

Sant Gadge Baba Amravati University, Amravati

Faculty: Science and Technology

Programme: B. Sc. Forensic Science

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 centred 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

PSOs:

At the end of the programme, students would be able to

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. Analyze 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. Analyse 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 minute 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

Mentioned below are some of the employability potentials for Forensic Science graduates:

1. Students can do Ph.D. at IITs, NITs, IISERs, IISc, BARC, TIFR, CSIR, Universities, Colleges by clearing NET-JRF, GATE or PET examinations.
2. Students can do Ph.D. from foreign Universities; students may get scholarships.
3. Students can take teaching jobs at Universities or Sr. colleges by clearing SET or NET-LS examinations.
4. Research Scientists in various Public Sector Units like ONGC, IOCL, NTPC and Private sector industries.
5. Students can become security analyst, penetration tester, software developers in IT industries.
6. Students can become Quality Control Chemists/ Food Inspector at Food Co-operation of India, Food Safety and Standards etc.
7. Student can become Investigator, Forensic Scientist.
8. Laboratory technicians to look after sophisticated instruments like NMR, Mass Spectrometer, UV-Visible Spectrophotometer, Single crystal machines, XRD, SEM, AAS, TEM etc.
9. Technician for repairing sophisticated instruments
10. Student can become medico legal officer

11. Research Scientist/ Operations Manager/ Chemists / Quality Manager / Research Manager at various industries like Pharmaceuticals, Cement, Plastic, Drugs, Paint, Dyes, Agricultural sector etc.
12. Student can become Small or medium scale entrepreneur (own industry) for investigation purpose and for preventive forensic.
13. Students can become Government officers by clearing UPSC, MPSC, Bank Probationary officers, other competitive examinations
14. Employee at Security Printing and Minting co-operation of India
15. Employee at Office in Indian Army, Navy and Air force.
16. Forensic Science student work for police system and also work as an investigator.
17. Forensic Science students also work in central investigative agency like CBI, IB, NIA and for other force like BSF, NSG, BPRD, NCRB.
18. Forensic Science student also work in journalism.
19. Forensic science students work in judicial process.
20. Free-lancer as educational you tube videos maker
21. Educational-aid maker
22. Free-lancer for creating awareness against Forensic Science

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

Syllabus Prescribed for 03 Year UG Programme

Programme:

Semester 1

Code of the Course/Subject	Title of the Course/Subject	(Total Number of Periods)
1S Forensic Science	Basics of Forensic Science	84

COs

By the end of the Course, students would 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 criminal cases

Unit	Content
Unit I	<p>A) Basics of Forensic Science and Its Developmental Growth</p> <ul style="list-style-type: none"> ● Introduction to Forensic Science- Definition, nature, need and function. ● Principles and laws of Forensic Science. ● Historical development of for Forensic Science in India and world. ● Branches of Forensic Science. ● Ethical issues of Forensic Science. <p>B) Forensic Science Laboratories and Facilities</p> <ul style="list-style-type: none"> ● Growth of Forensic Science Laboratories in India – Central, State and Regional level laboratories ● Educational setup in Forensic Science in India ● Services and functionalities provided by various FSLs ● Various divisions in the FSL – Ballistics, Biology, Chemistry Documents, Physics, Psychology, Serology, Toxicology, etc. ● Educational Setup of Forensic Science in India. <p style="text-align: right;">(14 periods)</p>
Unit II	<p>A) Crime Scene and Its Management</p> <ul style="list-style-type: none"> ● Definition of crime scene ● Types of crime scenes – primary, secondary, crime scenes based on size of evidence- Indoor Crime Scene, outdoor crime scene and mobile crime scene. ● Crime scene Management – Protection, Documentation, Searching, Collection, Packaging. ● Sketching method of Crime Scene: Triangular, Rectangular, Baseline and Polar Co- ordination. ● Photography of Crime Scene: Long range, mid-range and close up photography ● Role of Forensic Scientist, First Responding officer and other experts. ● Crime Scene Reconstruction <p>B) Physical Evidence</p> <ul style="list-style-type: none"> ● Definition, Classification of Physical Evidences- on the Basis of Class, Nature and Size, ● Different Search Methods for Physical Evidences: Zone, Grid, Spiral, strip and wheel ● Collection, Preservation, Packaging, Labelling, Sealing and

