FACULTY OF BASIC AND APPLIED SCIENCES

SCHEME & SYLLABUS

FOR

B.Sc. (HONOURS) FORENSIC SCIENCE

Version	
Date of BOS/BOF/AC	
Implemented from (Session)	
Scheme and Syllabus Page Number	

SESSION: 2020-21

PROGRAMME DETAILS

Name of programme	B.Sc. (Honours) Forensic Science
Duration of Programme	3 Years
Programme Objectives (POs):	The programs provide opportunity for learners to achieve the following objective: Make students familiar with the field of forensic science which includes investigating a crime by applying forensic science principles. Enhance knowledge, in depth understanding and application of forensic science, policing and criminal investigation by teaching and research. Develop critical and analytical subject specific skills involving the principles, practices and techniques of specific field. Develop competence in research methods and presentation of information. Develop skills in forensic identification, forensic problem solving either independently or as a team member. Keep abreast with all recent developments and emerging trends in Forensic science, Ethics and the law.
Programme Specific Outcomes (PSOs):	Understand application of Forensic Science, Photography and Crime Scene Management. Techniques of Forensic Physics, Forensic Ballistics, Forensic Chemistry and Toxicology. Study Forensic Dermatoglyphics and other impressions. All PSOs are helpful in forensic identification with reference to various crimes. Understanding and application of scientific method in research.

Total Credit of the Program

Sem	I	II	III	IV	V	VI	Total
Credits	22	24	26	26	-	-	98

B.Sc. (HONS.) FORENSIC SCIENCE SCHEME WEF 2019-20						
SEMESTER I						
Course Code	***University Course Type***	***Course Name***	***Teaching Scheme***			
			L	***T***	***P***	***C***
FSH 101	Core Theory	Introduction to Forensic Science	4	0	0	4
FSH 103	Core Theory	Crime and Society	4	0	0	4
FSH 102	Core Practical	Introduction to Forensic Science Lab	0	0	4	2
FSH 104	Core Practical	Crime and Society Lab	0	0	4	2
ZOO 150	Generic Elective Course-1 (GEC)	Zoology for Forensic Science	3	0	0	3
PHY 198		Physics for Forensic Science	3	0	0	3
ZOO 151		Zoology Lab for Forensic Science	0	0	2	1
PHY 199		Physics Lab for Forensic Science	0	0	2	1
CHY 103	Core Ability Enhancement	Environmental Science	2	0	0	2
Total			**16**	**0**	**12**	**22**

B.Sc.(HONS.) FORENSIC SCIENCE SCHEME WEF 2019-20						
SEMESTER II						
Course Code	***University Course Type***	***Course Name***	***Teaching Scheme***			
			L	***T***	***P***	***C***
FSH 105	Core Theory	Criminal Law	4	0	0	4
FSH 107	Core Theory	Forensic Psychology	4	0	0	4
FSH 106	Core Practical	Criminal Law Lab	0	0	4	2
FSH 108	Core Practical	Forensic Psychology Lab	0	0	4	2
BOT 170	Generic Elective Course-2 (SEC)	Botany for Forensic Science	3	0	0	3
BOT 171		Botany Lab for Forensic Science	0	0	2	1
CHY 252		Chemistry for Forensic Science	3	0	0	3
CHY 253		Chemistry Lab for Forensic Science	0	0	2	1
ENG 106	Core Ability Enhancement	Professional Communication	2	0	0	2
ENG 107		Communication Tech Lab	0	0	2	1
SEP 200	Skill Enhancement Practical	Extra-CurricularActivity (NSS/NCC/Scouting/ club activity)	0	0	2	1
Total			**16**	**0**	**16**	**24**

B.Sc.(HONS.) FORENSIC SCIENCES SCHEME WEF 2019-20						
SEMESTER III						
Course Code	University Course Type	Course Name	Teaching Scheme			
			L	T	P	C
FSH 109	Core Theory	Forensic Dermatoglyphics	4	0	0	4
FSH 111	Core Theory	Technological Methods in Forensic Science	4	0	0	4
FSH 113	Core Theory	Criminalistics	4	0	0	4
FSH 110	Core Practical	Forensic Dermatoglyphics Lab	0	0	4	2
FSH 112	Core Practical	Technological Methods in Forensic Science Lab	0	0	4	2
FSH 114	Core Practical	Criminalistics Lab	0	0	4	2
FSH137/ FSH139	Generic Elective Course (GEC)	Digital Forensic / Swayam	4	0	0	4
FSH 138/ FSH140		Digital Forensic Lab / Swayam Lab	0	0	4	2
FSH 141	Core Ability Enhancement	Introduction to Biometry	2	0	0	2
Total			**18**	**0**	**16**	**26**

B.Sc.(HONS.) FORENSIC SCIENCES SCHEME WFF 2019-20						
SEMESTER IV						
Course Code	University Course Type	Course Name	Teaching Scheme			
			L	T	P	C
FSH 115	Core Theory	Introduction To Forensic Chemistry	4	0	0	4
FSH 117	Core Theory	Questioned Documents	4	0	0	4
FSH 119	Core Theory	Forensic Biology	4	0	0	4
FSH 116	Core Practical	Introduction To Forensic Chemistry Lab	0	0	4	2
FSH 118	Core Practical	Questioned Documents Lab	0	0	4	2
FSH 120	Core Practical	Forensic Biology Lab	0	0	4	2
FSH142/ FSH144	Generic Elective Course (GEC)	Economics/ Swayam	4	0	0	4
FSH143/ FSH145		Economics Lab/ Swayam Lab	0	0	4	2
FSH 146	Core Ability Enhancement	Handwriting Identification and Recognition	2	0	0	2
Total			**18**	**0**	**16**	**26**

Theory – 2 Midterm Exams and Course Work* (40%) End Term Exam (60%)

Practical- 2 Midterm Exams and Course Work* (60%) End Term Exam (40%)

*Class work shall include: Quiz, Assignment, Seminars, Presentations, Attendance, Case study, Surprise class test, Lab record, Viva, Projects, and Observation Book

Semester I

FSH 101
INTRODUCTION TO FORENSIC SCIENCE

L-T-P-C Structure 4-0-0-4 **Course Type: Core Theory**

COURSE OBJECTIVES: The objective of this course is to

CO1:Introduce the concept of forensic science, its development and progress over time.
CO2:It will also familiarize students with the organizational setting and working set up of forensic laboratories.
CO3:It aims to introduce different techniques used in forensic investigations with the principles involved.

MODULE I

Basic of Forensic Science: Introduction, Definition, need, signification and scope of Forensic Science. Principles of Forensic Science, Multi professional and multi personal aspects of forensic science. Domains in Forensic Science: Forensic Biology, Forensic Medicine, Forensic Toxicology, Forensic Osteology and Odontology, Forensic Physics, Forensic Photography, Ballistics, Fingerprint, Forensic Psychology, Forensic Anthropology, Wild life Forensic, DNA profiling, Computer Forensic etc., Functions of Forensic Scientist, Police officers,

MODULE II

History of Development of Forensic Science in India

Functions of forensic science. Historical aspects of forensic science, concepts in forensic science.

Ethical issue in Forensic Science: Definition of ethics, professional standards for practice of Criminalistics

MODULE III

Tools and Techniques in Forensic Science

Forensic science in international perspectives, including set up of INTERPOL and FBI, Problem of proof in forensic science. Government Examiners of Questioned Documents, Fingerprint Bureaus, National Crime Records Bureau, Police & Detective Training Schools, Bureau of Police Research & Development, Medico legal expert officers, Corpous delicei,modal operandi

MODULE IV

Duties of forensic scientists Code of conduct for forensic scientists. Qualifications of forensic scientists, Data depiction. Report writing, Physical evidences and its importance in Forensic Science

MODULE V

Organizational set up of Forensic Science Laboratories in India

Hierarchical set up of Central Forensic Science Laboratories, State Forensic Science Laboratories, Directorate of Forensic Science and Mobile Crime Laboratories. Police Academies. Services of crime laboratories. Basic services and optional services.

Text Books:

1) B.B. Nanda and R.K. Tiwari, *Forensic Science in India: A Vision for the Twenty First Century*, Select Publishers, New Delhi (2001).
2) M.K. Bhasin and S. Nath, *Role of Forensic Science in the New Millennium*, University of Delhi, Delhi (2002).

Reference Books:

1) S.H. James and J.J. Nordby, *Forensic Science: An Introduction to Scientific and Investigative Techniques*, 2nd Edition, CRC Press, Boca Raton (2005).

2) W.G. Eckert and R.K. Wright in *Introduction to Forensic Sciences*, 2nd Edition, W.G. Eckert (ED.), CRC Press, Boca Raton (1997).

3) R. Saferstein, *Criminalistics*, 8th Edition, Prentice Hall, New Jersey (2004).

4) W.J. Tilstone, M.L. Hastrup and C. Hald, *Fisher's Techniques of Crime Scene Investigation*, CRC Press, Boca Raton (2013).

FSH 102
INTRODUCTION TO FORENSIC SCIENCE LAB

L-T-P-C Structure 0-0-4-2 **Course Type: Core Practical**

COURSE OBJECTIVES: The objective of this course is to

CO1:Understand the basic concept, meaning, significance and development of Forensic science.

