Practical)	2	60	--	50

<table>
<tr><td>Course Objectives:</td><td colspan="2">The intended objectives are:
1. To introduce glasswares and evidence packaging materials.
2. To prepare case reports on various poisoning cases.
3. To create awareness regarding alcoholic and non- alcoholic beverages.
4. To analyse the reports of analytical techniques.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="2">After completion of the course, the learner will able to:
1. Prepare TLC plates.
2. Identify the various components present in cement samples.
3. Apply analytical techniques for the analysis of beverage samples.
4. Acquire the necessary basic skills for performing TLC.</td></tr>
<tr><td>Unit System</td><td>Content/ Experiments</td><td>Incorporation of Pedagogies</td></tr>
<tr><td>Calibration of glassware, instruments and standardization of solutions</td><td>1. To make silica gel for TLC.
2. To prepare TLC plates on glass slides.
3. To prepare solvent system for paper chromatography.
4. To prepare solvent system for TLC.
5. Handling of petroleum samples.
6. Packaging and sealing of glass vials/ test tubes.
7. To prepare cement blocks.
8. Prepare extract of plant poisons.
9. To study principle and working of UV Visible spectrophotometer.
10. To study composition of different alcoholic beverages.</td><td>By combining hands-on experiments, discussions, and real-world applications, students will gain a comprehensive understanding of forensic lab practices.
A few suggested pedagogies are:
• Hands-On Laboratory Sessions: Provide regular hands-on laboratory sessions where students can directly apply theoretical knowledge to practical experiments.
• Demonstrations and Simulations: Use virtual simulations for certain experiments to enhance accessibility and understanding of forensic applications.
• Flipped Classroom Model: Encourage students to come to class prepared, promoting active participation.
• Interactive Workshops: Provide opportunities for students to engage in discussions, ask questions, and seek clarification.
• Technology Integration: In corporate proper tools and techniques for forensic analysis and presentation.
• Guest Lectures and Industry Connections: Establish connections with professionals in the field to provide students with a broader perspective on forensic lab practices.
• Inquiry based Learning: Explore topics through questioning, investigation and research
• Case based Learning: Analyze and discuss real cases to apply theoretical knowledge
Any other innovative pedagogy as applicable</td></tr>
</table>

References:	1. W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's, Techniques of Crime Scene Investigation, CRC Press, Boca Raton (2013). 2. F.G. Hofmann, A Handbook on Drug and Alcohol Abuse, 2nd Edition, Oxford University Press, New York (1983). 3. A.W. Jones, Enforcement of drink-driving laws by use of per se legal alcohol limits: Blood and/or breath concentration as evidence of impairment,Alcohol, Drug and Driving, 4, 99 (1988). **Web resource:** https://www.cdc.gov/alcohol/fact-sheets/alcohol-use.html
Model Questions:	**NA**

Distribution of Marks and the scheme of (SEC) Practical Examination is as follows:

Internal Assessment

The 50 marks fragmentation as follows:

• Active participation in activities	15 Marks
• Continuous Assessment Tests (CAT) (At least three tests) *	20 Marks
• Submission of duly certified practical record	10 Marks
• Internal examiner viva-voce	05 Marks
Total	**50 Marks**

*Note: Total Performance in CAT (i.e. 40 %) shall be based on the best two out of three in CATexaminations