	<p>Forwarding of Physical Evidences.</p> <ul style="list-style-type: none"> ● Chain of Custody. ● Forwarding Letter. <p style="text-align: right;">14(periods)</p>
Unit III	<p>Crime, Criminology and Penology</p> <ul style="list-style-type: none"> ● Crime, Criminology: Definition & its Scope, Crime: Definition, Nature. ● Theories of Criminal Behavior– Biological, Sociological and Psychological. ● Juvenile Delinquency ● Investigation: FIR, Case Diary, Cognizable and Non-Cognizable Offences, Police Custody & Judicial Custody, Bailable and Non-Bailable Offences, Compoundable offences and non-Compoundable offences, Parole ● Procedure of Filing Charge Sheet. ● Indian Police System ● Indian Penal Code, 1860: Crime Against Person, Crime Against Property. ● Criminal Procedure Code, 1973 ● Indian Evidence Act, 1872 <p style="text-align: right;">(14periods)</p>
Unit IV	<p>Impressions and Prints</p> <ul style="list-style-type: none"> ● Fingerprints: Nature, Location, Types, Patterns, Collection and examination, taking control sample, Forensic Significance, etc. ● Foot Prints: Importance, Gait pattern, casting of footprints from different surfaces, taking control sample. ● Tire Marks and Skid Marks: Collection and evaluation, Forensic Significance. ● Lip Prints: Nature, Location, Collection and examination, taking control sample, Forensic Significance, etc. ● Bite Marks: Nature, Location, Collection and examination, taking control sample, Forensic Significance, etc. ● Ear Print: Nature, Location, Collection and examination, taking control sample, Forensic Significance, etc. <p style="text-align: right;">(14periods)</p>
Unit V	<p>Questioned Documents and Its Examination</p> <ul style="list-style-type: none"> ● Definition of Document and questioned document, classification of document, genuine and forged document. ● Collection, Preservation and handling of questioned documents. ● Forgery: Nature, classification and examination and legal aspect. ● Basic principle of handwriting ● Class Characteristics and Individual Characteristics of handwriting ● Principle of Handwriting Examination ● Tools needed for Questioned Document Examination ● Function of Forensic Document Examiner <p style="text-align: right;">(14 periods)</p>
Unit VI	<p>Forensic Medicine and Jurisprudence</p> <ul style="list-style-type: none"> ● Introduction to Forensic Medicine and Jurisprudence ● Legal Procedure in India: Police inquest, Magistrate's inquest, Coroner's inquest. ● Documentary evidence: Medical certificates, medical reports, dying declaration. Understanding laws and ethics of medical practice. ● Medico legal aspects of death: Diagnosis of death- somatic & molecular, early and intermediate changes following death, late changes after death- putrefaction, autolysis, bacterial action, factors affecting these changes. ● Medico legal investigation of sexual offences, including examination of victims and suspects. ● Medico legal aspects of death: causes of death such as asphyxia, electrocution, thermal trauma, heat burns, starvation, natural death, sudden death, death by accident.

	<ul style="list-style-type: none"> ● Medico legal aspects of wounds: Medical and legal definition of wounds, types of mechanical and regional injuries, aging of wounds, difference between suicidal, homicidal and accidental wounds. <p style="text-align: right;">(14 periods)</p>
<p>*SEM 1. Paper Writing and Presentations Program Indoor Crime Scene, outdoor crime scene and mobile crime scene</p> <p>2. Identify: Types of crimes, establishment of police in India, Fundamentals of Forensic Science and its importance in Society, understanding medico legal aspect.</p>	
<p>COs: 1. The working and establishment of police in central and state level. 2. The tools and techniques for analysis of different types of crime scene evidence and an idea about various preventive measures</p>	
**Activities	<ol style="list-style-type: none"> 1. Quiz Competitions, 2. Seminar competitions 3. Project assignment Unit Test 4. Government Forensic Science Laboratory Visit. 5. Accident or Crime scene field visit 6. Collection of crime scene evidences 7. Police Station visit to understand the basic procedure of policing. <p style="text-align: right;">(periods)</p>