CO2:To elucidate research methodologies and techniques used in the formation of research design on a specific problem.

CO3:Describe Crime scene investigations, Reconstruction of scene of crime,basic principles of photography and its relevance.

1. To study the history of crime cases from forensic science perspective.
2. To cite examples of crime cases in which apprehensions arose because of Daubert standards.
3. To review the sections of forensic science at INTERPOL and compare with those in Central Forensic Science Laboratories in India. Include suggestions for improvements if any.
4. To study the annual reports of National Crime Records Bureau and depict the data on different type of crime cases by way of smart art/templates.
5. To write report on different type of crime cases.
6. To review how the Central Fingerprint Bureau, New Delhi, coordinates the working of State Fingerprint Bureaus.
7. To examine the hierarchical set up of different forensic science establishments and suggest improvements.
8. To examine the list of projects undertaken by the Bureau of Police Research and Development and suggest the thrust areas of research in Police Science.
9. To compare and contrast the role of a Police Academy and a Police Training School.
10. To compare the code of conduct prescribed by different establishments for forensic scientists.
11. What are physical evidences and types of physical evidences.
12. How to collect preserved and transport blood stain from the surface.

13. How to collect preserved hair, fiber (trace evidences) from the scene of crime.

Text Books:

1) B.B. Nanda and R.K. Tiwari, *Forensic Science in India: A Vision for the Twenty First Century*, Select Publishers, New Delhi (2001).
2) M.K. Bhasin and S. Nath, *Role of Forensic Science in the New Millennium*, University of Delhi, Delhi (2002).
3) S.H. James and J.J. Nordby, *Forensic Science: An Introduction to Scientific and Investigative Techniques*, 2nd Edition, CRC Press, Boca Raton (2005).

Books Suggested:

1) W.G. Eckert and R.K. Wright in *Introduction to Forensic Sciences*, 2nd Edition, W.G. Eckert (ED.), CRC Press, Boca Raton (1997).
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).

FSH 103
CRIME AND SOCIETY

L-T-P-C Structure 4-0-0-4 **Course Type: Core Theory**

COURSE OBJECTIVES: The objective of this course is to

CO1:Introduce the concept and scope of crime. It will familiarize students with types of crime and its effects as well its prevention.
CO2:The course would highlight about criminal behavior and related theories.
CO3:It will disseminate information to students with Basics of Criminology**,** Crime, Criminal behavior, Human rights and criminal justice system in India.

MODULE-I

Basics of Criminology

Definition, aims and scope. Theories of criminal behavior – classical, positivist, sociological. Criminal anthropology, Criminal profiling, Understanding modus operandi, Investigative strategy, Role of media.

MODULE-II

Crime

Elements, nature, causes and consequences of crime. Deviant behavior. Hate crimes, organized crimes and public disorder, domestic violence and workplace violence. White collar crimes Victimology. Juvenile delinquency. Social change and crime. Psychological Disorders and Criminality. Situational crime prevention.

MODULE-III

Criminal behavior: Introduction of criminal behavior, theories ofcriminal behavior: classical and non-classical theories, biological theories, physiological theories, psychogenic theory, economic theory, geographical theories, and sociological theories**.**

MODULE-IV

Crime detection agency : Organization set up, National Institute of Criminology and Forensic science, Crime Investigation department, Central Bureau of Investigation, National Investigation Agency , World Anti-Doping Agency, National Drug Testing Laboratory, Centre for Cellular and Molecular Biology, Intelligence Bureau, Research Analysis Wing, Bureau of Police Research & Development, Defense Research and Development Organization, Central Police Organization, Central Detective Training School, Fingerprint Bureau Investigation, Crime Investigation Agency, Crime Scene Investigation, Drug Enforcement Administrator & Interpol, OCTOPUS etc.

MODULE-V

Criminal Justice System

Broad components of criminal justice system. Policing styles and principles. Police's power of investigation. Filing of criminal charges. Community policing. Policing a heterogeneous society. Correctional measures and rehabilitation of offenders.

Human rights and criminal justice system in India: Human rights, principal sectors of human rights abuses (Crime, Police, Courts, Prisons, states and others), Suggestions for improving the system of criminal justice.

Text Books:

1)S.H. James and J.J. Nordby, *Forensic Science: An Introduction to Scientific and Investigative Techniques*, 2nd Edition, CRC Press, Boca Raton (2005).

2)D.E. Zulawski and D.E. Wicklander, *Practical Aspects of Interview and Interrogation*, CRC Press, Boca Raton (2002).

Books Suggested:

1)R. Saferstein, *Criminalistics*, 8th Edition, Prentice Hall, New Jersey (2004).

2)J.L. Jackson and E. Barkley, *Offender Profiling: Theory, Research and Practice*, Wiley, Chichester (1997).

3)R. Gupta, *Sexual Harassment at Workplace,* LexisNexis, Gurgaon (2014).

FSH 104
CRIME AND SOCIETY LAB

L-T-P-C Structure 0-0-4-2 **Course Type: Core Practical**

COURSE OBJECTIVES: The objective of this course is to

To understand concept of crime and recent development in its control and prevention. To study the aim and scope of criminology.

To elucidate Criminal profiling and modus operandi, portrait parley, voice stress analysis

To describe History and development of police administration; Police duties, responsibilities and powers.

1. To review past criminal cases and elucidate which theory best explains the criminal behavior of the accused
2. To review crime cases where criminal profiling assisted the police to apprehend the accused.
3. To cite examples of crime cases in which the media acted as a pressure group.
4. To evaluate the post-trauma stress amongst victims of racial discrimination.
5. To correlate deviant behavior of the accused with criminality (take a specific example).
6. To evaluate victimology in a heinous crime.
7. To examine a case of juvenile delinquency and suggest remedial measures.
8. To evaluate how rising standards of living affect crime rate.
9. To review the recommendations on modernization of police stations and evaluate how far these have been carried out in different police stations.
10. To visit a 'Model Police Station' and examine the amenities vis-à-vis conventional police stations.
11. To examine steps being taken for rehabilitation of former convicts and suggest improvements.
12. To prepare a report on interrogation cells and suggest improvements.

Text Books:

1)S.H. James and J.J. Nordby, *Forensic Science: An Introduction to Scientific and Investigative Techniques*, 2nd Edition, CRC Press, Boca Raton (2005).

2)D.E. Zulawski and D.E. Wicklander, *Practical Aspects of Interview and Interrogation*, CRC Press, Boca Raton (2002).

Books Suggested:

1)R. Saferstein, *Criminalistics*, 8th Edition, Prentice Hall, New Jersey (2004).

2)J.L. Jackson and E. Barkley, *Offender Profiling: Theory, Research and Practice*, Wiley, Chichester (1997).

3)R. Gupta, *Sexual Harassment at Workplace,* LexisNexis, Gurgaon (2014).

ZOO 150
ZOOLOGY FOR FORENSIC SCIENCE

L-T-P-C Structure 3-0-0-3 **Course Type: GE Theory**

COURSE OBJECTIVE: Upon successful completion, student will be able

CO1:Understand the role, structure and importance of the bio molecules associated with plant life.
CO2:Learn Ultra structure and functioning of cell in the submicroscopic and molecular level.
CO3:Understand applications of basic techniques in Mendelism.
CO4:To explain general characters of insects.
CO5:Understand the wildlife conservation.

MODULE-I

Introduction

The cell, Human anatomy and physiology, structural unit of life, History of cell organization, Prokaryotic and eukaryotic cell, cell cycle, Mitosis and meiosis, Integumentary, Respiratory system, digestive system, excretory system, Cardiovascular system and reproductive system.

MODULE-II

Entomology in Forensic Science

Phylum Arthropoda, class insecta, General Entomology: Significance of Terrestrial and Aquatic insects in Forensic Science
Role of Insects in investigation, determine the time since death and use of insects in Forensic science.

MODULE-III

Human Biochemistry

Protein structure and its functions; Carbohydrates structure, function, properties; Lipids structure, properties and functions, Types of micronutrients and macronutrients in the body. Hormonal functions and Stimulations.

MODULE-IV

Wildlife Forensic Science

Introduction and importance of wildlife, Protection acts, Endangered Species of animals, wildlife Environment Protection Act, animal parts and organs, which are significant in Wildlife, Wildlife laboratories and its Organization and Wildlife conservation act.

MODULE-V

Mendelism

Mendel's Law, Exceptions to Mendel's Law,DNA & RNA: Structure, functions, types and Discovery, Morphological structure and organization, Special type of Chromosome, Salivary glands, Lamp brush Chromosome, supernumerary Chromosome, mutations, Definition & types mutagens (Physical & Chemical)

Text Books:

1) Ruppert and Barnes, R.D. Invertebrate Zoology, VIII Edition. Holt Saunders International Edition (2006)
2) Gupta P.K.2004. Cytology, Genetics and evolution. Rastogi Publications, Meerut. (Hindi Edition)
3) Campbell, MK (2012) Biochemistry, 7th ed., Published by Cengage Learning.
4) Tymoczko JL, Berg JM and Stryer L (2012) Biochemistry: A short course, 2nd ed., W.H.Freeman

Reference Books:

1)Kaushik, M.P.2003. A text Book of Modern Botany. Prakash publications, Muzaffar nagar (UP)
2) Klug, W.W.AndCummings, M.R.2005.Concepts of genetics Pearson Education (Singapore) pvt. Ltd., Indian Branch, Pratap Ganj,New Delhi.
3) Berg JM, Tymoczko JL and Stryer L (2011) Biochemistry, W.H.Freeman and Company
4) Nelson DL and Cox MM (2008) Lehninger Principles of Biochemistry, 5th Edition., W.H. Freeman and Company.
5) Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, J.I. The Invertebrates: A New Synthesis, III Edition, Blackwell Science(2002).
6) Young, J. Z. The Life of Vertebrates. III Edition. Oxford university press (2004).
Pough H. Vertebrate life, VIII Edition, Pearson International

PHY 198
PHYSICS FOR FORENSIC SCIENCE

L-T-P-C Structure 3-0-0-3 **Course Type: GE Theory**

COURSE OBJECTIVES: The objective of this course is to
CO1:Introduce the concept of Newton's law of motion, Elasticity & fluid dynamics
CO2:Study of sound and light, Laser & Fiber optics
CO3:Study of Radio activity (nuclear properties and half-life, Conservation laws in nuclear reactions, Biological effects of nuclear radiation etc.)
CO4:Study of Electronics circuits & Digital electronics like LR, CR, LCR circuits, transducers Photo sensors, Logic gates and their applications, Flip- flops and counters.
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MODULE-I

Newton's Law of Motion, Elasticity & Fluid Dynamics
Interpretation and applications of Newton's laws of motion, projectile motion, idea of range, time of flight, and maximum height of a projectile, Pseudo forces, coriolis force and its effect on earth surface, elastic properties of matter, elastic constants and their inter relations.
Fluid dynamics, equation of continuity, Bernoulli's equation and explanation of some phenomena, stream line and turbulent flow, lines of flow in air foil, Purseuille's equation.

MODULE-II

Study of Sound and Light
Velocity of sound, noise and sound intensity measurement, echo, reverberation, Sabine's formula, absorption effect of different materials, acoustics of buildings and factors affecting acoustics of buildings.
Sound distribution in an auditorium, introduction to ultrasonic, production of ultrasonic waves, applications of ultrasonics.
Refraction through thin layers, lens combinations, aberrations, interference in thin films, fringes of equal thickness, Newton's rings, and simple table spectrophotometer

MODULE-III

Laser and Fiber Optics
Concept of Induced absorption, Spontaneous and Stimulated emission, Population inversion, Pumping Process, Condition for lasing action, Active medium, Production of LASER source mainly Ruby LASER and He-Ne LASER, Properties of Laser light, applications of LASER: Holography and it's applications.
Total internal reflection & Optical fibers, Propagation of light through optical fiber, Angle of acceptance and numerical aperture, losses.

MODULE-IV

Radio Activity
Review of nuclear composition, nuclear properties and half-life, Radioactive decay schemes, Nuclear reactions, Conservation laws in nuclear reactions, Q- value of Nuclear reaction.

Applications of Radio Isotopes, Radiometric dating, Radiation hazards, Radiation levels of safety, Biological effects of nuclear radiation, Radiation protection methods, Nuclear disasters, Nuclear waste disposal, Radiation damage, Roentgen and Roentgen equivalent physical (rep) and man (rem), Radiation dose.

MODULE-V

Electronics Circuits & Digital Electronics

Basics of LR, CR, LCR circuits, transducers (Electric and Photo sensors), Rectifier circuits, Transistor and its characteristics and applications, Introduction to OPAM, remote sensing and controlling, , Logic gates and their applications, Flip-flops and counters.

Text Books:

1) Engineering mechanics**:**R. K. Bansal, Laxmi Publications (P) Ltd.
2) . Engineering Mechanics**:** D.P Sharma et. Al. , Pearson.
3) Engineering Physics**:** R. K. Gaur & S. L. Gupta, DhanpatRai Publications.
4) Engineering Physics**:** A. S. Vasudeva, S- Chand.
5) University Physics**:** J. C. Upadhyaya, Himalaya Publications.
6) Modern Physics**:** R. Murugeshanet. All. , S Chand Co Ltd.
7) Mechanics and Properties of Matter**:** J. C. Upadhyaya.
8) Optics**:** P. K. Srivastava, CBS Publication.
9) Optics**:** Khandelwal D. P.

Books Suggested:

1) Lasers **:**Theory and Application- Thyagrajan.
2) Lasers and Non- Linear Optics**:** B. B. Laud, Wiley Easter Ltd.
3) Optoelectronics Devices and Circuits- Amar K. Ganguly, Narosa Publication.
4) Atomic and Nuclear Physics **:**N. Subrahmanyam et.al. , S- chand company Ltd.
5) Nuclear Physics**:** S. B. Patel,John Wiley & Sons.
6) Digital Computer Electronics**:** Malvino, Brown, Tata McGraw hills.
7) Principle of Electronics**:** V. K. Mehta, S Chand.

ZOO 151
ZOOLOGY LAB FOR FORENSIC SCIENCE

L-T-P-C Structure 0-0-2-1 **Course Type: GE Practical**

COURSE OBJECTIVE: Upon successful completion, student will be able

CO1:Understand the role, structure and importance of the bio molecules associated with plant life.
CO2:Learn Ultra structure and functioning of cell in the submicroscopic and molecular level.
CO3:Understand applications of basic techniques in Mendelism.
CO4:To explain general characters of insects.
CO5:Understand the wildlife conservation.

1. Introduction to microscopy-simple and compound microscope.
2. Preparation and use of fixatives and stains.
3. Study of different stages of Mitosis and Meiosis through permanent slide.
4. Study of cell and its organelles with the help of electron micrographs
5. Study of life cycle of insect.
6. Qualitative tests for carbohydrates, reducing sugars, non-reducing sugars, lipids and proteins.
7. To prepare a case report on forensic entomology.
8. To prepare a case report on problems of wildlife forensics

Text Books:

1.Gupta P.K.2004. Cytology, Genetics and evolution. Rastogi Publications, Meerut. (Hindi Edition)
2.Campbell, MK (2012) Biochemistry, 7th ed., Published by Cengage Learning.
3.Tymoczko JL, Berg JM and Stryer L (2012) Biochemistry: A short course, 2nd ed., W.H.Freeman

Reference Books:

1.Kaushik, M.P.2003. A text Book of Modern Botany. Prakash publications, Muzaffar nagar (UP)
2. Klug, W.W.AndCummings, M.R.2005.Concepts of genetics Pearson Education (Singapore) pvt. Ltd., Indian Branch, Pratap Ganj,New Delhi.
3.Berg JM, Tymoczko JL and Stryer L (2011) Biochemistry, W.H.Freeman and Company
4.Nelson DL and Cox MM (2008) Lehninger Principles of Biochemistry, 5th Edition., W.H. Freeman and Company.

PHY 199
PHYSICS LAB FOR FORENSIC SCIENCE

L-T-P-C Structure 0-0-2-1 **Course Type: GE**

Practical

COURSE OBJECTIVES: The objective of this course is to

To Study Refractive index of liquid by interference method. To Study Frequency of AC mains, LDR, LCR etc.

To study Bridge rectifier (to study load regulation), Transistor(CE) characteristics,

D-Morgan's Theorems Ex-or gate, NAND and NOR as universal building block.

At the end of this course, students will be able to

Understand the fundamentals of interference method

Understand the fundamentals of Bridge rectifier and Transistor(CE) characteristics

Understand the fundamentals of D-Morgan's Theorems Ex-or gate, NAND and NOR as universal building block

1) Refractive index of a liquid by interference method
2) Frequency of AC mains
3) LDR characteristics
4) LCR series resonance
5) Study of Bridge rectifier with different loads.
6) Transistor (CE) characteristics
7) D-Morgan's Theorems
8) Ex-OR gate, NAND and NOR as universal building block.
9) Use of CRO
10) Determination of wavelength of light using Newton's rings method.
11) Meldes experiment

Text Books:

1) Engineering Physics**:** R. K. Gaur & S. L. Gupta, DhanpatRai Publications
2) Engineering Physics**:** A. S. Vasudeva, S- Chand
3) University Physics**:** J. C. Upadhyaya, Himalaya Publications
4) Modern Physics**:** R. Murugeshanet. All. , S Chand Co Ltd.
5) Mechanics and Properties of Matter**:** J. C. Upadhyaya
6) Optoelectronics Devices and Circuits- Amar K. Ganguly, Narosa Publication.

Books Suggested:

1) Atomic and Nuclear Physics **:**N. Subrahmanyam et.al. , S- chand company Ltd.
2) Nuclear Physics**:** S. B. Patel,John Wiley & Sons.
3) Digital Computer Electronics**:** Malvino, Brown, Tata McGrawhills.
4) Principle of Electronics**:** V. K. Mehta, S Chand

CHY103
ENVIRONMENTAL SCIENCE

L-T-P-C Structure 2-0-0-2 **Course Type: CAE**

COURSE OBJECTIVE: Students will gain an understanding of:

Core concepts and methods from ecological and physical sciences and their application in environment.