Course Material/Learning Resources

1. Text books: Introduction to Forensic Science in Crime Investigation By Dr.(Mrs.) Rukmani Krishnamurthy
 2. Henry Lee's Crime Scene Handbook by Henry C Lee
 3. Forensic Biology by Shrikant H. Lade
 4. Crime Scene Processing and Laboratory Work Book by Patric Jones
 5. Criminalistics: An Introduction to Forensic Science, 9th ed. By Richard Saferstein
 6. Compute Crime and Computer Forensic by Dr. R.K. Tiwari
 7. Criminal Profiling: An Introduction to a Behavioral Evidence Analysis, 3rd ed. By Brent E. Turvey
 8. Handbook of Forensic Psychology by Dr. Veerraghavan
 9. Crime Scene Management with Special Emphasis on National Level Crime Cases by Dr. Rukmani Krishnamurthy under publishing
 10. Text Book of Medical Jurisprudence, Forensic Medicine and Toxicology by Parikh C.K.
 11. The Identification of Firearms and Forensic ballistics by Barrard and Gerald.
 12. Reference Books: Forensic Science: An Introduction to Scientific and Investigative Techniques 3rd ed. by Stuart H. James
 13. Forensic Science in Criminal Investigation and Trial, 4th ed. By B.R. Sharma
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Syllabus Prescribed for 03 Year UG Programme

Programme: B.Sc. Practical Basics of Forensic Science

Semester 1

Code of the Course/Subject	Title of the Course/Subject	(No. of Periods/Week)
1S FRS Practical	(Laboratory/Practical/practicum/hands-on/Activity)	21 Sessions

Basics of Forensic Science Practical

COs:

Upon completion of the course successfully, students would be able to perform/demonstrate the following

*** List of Practical/Laboratory Experiments/Activities etc.**

1	Collection and Handling of Petroleum samples.
2	Collection and Handling of Murder samples
3	Collection and Handling of fire crime scene samples.
4	Perform rough and fair sketch of indoor and outdoor crime scene.
5	Perform Photography of indoor and outdoor crime scene.
6	To take Plain and Rolled inked fingerprints and identify patterns.
7	To develop latent fingerprints with powder method
8	Lifting of fingerprints.
9	Document and fingerprint photography.
10	Casting of Footprint
11	Detection of forgery including traced and simulated forgery and built-up documents
12	Examination of security features of Indian Currency Note, Passport and Plastic money.
13	Report writing and interpretation.
14	Identification of handwriting by using class and individual characteristics.
15	Identification of Indented and Invisible writing.
16	Identification of typescripts and printing matter.

Note: Please use Times New Roman 10-point font

Reference Books.

1. Introduction to Forensic Science in Crime Investigation By Dr.(Mrs.) Rukmani Krishnamurthy
2. Henry Lee's Crime Scene Handbook by Henry C Lee
3. Forensic Biology by Shrikant H. Lade
4. Crime Scene Processing and Laboratory Work Book by Patric Jones
5. Forensic Science: An Introduction to Scientific and Investigative Techniques 3rd ed. by Stuart H. James
6. Criminalistics: An Introduction to Forensic Science, 9th ed. By Richard Saferstein
7. Compute Crime and Computer Forensic by Dr. R.K. Tiwari
8. Criminal Profiling: An Introduction to a Behavioral Evidence Analysis, 3rd ed. By Brent E. Turvey
9. Forensic Science in Criminal Investigation and Trial, 4th ed. By B.R. Sharma
10. Handbook of Forensic Psychology by Dr. Veera raghavan
11. Crime Scene Management with Special Emphasis on National level Crime Cases by Dr. Rukmani Krishnamurthy under publishing
12. Text Book of Medical Jurisprudence, Forensic Medicine and Toxicology by Parikh C.K.
13. The Identification of Firearms and Forensic ballistics by Barrard and Gerald.