To make everyone aware of environmental issues like pollution, loss of forest, solid waste disposal, and degradation of environment.

The ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.

Identify pollution and explain threats to the environment.

Discuss how political involvement can increase one's awareness of the topic of environmental protection

MODULE-I

Introduction and natural resources: Multidisciplinary nature and public awareness, renewable and non renewable resources and associated problems, forest, water , mineral, food , energy and land resources. Introduction to natural resources, conservation of natural resources and human role.

MODULE-II

Ecosystem: Ecological concepts, concept of ecosystems, types of ecosystems, ecosystem structure and functioning, energy flow, food chains and food webs, ecological pyramids

MODULE-III

Biodiversity and Conservation: Definition, genetic species and ecosystem diversity biogeographically , classification of Indian value of biodiversity at national and local levels, India as a mega-diversity nation , treats to biodiversity and endangered and endemic species of India, need for conservation of biodiversity.

MODULE-IV

Environmental pollution: Definition , causes, effect and control of air pollution , water pollution, soil pollution, marine pollution, noise pollution, thermal pollution, electromagnetic pollution, nuclear hazards , human role in prevention of pollution, solid waste management, disaster management, floods , earthquake, cyclone, and landslide **Firework Safety:**, Combustion of firework and pollution (noise, smoke, fireworks

fallout and residue pollution), heavy metal toxicity due to fireworks and associated health effects.

MODULE-V

Social Issue and Environment: Unsuitable to suitable development , urban problem related to energy and water conservation, environment protection act, wild life protection act, forest conservation act, environmental issues, population explosion, and family welfare programme. Environmental and human health HIV, women and child welfare, role of information technology on environment and human health.

Corruption: definition and reasons, details of organizations/agencies working against corruption, role of individual against corruption and mode of action.
Ethics : Meaning , nature, determinants and objectives of ethics, ethics and its relation to values norms and morals, Indian ethos, Swami Vivekananda and ethics.

Text Books:

1) Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA
2) Odum E.P.: Fundamentals of Ecology,1996, Dehradun: Natraj Publisher

Books Suggested:

1) Agrawal, K.C.: Fundamentals of Environmental Biology,2001, Bikaner (India): Nidhi Publishers
2) Chapman, J.L. & Reiss, M.J.: Ecology: Principles and Applications, 1995, Cambridge University Press
3) Atmospheric pollution, by W Buch , Tata McGraw Hill(TMH)

Semester II

FSH 105
CRIMINAL LAW

L-T-P-C Structure 4-0-0-4 **Course Type: Core Theory**

COURSE OBJECTIVES: The objective of this course is to

Introduce the concept and scope of crime. It will familiarize students with types of crime and its effects as well its prevention.

The course would highlight about criminal behavior and related theories. The course aims to discuss the concept of Juvenile delinquency and Victimology.

It will disseminate information to students with specific criminal Law, Indian Penal Code: sections, Criminal Procedure Code and police Administration.

MODULE-I

Basic of Crime

Definition of Crime, Nature of Crime, Essentials of Crime, Criminals and society Classification of crime, cognizable and non-cognizable offence, bailable and non-bailable offence, compoundable, non-compoundable offences and punishments.

MODULE-II

Various types of Crime

Various types of crime under IPC, Crime against State,Crime against Army, Navy, and Air Force, Crime against public Tranquility, Crime relating to public servant, Offences relating to election, False evidence and offence against public justice, Offence relating to Coin and Government stamps, Offence relating to weight and measures, Offence relating to Religion**.**

MODULE-III

Law to Combat Crime

Classification – civil, criminal cases. Essential elements of criminal law. Constitution and hierarchy of criminal courts, Criminal Procedure Code.

Sentences which the court of Chief Judicial Magistrate may pass, Summary trials – Section 260(2).

Judgements in abridged forms – Section 355.

Indian Penal Code pertaining to offences against persons – Sections 121A, 299, 300, 302, 304A, 304B, 307, 309, 319, 320, 324, 326, 351, 354, 359, 362, Sections 375 & 377 and their amendments.

Indian Penal Code pertaining to offences against property Sections – 378, 383, 390, 391, 405, 415, 420, 441, 463, 489A, 497, 499, 503, 511.

Indian Evidence Act – Evidence and rules of relevancy in brief. Expert witness. Cross examination and re-examination of witnesses.

Sections 32, 45, 46, 47, 57, 58, 60, 73, 135, 136, 137, 138, 141, Section 293 in the code of criminal procedure.

MODULE-IV

Constitution of India

Preamble, Fundamental Rights, Directive Principles of State Policy. – Articles 14, 15, 20, 21, 22, 51A..

MODULE-V

Acts Pertaining to Socio-economic and Environmental Crimes

Narcotic, Drugs and Psychotropic Substances Act. Essential Commodity Act, Drugs and Cosmetics Act. Explosive Substances Act. Arms Act, Dowry Prohibition Act. Prevention of Food Adulteration Act. Prevention of Corruption Act, Wildlife Protection Act. I.T. Act. Environment Protection Act. Untouchability Offences Act

Text Books :

1) D.A. Bronstein, *Law for the Expert Witness*, CRC Press, Boca Raton (1999).
2) Vipa P. Sarthi, *Law of Evidence*, 6th Edition, Eastern Book Co., Lucknow (2006).
3) A.S. Pillia, *Criminal Law*, 6th Edition, N.M. Tripathi Pvt Ltd., Mumbai (1983).

Books Suggested :

1) R.C. Nigam, *Law of Crimes in India*, Volume I, Asia Publishing House, New Delhi (1965).
2) (Chief Justice) M. Monir, *Law of Evidence*, 6th Edition, Universal Law Publishing Co. Pvt. Ltd., New Delhi (2002).

FSH 107

FORENSIC PSYCHOLOGY

L-T-P-C Structure 4-0-0-4 **Course Type: Core Theory**

COURSE OBJECTIVES: The objective of this course is to

Introduce the Concepts of psychology - Definition , goals , History and Development of psychology.

It aims at explaining the concept of forensic entomology and forensic psychology with details involved and their application in forensic investigations.

MODULE I

The Science of Psychology

Concepts of psychology - Definition of psychology, goals of psychology, History of psychology - Development of psychology, role of psychologist, Different perspectives in Psychology - Modern perspectives, Humanistic, behavioristic, cognitive, psychodynamic, Types of psychology professions - Psychiatrist, Psychologist, Counselor, The science and research methods - Interview, observation, case study method,

MODULE II

Biological Perspective

Nerve and neuron - Building the network, structure of neuron, neural impulses, neurotransmitters,

Nervous System -Central nervous system, structure and function of CNS, types of amnesia, Peripheral nervous system, Human brain - structure and function, significance of left and right brain, types of Amnesia, Endocrine system- Pituitary gland, Thyroid gland, Neurotransmitters**.**

Consciousness & Perception

Consciousness - Definition of consciousness, states of consciousness**,** Altered state of consciousness - Dreams, awake states including day dreaming**,** Rhythms of consciousness (Circadian rhythms) Sleep – stages of sleep, Dreams –Content, REM sleep and non-REM sleep, Altered states – Hypnosis, Meaning, Hypnotic stages**,** Attention and awareness definition, Sensation and perception- Basic concepts in perception, problems in attention and perception, assessment attention and perception.

MODULE III

Learning and Memory

Learning: Definition, and types of learning, Classical conditioning – Conditioned stimulus, unconditioned stimulus, Operant Conditioning – Thorndike's law of effect l basics of operant conditioning, generalization, discrimination.

Reinforcement – Primary And Secondary, Positive Reinforces, Punishment, Cognitive Learning – latent learning; observational learning, Basic Processes of Memory – Encoding, Storage, Retrieval. Sensory – Iconic, Memory and Echoic, Memory; STM – Working Memory, LTM, Episodic Memory. Explicit memory And Implicit memory, Techniques to improve memory: Rehearsal, Chunking, Mnemonics, Forgetting.

MODULE IV

Cognition, Motivation And Emotion

Thinking-Theories and models of thinking, types of Thinking, Decision making and problem solving: Stages of problem solving, methods of problem of problem solving, theories of decision making. Concept formation: Types of concepts. Intelligence: Definition, Tests of intelligence, concepts of. IQ Motivation: types and approaches of motivation and emotion.Stress and coping endocrine system : Types of stresses, relaxation techniques.

MODULE V

Theories of Personality

Understanding personality: Definition, stressing uniqueness, enduring characteristics, temperament, Approaches – Psychodynamic (Freud, Jung & Adler), Humanistic (Rogers & Maslow) .Assessment of personality – Questionnaires, Rating Scales and Projective tests, biological model assessment of personality.

Text Books:

1) B.B. Nanda and R.K. Tiwari, *Forensic Science in India: A Vision for the Twenty First Century*, Select Publishers, New Delhi (2001).

Books Suggested :

1) M.K. Bhasin and S. Nath, *Role of Forensic Science in the New Millennium*, University of Delhi, Delhi (2002).

2) S.H. James and J.J. Nordby, *Forensic Science: An Introduction to Scientific and Investigative Techniques*, 2nd Edition, CRC Press, Boca Raton (2005)

FSH 106
CRIMINAL LAW LAB

L-T-P-C Structure 0-0-4-2 **Course Type: Core Practical**

COURSE OBJECTIVES: The objective of this course is to

To understand cognizable and five non-cognizable offences.

To study a crime case in which an accused was punished on charge of murder under Section 302.

To study a case wherein the Untouchability Offences Act was invoked on the basis of Article

1. To prepare a schedule of five cognizable and five non-cognizable offences.
2. To study the powers and limitations of the Court of Judicial Magistrate of First Class.
3. To prepare a schedule of the offences which may be tried under Section 260(2) of Criminal Procedure Code.
4. To study a crime case in which an accused was punished on charge of murder under Section 302.
5. To study a crime case in which an accused was punished on charge of rape under Section 375.
6. To cite example of a case in which the opinion of an expert was called for under Section 45 of the Indian Evidence Act.
7. To cite a case wherein a person was detained under Article 22(5) of the Indian Constitution. Express your views whether the rights of the person as enlisted in this Article were taken care of.
8. To cite a case under Article 14 of the Constitution of India wherein the Right to Equality before Law was allegedly violated.
9. To list the restrictions imposed on Right to Freedom of Worship under the Constitution of India.
10. To prepare a schedule of persons convicted under Narcotics, Drugs and Psychotropic Act statistically analyze the age group to which they belonged.
11. To study a case in which Drugs and Cosmetic Act was invoked.
12. To study a case in which Explosive Substances Act was invoked.
13. To study a case in which Arms Act was invoked.
14. In light of Section 304B of the Indian Penal Code, cite a case involving dowry death.
15. To study a case wherein the Untouchability Offences Act was invoked on the basis of Article

Text Books :

1) D.A. Bronstein, *Law for the Expert Witness*, CRC Press, Boca Raton (1999).
2) Vipa P. Sarthi, *Law of Evidence*, 6th Edition, Eastern Book Co., Lucknow (2006).
3) A.S. Pillia, *Criminal Law*, 6th Edition, N.M. Tripathi Pvt Ltd., Mumbai (1983).

Books Suggested:

4) R.C. Nigam, *Law of Crimes in India*, Volume I, Asia Publishing House, New Delhi (1965).
5) (Chief Justice) M. Monir, *Law of Evidence*, 6th Edition, Universal Law Publishing Co. Pvt. Ltd., New Delhi (2002).

FSH 108
FORENSIC PSYCHOLOGY LAB

L-T-P-C Structure 0-0-4-2 **Course Type: Core Practical**

COURSE OBJECTIVES: The objective of this course is to

To learn different types of injuries and their forensic investigations.

To understand the concept of Forensic Entomology their history and significance. To analyse different methods used in forensic psychology like Lie detection, brain fingerprinting, narco-analysis, hypnosis, neuro-anthropological and psychological testing.

1. To cite a crime case where legal procedures pertaining to psychic behavior had to be invoked.
2. To prepare a report on relationship between mental disorders and forensic psychology.
3. To review a crime case involving serial murders. Comment on the psychological traits of the accused.
4. To cite a crime case involving a juvenile and argue for and against lowering the age for categorizing an individual as juvenile.
5. To study a criminal case in which hypnosis was used as a means to detect deception.
6. To prepare a case report on thematic appreciation test.
7. To prepare a case report on Minnesota multiphasic personality inventory test.
8. To prepare a case report on thematic appreciation test.
9. To prepare a case report on word association test.
10. To prepare a case report on Bhatia's battery of performance test of intelligence.
11. To cite a criminal case in which narco analysis was used as a means to detect deception.

Text Books:

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) J.C. DeLadurantey and D.R. Sullivan, *Criminal Investigation Standards*, Harper & Row, New York (1980).

Books Suggested:

1) J. Niehaus, *Investigative Forensic Hypnosis*, CRC Press, Boca Raton (1999).
2) E. Elaad in *Encyclopedia of Forensic Science, Volume 2*, J.A. Siegel, P.J. Saukko and G.C. Knupfer (Eds.), Academic Press, London (2000).

BOT 170
BOTANY FOR FORENSIC SCIENCE

L-T-P-C Structure 3-0-0-3 **Course Type: GE Theory**

COURSE OBJECTIVE: Upon successful completion, students are able to

Understand the diversity among Viruses,
Bacteria. Understand the diversity among Algae.
Understand the structure and life cycle patterns of Viruses, Bacteria, Algae.
Know the Economic Importance of Viruses, Bacteria, Algae.
Clear & sound background knowledge in respect to morphology and classification.

MODULE I

Viruses – Discovery, general structure, replication (general account), DNA virus (T-phage); Lytic and lysogenic cycle, RNA virus (TMV); Economic importance; Bacteria – Discovery, General characteristics and cell structure; Reproduction – vegetative, asexual and recombination (conjugation, transformation and transduction); Economic importance.

MODULE II

Forensic significance of soil, Introduction of soil, formation of soil, Soil horizons, layers of soils, organic deposit and mineral matters of soil. Soil as evidence, impression of soil, pH of soil. Composition of soil, Size, distribution of soil, collection preservation and handling of soil. Examination of soil, physical properties, texture, soil density, methods of soil analysis, microscopic analysis density gradient method
.

MODULE III

General Characteristics, classification and economic importance of Algae, Fungi, Lichens, Bryophytes, Pteridophytes & Gymnosperms Angiosperms: Principle of classification and nomenclature of angiosperms, Anatomy of angiosperms, Structure and development of anthers and ovules, fertilization, seed development, seed dormancy and germination

MODULE IV

Identification of Plant specimen. Analysis of pollen & aquatic microorganisms, Techniques for dating specimens using plant material. Dendrochronology. Application of plant ecology

MODULE V

Paleaeobotany: types of fossils, geological timescale. Brief account of *Rhynia* and *Psilophytes*. *Pteridospermales(Glossopteridaceae), Cycadeoidales*, *cordaitales* and *pentoxylales*. Contribution of birbal sahani in Paleaeobotany.

Text Books:

1) Sethi, I.K. and Walia, S.K. (2011). Text book of Fungi & Their Allies, MacMillan Publishers Pvt. Ltd., Delhi.
2) Vashishta, P.C., Sinha, A.K., Kumar, A., (2010). Pteridophyta, S. Chand. Delhi, India.

Reference Books

1) Kumar, H.D. (1999). Introductory Phycology. Affiliated East-West. Press Pvt. Ltd. Delhi.2nd edition.

2) Tortora, G.J., Funke, B.R., Case, C.L. (2010). Microbiology: An Introduction, Pearson Benjamin Cummings, U.S.A. 10th edition.
3) Alexopoulos, C.J., Mims, C.W., Blackwell, M. (1996). Introductory Mycology, John Wiley and Sons (Asia), Singapore. 4th edition.
4) Raven, P.H., Johnson, G.B., Losos, J.B., Singer, S.R., (2005). Biology. Tata McGraw Hill, Delhi, India.
5) Bhatnagar, S.P. and Moitra, A. (1996). Gymnosperms. New Age International (P) Ltd Publishers, New Delhi, India.
6) Parihar, N.S. (1991). An introduction to Embryophyta. Vol. I. Bryophyta. Central Book Depot, Allahabad.

BOT 171
BOTANY LAB FOR FORENSIC SCIENCE

L-T-P-C Structure 0-0-2-1 **Course Type: GE Practical**

COURSE OBJECTIVE: Upon successful completion, students are able to

Know Preparation of temporary and permanent algal slides.

Understand Preparation of cotton blue, Lactophenol and culture medium – PDA.

Study fungi with respect to vegetative, reproductive structures and classification with reasons.

1. EMs/Models of viruses – T-Phage and TMV, Line drawing/Photograph of Lytic and Lysogenic Cycle.
2. Types of Bacteria from temporary/permanent slides/photographs; EM bacterium; Binary Fission; Conjugation; Structure of root nodule.
3. Gram staining of bacteria
4. Study of vegetative and reproductive structures of *Nostoc, Chlamydomonas* (electron micrographs)*, Oedogonium, Vaucheria, and Polysiphonia* through temporary preparations and permanent slides.
5. *Rhizopus, Penicillium,Alternaria:* Asexual stage from temporary mounts and sexual structures through permanent slides.
6. Determination of soil pH and comparative study
7. Types of wood and wood examination

Text Books:

1) Sethi, I.K. and Walia, S.K. (2011). Text book of Fungi & Their Allies, MacMillan Publishers Pvt. Ltd., Delhi.

Reference Books:

1) Kumar, H.D. (1999). Introductory Phycology. Affiliated East-West. Press Pvt. Ltd. Delhi.2nd edition.
2) Tortora, G.J., Funke, B.R., Case, C.L. (2010). Microbiology: An Introduction, Pearson Benjamin Cummings, U.S.A. 10th edition.
3) Alexopoulos, C.J., Mims, C.W., Blackwell, M. (1996). Introductory Mycology, John Wiley and Sons (Asia), Singapore. 4th edition.