Faculty: Science and Technology
Programme: B. Sc. Forensic Science

Syllabus Prescribed for 03 Year UG Programme

Programme: B. Sc. (Forensic Science)

Semester 2

Code of the Course/Subject	Title of the Course/Subject	(Total Number of Periods)
2S Forensic Science	Basics of Forensic Chemistry and Toxicology	84
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COs

By the end of the Course, students would be able to

1. Understand the basics of forensic chemistry and its procedure.
2. Describe the various instrumental techniques (Analytical Techniques)
3. Understand the evidence collection and analysis method of forensic chemistry.
4. Understand about poisonous materials and its analysis.
5. Analyse gold, silver, adulterants, cements, petroleum products, etc.
6. Understand fire and arson cases and its investigation
7. Understand legality of chemical and toxicological materials.

Unit	Content
Unit I	<p>A) Forensic Chemistry</p> <ul style="list-style-type: none"> ● Introduction to Forensic Chemistry, Chemistry division in FSL, Evidences in Forensic Chemistry and Toxicology. ● Screening, sampling method (Collection), Packaging method. <p>B) Qualitative-Quantitative Analysis</p> <ul style="list-style-type: none"> ● Organic-inorganic product: Chemicals, oils, fats, petroleum product, cement. <p>C) Miscellaneous</p> <ul style="list-style-type: none"> ● Examination of gold, silver, tobacco, tea, sugar, salt, fertilizer, dyes, etc. <p style="text-align: right;">(14 periods)</p>
Unit II	<p>Separation and Detection Techniques</p> <ul style="list-style-type: none"> ● Distillation and its types. ● Chromatography: Introduction to chromatography, classification, types include TLC, Paper chromatography, HP-TLC, GC, HPLC. ● Spectroscopy: Introduction to spectroscopy, EMR, Beer's-Lambert's law, electronic transitions, UV-Visible, IR, AAS, AES, NMR, MS, XRD and NAA. <p>Gravimetric Analysis: TGA, DTA, DSC.</p> <p style="text-align: right;">14(periods)</p>
Unit III	<p>Forensic Toxicology</p> <ul style="list-style-type: none"> ● Introduction to Toxicology and Forensic Toxicology. ● Significance of Forensic Toxicology and its examination. ● Poison: Definition, Classification, types of poisoning, mode of action of poison, sign and symptoms. ● Collection and preservation of toxicological exhibits in fatal and survival cases.

	<ul style="list-style-type: none"> ● Medico legal and post-mortem examination report/finding studies ● Specific analysis and plan/approach to toxicological examination of poisoning samples ● Administration, Distribution, Metabolism and Excretion of Poison ● Interpretation of analytical data and forming opinions <p style="text-align: right;">(14periods)</p>
Unit IV	<p>Narcotic Drugs and Psychotropic Substances</p> <ul style="list-style-type: none"> ● Introduction to Narcotic drugs and psychotropic substances ● Classification of narcotic drugs and its effects. ● Drug hazardous, tolerance and dependence of drugs, Problems of drug addiction ● Identification of drug addicts and crimes related to substance abuse ● Analytical techniques of identification of drugs <p style="text-align: right;">(14periods)</p>
Unit V	<p>Study of Analysis of Beverages</p> <ul style="list-style-type: none"> ● Introduction of alcohol and illicit liquor ● Alcoholic and non-alcoholic beverages and their composition ● Proof spirit, absorption, detoxication and excretion of alcohol ● Problems in alcohol cases and difficulties in diagnosis ● Analytical techniques of alcohol and other articles ● Alcohol and prohibition, consequences of drunken driving ● Diseases related to alcohol ● Case studies. <p style="text-align: right;">(14 periods)</p>
Unit VI	<p>Miscellaneous</p> <ul style="list-style-type: none"> ● Arson: chemistry of fire, investigation and evaluation of clue material, analysis of arson exhibits by instrumental method and management of arson cases.\ ● Food adulteration: Introduction to food adulteration, preservation of food adulteration, analytical technique for analysis of exhibits involved in food and other material cases. ● Relevant provisions: <ol style="list-style-type: none"> 1. Preservation of Food Adulteration Act 1954 (Definition, power of food inspector, offenses and penalties). 2. NDPS Act, 1985 (Definition, illicit opium cultivation, minimum and commercial quantities in narcotics drugs, offenses and penalties). 3. Prevention of illicit trafficking in NDPS act 1985 (Detention of the person under the act). 4. Prevention of Drug Control Act, 1940 (Definition, power of chief commissioner under the act). 5. Drug and Cosmetic Act, 1945 (Definition, adulterate trade, misbranded and spurious drugs and cosmetics, offenses and penalties). <p style="text-align: right;">(14 periods)</p>
<p>*SEM 2. Understanding the basics of forensic chemistry and toxicology. Its collection, analysis and reporting.</p> <p>2. MOOC on SWAYAM relevant</p> <p>3. Identify: Chemical and toxicological evidences from crime scene, analytical methods, Forensic Toxicology, narcotic drug, poison, alcohol, etc.</p>	