CHY 252

CHEMISTRY FOR FORENSIC SCIENCE

L-T-P-C Structure 3-0-0-3 **Course Type: GE Theory**

COURSE OBJECTIVES: The objective of this course is to

Introduce the forensic chemistry basics with focus on Liquid state and solutions, Chemical thermodynamics and chemical kinetics, Introduction of Periodic Table & Physical Instruments, Introduction of Inorganic and Organic Chemistry and Analytical Techniques.

MODULE I

Liquid State and Solutions

Liquid state: Free volume of liquid and density measurement, physical properties of liquid, vapor pressure, surface tension, surfactants, viscosity, molar refraction, optical activity, structure of liquid.

Solutions: Method of exploring concentration of solutions, binary liquids, vapor pressure, composite diagram of binary liquids and solutions, distillation, fractional distillation, vacuum distillation.

MODULE II

Chemical Thermodynamics and Chemical Kinetics

Chemical thermodynamics and kinetics, first law of thermodynamics, internal energy, enthalpy, second law of thermodynamics, entropy and its significance, free energy and work function. Rate of reaction, order of molecularity of reaction, slow reaction and fast reaction, first order reaction, half life period of first order reaction, activation energy, temperature dependence of activation energy, explosive reactions, oscillatory reactions.

MODULE III

Introduction of Periodic Table & Physical Instruments

Study of Modern Periodic Table, Long form of Periodic Table, periodic properties, atomic radiation, ionization potential, electron affinity, electronegativity, metallic characters, Non-metallic characters and magnetic properties, Comparative study of S and P block elements, Conductance, Conductometry, Electro Motive Force, Potentiometry.

MODULE IV

Introduction of Inorganic and Organic Chemistry

Empirical and molecular formulae, hybridization, nature of chemical bonding, polarization, hydrogen bonding, Van der walls forces, IUPAC nomenclature of alkanes, alkenes, haloalkanes, alcohol, ether, aldehydes, ketones, carboxylic acids, nitro compounds, nitrites including cyclic analogues and also aromatic compounds, naphthalene, anthrones and phenanthrones ,Reactive intermediates and related reactions.

MODULE V

Introduction of Cement

What is cement, composition, types, forensic significance of cement samples, Instrument used for cement sample, Chemical examination of cement sample, Physical examination of cement sample, Collection, preservation and packaging of cement sample.

Text Books:

1) Thermodynamics for Chemists by S, Glasstone.
2) Principles of Physical Chemistry and Puri, Sharma and Pathania.
3) Advanced Inorganic Chemistry Vol II by Madan , Malik and Tuli.
4) Concise Inorganic Chemistry Fifth Edition by J. D. Lee.
5) Organic Chemistry by Moris and Boyed.
6) Heterocyclic Chemistry by Gupta and Kumar Vol I and Vol II
7) Chemistry of Natural Products by S.V. Bhat, B. A. Nagaswampagi, M. Shivshankar.
8) Instrumental Analysis by Skoog, Holler and Crouch.

Books Suggested:

1) Essential of Physical Chemistry by Bahl, Bahl and Tuli.
2) Text book of organic chemistry by ArunBahl and B. S. Bahl.
3) Basic Concept of Analytical Chemistry by S. M. Khopkar, Third Edition, New Ag International Publication.
4) Analytical Chemistry by G. R. Chatwal, Himalaya Publication.
5) Instrumental Methods of Analysis, Seventh Edition by Willard, Merrit, Dean and Settle.
6) Analytical Chemistry by Dr. Alka Gupta.
7) Instrumental Method of Analysis by G. R. Chatwal and S. K. Anand, Himalaya Publication

CHY 253

CHEMISTRY LAB FOR FORENSIC SCIENCE

L-T-P-C Structure 0-0-2-1 **Course Type: GE Practical**

COURSE OBJECTIVES: The objective of this course is to

Introduce the forensic chemistry basics with focus on Liquid state and solutions, Chemical thermodynamics and chemical kinetics.

Introduction of Periodic Table & Physical Instruments, Introduction of Inorganic and Organic Chemistry and Analytical Techniques.

1. To determine the density of given liquid
2. To determine the viscosity of given liquid
3. To determine the surface tension of given liquid .
4. Standardization of given liquid by primary standard
5. To determine strength given acid.
6. Inorganic micro/ semi micro qualitative analysis .
7. Collection, preservation and packaging of cement sample.

Text Books:

1) Parikh, C.K; Text Book of Medical Jurisprudence, Forensic Medicine & Toxicology, CBS Pub. New Delhi,1999
2) Morrison R.T and Boyd R. N;Organic Chemistry 6th Ed Prentice Hall, 2003.
3) Laboratory Procedure Manual : Petroleum Products ,Directorate of Forensic Science, MHA, Govt. of India, 2005.
4) Working Procedure Manual on Chemistry ; Directorate of Forensic Science MHA Govt. of India.
5) Bureau of Indian Standard Specifications related to Alcohols and Petroleum Products.

Books Suggested:

1) Physical Chemistry Practical's by J. B. Yadav**.**
2) Qualitative Analysis by Vogel.
3) A Concise Book of Practical Chemistry by Dr. A. B. Dumir, Dr. A. S. Munde, Prof. S. Umar, Prof. A. R. Muley.

ENG 106
PROFESSIONAL COMMUNICATION

L-T-P-C Structure 2-0-0-2 **Course Type: AEC**

COURSE OBJECTIVE: Upon successful completion, students are able to
Understand importance and barriers of communication
Understand Group Discussion.
Understand Effective Presentation Skills
Understand professional and technical writing skills.

MODULE-I

Fundamentals of Communication: Introduction, Definition , Process , Importance, Different Forms and Purpose of Communication , Barriers to Communication , Organization and Interpersonal Communication

MODULE-II

Group Discussion: Introduction to Group Discussion ,Types, Roles and Functions in Group Discussion, Difference between GD and Debate, Preparation Strategy , Tips for a good GD

MODULE-III

Presentation: Fundamentals of Presentation **,**Audience Analysis**,** Organizing Material Effective Presentation**,** Question –Answer Session

MODULE-IV

Professional Writing : Official Correspondence- Drafting E-mails, Memorandum, Notice, agenda, Minutes, Circulars, Business Correspondence-Business letter writing, sales letters, Enquiry letters and replies to enquiry(enquiry about a product, service or information, asking for a quotation, placing an order and replies to the same) letters of Claim and Adjustment.

MODULE-V

Technical Writing Report Writing- General and Technical report, Definition, Types, structure, Technical proposals-Definitions, Types and Format.

Books Suggested:

1)Communication Skills, PushpLata, Sanjay Kumar, Oxford Higher Education/Oxford University Press , 2011.
2)Technical Communication, Principles and Practice, Meenakshi Raman &Sangita Sharma, Oxford University Press.
3) Effective Technical Communication, M Ashraf Rizvi, Tata McGraw –Hill Eduction.
4)Basic Communication Skills for Technology, Andre J Rutherford , Person Education Asia.

ENG 107

COMMUNICATION TECHNIQUE LAB

L-T-P-C Structure 0-0-2-1 **Course Type: AEC**

COURSE OBJECTIVE: Upon successful completion, students are able to

Understand methods of word formation.

Understand Group Discussion.

Learn Presentation Skills

1. Phonetics Symbols and Transcriptions
2. Methods of word formation
3. Reading, Listening and speaking Skills
4. Seminar Presentation
5. Group Discussion
6. Job Interview

Books Suggested:

1) Advanced Manual for Communication Laboratories and Technical report Writing, D.Sindha Rani, Pearson (New Delhi)
2) A Course in Phonetics and Spoken English , J. Sethi&P.V.Dhamija, PHI Learning Pvt. Ltd
3) English Language Laboratories: A Comprehensive manual, NiraKonar , PHI Learning Pvt
4) Oxford English Learning Package (with CDs: Headway Series
5) Tata McGraw hills English Learning package (with CDs)
6) Oxford advanced Learners Dictionary by Oxford University Press (New Delhi).

Semester III

FSH 109

FORENSIC DERMATOGLYPHICS

L-T-P-C Structure 4-0-0-4 **Course Type: Core Theory**

COURSE OBJECTIVES: The objective of this course is to

CO1: The fundamental principles on which the science of fingerprinting is based.
CO2: Fingerprints are the most infallible means of identification.
CO3: The world's first fingerprint bureau was established in India.
CO4: The method of classifying criminal record by fingerprints was worked out in India, and by Indians.
CO5: The physical and chemical techniques of fingerprints was worked out in India, and evidence.
CO6: The significance of foot, palm, ear and lip prints.

MODULE I

INTRODUCTION AND HISTORY

Introduction and history with special reference to India. Biological basis of fingerprints. formation of ridges. Fundamentals of fingerprinting. Types of fingerprints.

MODULE II

BASICS OF FINGERPRINTING

Fingerprint patterns. Fingerprint characters/ minuiate. Plain and rolled fingerprints. Classification and cataloguing of fingerprint record. Automated fingerprint Identification system. Significance of poroscopy and edgeoscopy.

MODULE III

DEVELOPMENT OF FINGERPRINT

Latent prints. Constituents of sweat residue. Preservation of developed fingerprints. Digital imaging for fingerprint enhancement.

MODULE IV

PHYSICAL AND CHEMICAL METHOD

Latent fingerprints detection by physical and chemical techniques. Mechanism of detection of fingerprints by different developing reagents. Application of light sources in fingerprint detection. Fingerprint the deceased. Developing fingerprints on gloves.

MODULE V

OTHER IMPRESSIONS

Importance of footprints. Casting of footprints. Electrostating lifting of latent foot prints. Lip prints – Nature, location, collection and examination of lip prints. Ear prints and their significance. Palm prints and their historical importance.

Text Books:

1. J.E. Cowger, Friction Ridge Skin, CRC Press, Boca Raton (1983).
2. D.A. Ashbaugh. Quantiative Friction Ridge Analysis, CRC Press, Boca Raton (2000).

Books Suggested:

1. C. Champod, C. Lennard, P. Margot and M. Stoilovic, Fingerprints and other Ridge Skin Impressions, CRC Press, Boca Raton (2004).
2. Lee and Gaensleen's, Advances in Fingerprint Technology, 3rd Edition, R.S. Ramotowski (Ed.), CRC Press, Boca Raton(2013)

FSH 111
TECHNOLOGICAL METHODS IN FORENSIC SCIENCE

L-T-P-C Structure 4-0-0-4 **Course Type: Core Theory**

COURSE OBJECTIVES: The objective of this course is to

CO1: The importance of chromatographic and spectroscopic techniques in processing crime scene evidence.

CO2: The utility of colorimetry, electrophoresis and neutron activation analysis in identifying chemical and biological materials.

CO3: The significance of microscopy in visualizing trace evidence and comparing it with control samples.

CO4: The usefulness of photography and videography for recording the crime scene.

CO5: The significance of simple separation techniques.

MODULE I

CHEMICAL INSTRUMENTATION

Sample preparation for chromatographic and spectroscopic evidence. Chromatographic methods. Fundamental principles and forensic applications of thin layer chromatography. Gas chromatography and liquid chromatography.

MODULE II

PHYSICAL INSTRUMENTATION

Spectroscopic methods. Fundamental principle and applications of ultraviolet visible spectroscopy, infrared spectroscopy , atomic absorption spectroscopy, atomic emission spectroscopy and mass spectroscopy. X- ray spectrometry. Calorimetric analysis and Lambert – Beer law. Electrophoresis – fundamental principles and forensic applications. Neutron activation analysis - fundamental principles and forensic applications.

MODULE III

MICROSCOPY

Fundamental principles, Different types of microscopes. Electron microscope. Comparison microscope. Forensic application of microscopy.

MODULE IV

FORENSIC PHOTOGRAPHY

Basic principles and applications of photography in forensic science. 3 D photography. Photographic evidence. Infrared and ultraviolet photography. Videography. Crime scene and laboratory photography. Importance of photography. Point and shoot camera. Polarid camera. Role of movie camera, Dancing riots.

MODULE V

SIMPLE SEPARATION TECHNIQUES

General Idea and Basic Principle of Distillation and Various Types of Distillation Techniques. Centrifugation; Centrifuge and its Types. Filtration, Evaporation and Crystallization. Solvent Extraction Technique Like LLE, SPE, Micro SPE and Distribution Law.

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Text Books:

1. D.A. Skoog, D.M. West and F.J. Holler, Fundamentals of Analytical Chemistry, 6th Edition, Saunders Collage Publishing, Fort worth (1992)
2. W. Kemp, Organic Spectroscopy, 3rd Edition, Macmillan, Hampshire (1991)

Books Suggested:

1. J.W. Robinson, Undergraduate Instrumental Analysis, 5th Edition, Marcel Dekker, Inc., New York (1995)
2. D.R. Redsicker. The Practical Methodology of Forensic Photography, 2nd Edition, CRC Press, Boca Raton (2000)

FSH 113
CRIMNALISTICS

L-T-P-C Structure 4-0-0-4 **Course Type: Core Theory**

COURSE OBJECTIVES: The objective of this course is to

CO1: The methods of securing, searching and documenting crime scene.

CO2: The art of collecting, packaging and preserving different types of physical and trace evidence at crime scenes.

CO3: The legal importance of chain of custody.

CO4: The tools and techniques for analysis of different types of crime scene evidence.

CO5: Learn The techniques of documentation and reconstruction of crime scene.

MODULE I

INVESTIGATION

Introduction and definition of investigation. Quality of investigation officer. Role of investigation officer. Methods of investigation. Guideline of investigator- Police, CBI, CID, Other agencies, FIR. The recognition, Transportation of physical evidence, preservation of visras.

MODULE II

CRIME SCENE MANAGEMENT

Types of crime scene- indoor and outdoor. Securing and isolating the crime scene. Crime scene search methods. Safety measures at crime scene. Legal considerations at crime scenes.

MODULE III

DOCUMENTATION AND RECONSTRUCTION OF CRIME SCENE

Procedure and requirement for crime scene reconstruction, Documentation of crime scene-sketching and recording notes. Duties of first responders at crime scenes. Coordination between police personnel and forensic scientists at the crime scenes. The evaluation of 5Ws (who?, what?, when?, where?, why?,) and 1H (how?). Crime scene modus operandi.

MODULE IV

CRIME SCENE EVIDENCE

Classification of crime scene evidence – physical and trace evidence. Locard principle. Collection, labelling, sealing of evidence. Hazardous evidence. Preservation of evidence. Chain of custody. Reconstruction of crime scene.

MODULE V

EVIDENCES

Paint evidences – Collecting, packaging, and preservation. Analysis by destructive and non destructive methods. Importance of paint evidence in hit and run cases. Fibre evidences – artificial
and man-made fibres. Collecting of fibre evidence. Identification and comparison of fibres. Toolmark evidence. Classification of toolmarks. Forensic importance of toolmarks. Collection. Preservation and matching of tool marks.

Text Books:

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)

Books Suggested:

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)

FSH 110

FORENSIC DERMATOGLYPHICS LAB

L-T-P-C Structure 0-0-4-2 **Course Type: Core Practical**

COURSE OBJECTIVES: The objective of this course is to

CO1: The fundamental principles on which the science of fingerprinting is based.

CO2: Fingerprints are the most infallible means of identification.

CO3: The world's first fingerprint bureau was established in India.

CO4: The method of classifying criminal record by fingerprints was worked out in India, and by Indians.

CO5: The physical and chemical techniques of fingerprints was worked out in India, and evidence.

1. To detect fingerprints by powder method and iodine method.
2. To carry out ten Digit classification of plain and rolled fingerprints.
3. To identify different fingerprint patterns.
4. To carry out ridge tracing and ridge counting
5. To cast fingerprints using Plaster of Paris.
6. To detect fingerprinting by silver nitrate method.
7. To investigate physical and chemical methods of fingerprint detection.
8. To use different light sources for enhancing developed fingerprints.
9. To prepare cast of footprints.

Text Books:

1.J.E. Cowger, Friction Ridge Skin, CRC Press, Boca Raton (1983).

2.D.A. Ashbaugh. Quantiative Friction Ridge Analysis, CRC Press, Boca Raton (2000).

Books Suggested:

1.C. Champod, C. Lennard, P. Margot and M. Stoilovic, Fingerprints and other Ridge Skin Impressions, CRC Press, Boca Raton (2004).

2.Lee and Gaensleen's, Advances in Fingerprint Technology, 3rd Edition, R.S. Ramotowski (Ed.), CRC Press, Boca Raton

FSH 112

TECHNOLOGICAL METHODS IN FORENSIC SCIENCE LAB

L-T-P-C Structure 0-0-4-2 **Course Type: Core Practical**

COURSE OBJECTIVES: The objective of this course is to

CO1: The importance of chromatographic and spectroscopic techniques in processing crime scene evidence.

CO2: The utility of colorimetry, electrophoresis and neutron activation analysis in identifying chemical and biological materials.

CO3: The significance of microscopy in visualizing trace evidence and comparing it with control samples.

CO4: The usefulness of photography and videography for recording the crime scene.

CO5: The significance of simple separation techniques.

1. To determine the concentration of a colored compound by colorimetry analysis.
2. To carry out thin layer chromatography of ink samples.
3. To carry out separation of organic compounds by paper chromatography.
4. To identify drug samples using UV-Visible spectroscopy.
5. To take photographs using different filters.
6. To take photographs of crime scene exhibits at different angles.
7. To record videography of a crime scene.
8. Extraction of Ethanol by Simple Distillation.

Text Books:

1. D.A. Skoog, D.M. West and F.J. Holler, Fundamentals of Analytical Chemistry, 6th Edition, Saunders Collage Publishing, Fort worth (1992)

2. W. Kemp, Organic Spectroscopy, 3rd Edition, Macmillan, Hampshire (1991)

Books Suggested:

1. J.W. Robinson, Undergraduate Instrumental Analysis, 5th Edition, Marcel Dekker, Inc., New York (1995)

2. D.R. Redsicker. The Practical Methodology of Forensic Photography, 2nd Edition, CRC Press, Boca Raton (2000)

FSH 114
CRIMINALISTICS LAB

L-T-P-C Structure 0-0-4-2 **Course Type: Core Practical**

COURSE OBJECTIVES: The objective of this course is to

CO1: The methods of securing, searching and documenting crime scene.