COs: 1. Understanding of chemical evidences, its collection methods. 14. The tools and techniques for analysis of different types chemical evidences. 15. Aware about excise department 16. Legality related to chemical evidences.	
**Activities	1. Confidence building activities 2. Quiz Competitions, 3. Seminar competitions 4. Project assignment Unit Test 5. Government Forensic Science Laboratory Visit. 6. Industrial Visit

Course Material/Learning Resources

1. Instrumental Method of Chemical Analysis. Chatwal & Anand, Himalya Publication.
2. S. N. Tiwari, Analytical Toxicology, Govt. of India publications, New Delhi 1987
3. Brown P. R., Advance in Chromatography.
4. Introduction of Forensic Science in Crime Investigation by Dr. (Mrs.) R. Krishnamurthy.
5. Howard: Forensics Analysis by Gas Chromatography.
6. Yinon: Forensic Application of Mass Spectroscopy 1994.
7. Prakash M. et.al; Methods in Toxicology Anmol Publication, New Delhi (1998)
8. Parikh C.K; Text Book of Medical Jurisprudence Forensic Medicines and Toxicology. CBS Pub. New Delhi (1999)
9. Balraj S. Parmar et.al; Pesticide Formulation, CBS Publishers, New Delhi (2004)
10. Casarett & Doll Toxicology, The basic Science of Poisons
11. Curry A. S., Poison Detection in Human Organs 1976
12. Curry : Analytical Method in Human Toxicology 1986.
13. Lee and Gaensslem.: Advances in Forensic Science (Vol. 2) Instrumental Analysis.
14. Settle F. A.: Handbook of Instrumental Technique for Analytical Chemistry, Prentice Hall 1997.
15. Serope Kalpakjian, Steven R Schmid. "Manufacturing Engineering and Technology". International edition. 4th Ed. Prentice Hall, Inc. 2001. [ISBN 0-13-017440-8](#).
16. Hans-J. Koslowski. "Dictionary of Man-made fibers". Second edition. Deutscher Fachverlag. 2009.
17. Borrow: Molecular Spectroscopy 1980.
18. Willard H. H. et. al : Instrumental Methods of Analysis 1974.
19. Moonesens A. A. et. al. : Scientific Evidence in Criminal Cases 1973.
20. Lundquist and Curry: Methods of Forensic Sciences 1963.
21. Holfmann, F. G., Hand book of drug and alcohol abuse.
22. Arena Poisoning, Chemistry Symptoms and treatment,
23. nalysis of Plant Poisons, Dr. M P Goutam.
24. Drug Abuse Handbook, Karch.s.
25. Constitution of India
26. Indian Evidence Act.
27. Criminal Procedure code.
28. Indian Penal Code.
29. Bare Acts with short notes on the following: Narcotic Drugs & Psychotropic Substances Act, Drugs & Cosmetics Act, Explosive Substances Act, Dowry Prohibition Act, Prevention of Food Adulteration Act, Prevention of Corruption Act, Arms Act, Wild Life Protection Act.

Syllabus Prescribed for 03 Year UG Programme**Programme: UG****Semester 2**

Code of the Course/Subject	Title of the Course/Subject	(No. of Periods/Week)
2S- FRS Practical/ Forensic Science Practical	(Laboratory/Practical/practicum/hands-on/Activity) FRS Chemistry Practical	21 Sessions

COs:

Upon completion of the course successfully, students would be able to perform/demonstrate following

*** List of Practical/Laboratory Experiments/Activities etc.**

1	Identification of food adulteration- vegetable oil, cold drink, turmeric, ghee, chili powder, etc (02 nos).
2	Color test for identification of poisons and drugs (02 nos).
3	Color test for identification of alcohol from given matrix. (02 nos).
4	Separation of sampling material by TLC (Drugs, Poisons, etc) (02 nos).
5	Study of Steroids (separation by TLC).
6	Examination of chemicals used in trap cases by UV-Visible spectroscopy
7	Examination of Ink by using TLC and Paper Chromatography (02 nos)..
8	Microscopic examinations of Cannabis.
9	Separation of drugs and poisons using TLC and Paper Chromatography (02 nos).
10	Examination of other metals.
11	Analysis of Pesticides, Insecticides and Rodenticide by using TLC and Paper Chromatography.
12	Examination of petroleum products by using TLC and Other Chromatographic methods.
13	Chemical analysis of explosives materials (gun powder- microscopic test) (02 nos).
14	Working and Handling of GC, HPLC.
15	Analysis of cement.
16	Qualitative and Quantitative of drug opiates

References

1. Instrumental Method of Chemical Analysis. Chatwal & Anand, Himalya Publication.
2. S. N. Tiwari, Analytical Toxicology, Govt. of India publications, New Delhi 1987
3. Brown P. R., Advance in Chromatography.
4. Introduction of Forensic Science in Crime Investigation by Dr. (Mrs.) R. Krishnamurthy.
5. Howard: Forensics Analysis by Gas Chromatography.
6. Yinon: Forensic Application of Mass Spectroscopy 1994.
7. Prakash M. et.al; Methods in Toxicology Anmol Publication, New Delhi (1998)
8. Parikh C.K; Text Book of Medical Jurisprudence Forensic Medicines and Toxicology. CBS Pub. New Delhi (1999)
9. Balraj S. Parmar et.al; Pesticide Formulation, CBS Publishers, New Delhi (2004)
10. Casarett & Doll Toxicology, The basic Science of Poisons
11. Curry A. S., Poison Detection in Human Organs 1976
12. Curry : Analytical Method in Human Toxicology 1986.
13. Lee and Gaensslem.: Advances in Forensic Science (Vol. 2) Instrumental Analysis.
14. Settle F. A.: Handbook of Instrumental Technique for Analytical Chemistry, Prentice Hall 1997.
15. Serope Kalpakjian, Steven R Schmid. "Manufacturing Engineering and Technology". International edition. 4th Ed. Prentice Hall, Inc. 2001. ISBN 0-13-017440-8.
16. Hans-J. Koslowski. "Dictionary of Man-made fibers". Second edition. Deutscher Fachverlag. 2009.
17. Borrow: Molecular Spectroscopy 1980.
18. Willard H. H. et. al : Instrumental Methods of Analysis 1974.
19. Moonesens A. A. et. al. : Scientific Evidence in Criminal Cases 1973.

20. Lundquist and Curry: Methods of Forensic Sciences 1963.
21. Holfmann, F. G., Hand book of drug and alcohol abuse.
22. Arena Poisoning, Chemistry Symptoms and treatment,
23. nalysis of Plant Poisons, Dr. M P Goutam.
24. Drug Abuse Handbook, Karch.s.
25. Constitution of India
26. Indian Evidence Act.
27. Criminal Procedure code.
28. Indian Penal Code.
29. Bare Acts with short notes on the following: Narcotic Drugs & Psychotropic Substances Act, Drugs & Cosmetics Act, Explosive Substances Act, Dowry Prohibition Act, Prevention of Food Adulteration Act, Prevention of Corruption Act, Arms Act, Wild Life Protection Act.