CO2: The art of collecting, packaging and preserving different types of physical and trace evidence at crime scenes.

CO3: The legal importance of chain of custody.

CO4: The tools and techniques for analysis of different types of crime scene evidence.

CO5: Learn The techniques of documentation and reconstruction of crime scene

1. To prepare a report on evaluation of crime scene.
2. To reconstruct a crime scene (outdoor and indoor).
3. To identify and compare tool marks.
4. To identify cloth sample and fibre sample by physical matching.
5. Reconstruction of different crime scene.
6. Preservation and collection, labelling and handling and physical evidences.
7. Collection and Preservation of visras.
8. Reconstruction of different crime scene.

Text Books:

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)

Books Suggested:

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)

FSH 137
DIGITAL FORENSICS

L-T-P-C Structure 4-0-0-4 **Course Type: Generic Elective Course**

COURSE OBJECTIVES: The objective of this course is to

CO1: The basics of digital forensics and cyber security.

CO2: The cases which fall under the purview of digital crimes.

CO3: The types of digital crimes.

CO4: The elements involved in investigation of digital crimes.

MODULE I

INTRODUCTION TO CYBER FORENSICS

Cyber forensic basics- Introduction to cyber forensics, Storage Fundamentals, File system Concepts, Data Recovery, Operating system Software, Cell Phone/Mobile Forensics, Computer Et6hics and Application programs.

MODULE II

FUNDAMENTALS AND CONCEPTS, NETWORKING

Fundamentals of computer Hardware and accessories- development of hard disk, physical construction, CHS and LBA addressing, encoding methods and formats. Memory and processor, Methods of storing data, Operating system, Software, Introduction to Network, Concept of Network security and investigation, Basics of security planning, Multi layered security, Intrusion Triangle, Removing Intrusion opportunities, Importance of physical security, Protecting server, Work station and Network devices, Protection of removable Storage Disks.

MODULE III

COMPUTER CRIME/CYBER CRIME

Definition and types of computer crimes, Distinction between computer crimes and conventional crimes, Reason for commission of computer crimes, Breaching security and operation of digital systems. Computer Virus, cookies, obscenity and Computer worm- Trojan house, trap door, super zapping, logic bombs. Types of computer crimes- computer stalking, pornography, hacking, manipulation, crimes related to intellectual property rights, computer terrorism, Hate speech, private and national security in cyber space. An overview of hacking, spamming, phishing and stalking, Software piracy.

Relevant sections of Information Technology Act 2000

MODULE IV

CRYPTOGRAPHY

Encryption And Decryption Methods, Cryptography and Steganography.

MODULE V

COMPUTER FORENSIC INVESTIGATION

Introduction to cyber forensic investigation, Investigation tools, e-Discovery, Digital Evidence collection, Seizure of suspected computer, preparation required prior to seizure, , protocol to be taken at the scene, Extraction of information from the hard disk, Treatment of exhibits, Creating bitstream of the original media, Collection and seizure of magnetic media, Legal and privacy issues, Examining forensically sterile media, restoration of deleted files, Password cracking and E-mail tracking and IP Tracking , encryption and decryption methods, Tracking users.

Text Books:

1. R.K. Tiwari , P.K. Sastry and K.V. Ravikumar, computer crimes and computer forensics, Select publishers, New Delhi (2003).
2. C.B. Leshin, Internet investigations in criminal justice,Prentice hall, New Jersey(1997)

Books Suggested:

1. R. Saferstein, Criminalistics, 8th edition Prentice hall, New Jersey(2004)
2. E. Casey, Digital Evidence and Computer Crime, Academic press, London (2000)

FSH 138
DIGITAL FORENSICS LAB

L-T-P-C Structure 0-0-4-2 **Course Type: Generic Elective Course**

COURSE OBJECTIVES: The objective of this course is to

CO1: The basics of digital forensics and cyber security.

CO2: The cases which fall under the purview of digital crimes.

CO3: The types of digital crimes.

CO4: The elements involved in investigation of digital crimes.

1.To identify, seize and preserve digital evidence from crime scenes.

2. To detect deletions, obliterations and modifications of files using encase software.

3. To trace routes followed by e-mails and chats.

4. To identify the IP address of the sender of e-mails.

5. To demonstrate concealment techniques using cryptographic PGP.

6. To identify encrypted files.

7. To identify hidden files.

8. To use digital signatures for securing e-mail and online transactions.

9. To acquire data from PCs/laptops/HDDs/USBs, pen drives, memory cards and SIM cards.

10. To use symmetric and asymmetric keys for protection of digital record.

11. To carry out imaging of hard disks

Text Books:

1. 1.R.K. Tiwari , P.K. Sastry and K.V. Ravikumar, computer crimes and computer forensics, Select publishers, New Delhi (2003).
2. C.B. Leshin, Internet investigations in criminal justice,Prentice hall, New Jersey(1997)

Books Suggested:

1. R. Saferstein, Criminalistics, 8th edition Prentice hall, New Jersey(2004)
2. E. Casey, Digital Evidence and Computer Crime, Academic press, London (2000)

FSH 110
INTRODUCTION TO BIOMETRY

L-T-P-C Structure 4-0-0-4 **Course Type: Core Ability Enhancement Course**

COURSE OBJECTIVES: The objective of this course is to

CO1: The basics of biometry.
CO2: The classification of biometry processes.
CO3: The importance of behavioural biometry.

MODULE I

FUNDAMENTAL ASPECTS

Definition, characteristics and operation of biometric system, Classification of biometric systems- physiological and behavioural, Strength and weakness of physiological and behavioural biometrics.

MODULE II

TYPES OF BIOMETRICS

Multinodal biometrics, Key biometric processes- enrolment, identification and verification, Positive and negative identification, Performances measures used in biometric system- FAR, FRR, GAR, FTA, FTE and ATV. Biometric versus traditional technologies

MODULE III

PHYSIOLOGICAL BIOMETRICS

Fingerprints, palm prints, iris, retina, geometry of hand and face

MODULE IV

BEHAVIOURAL BIOMETRICS

Handwriting, Signatures, Keystrokes, Gait and voice
hotosensors, Logic gates and their applications, Flip- flops and counters.

MODULE V

SHOE IMPRESSION EXAMINATION

Introduction to Shoe impression, locating impressions at the scene of crime, Evidence collection: Collection, importance of Gait pattern, Forensic Identification and Methods of comparison, Case Studies

Text Books:

1.Bridges, B.C; Criminal Investigation, Practical Fingerprinting, Thumb Impression, Handwriting expert Testimony, Opinion Evidence., Univ. Book Agency, Allhabad,2000

2. Mehta, M.K; Indentification of Thumb impression & cross examination of Fingerprints, N.M. Tripathi Pub. Bombay, 1980.

3.Chatterjee, S.K; Speculation in Fingerprint Identification, Jantralekha printing Works, Kolkata, 1981.

4.Cowger James F; Friction Ridge Skin- Comparison & Identification of Fingerprints, CRC Press, NY, 1993

Books Suggested:

1.Cossidy, M.J; Footwear Identification, Royal Canadian, Mounted Police, 1980.

2. Iannavelli, A.V; Ear Identification, Forensic Identification Series, Paramount,1989.

3. Henry, C.L. & Ganesslen, R.E; Advances in Fingerprint Technology, CRC Press,London,1991.

4. Jain, A.K., Flynn, P.& Ross A.A., Handbook of Biometrics, Springer, New York 2008

Semester IV

FSH 115
INTRODUCTION TO FORENSIC CHEMISTRY

L-T-P-C Structure 4-0-0-4 **Course Type: Core Theory**

COURSE OBJECTIVES: The objective of this course is to

CO1: Theoretical understanding of major concepts in Forensic Chemistry

CO2: Range of practical skills in Forensic Chemistry, and

CO3: Knowledge and skills applicable to academia, industry, and government

CO4: The methods of analyzing trace amounts of petroleum products in crime scene evidence.

CO5: The techniques of locating hidden explosives.

CO6: The classification and characteristics of the narcotics, drugs and psychotropic substances.

MODULE I

FORENSIC CHEMISTRY

Forensic Chemistry: Introduction, Nature & Scope Distillation and Fractionation of Petroleum Products. Commercial Uses of Different Petroleum Product and their Analysis. Trace Analysis of Petroleum Products in Forensic Exhibits. Analysis of Alcohol and Non-alcoholic Beverages. Adulteration in Food Products, Use of Pesticides and Insecticides.

MODULE II

ABUSE AND MISUSE OF DRUGS

Introduction, Classification, Route of Administration of Different type of Narcotic Drugs & Psychotropic Substances, Analysis of ND& P Substances. Drug Abuse in Sports.

MODULE III

IMPORTANCE OF GLASS AS EVIDENCE

Glass evidence – connection, packaging, analysis. Matching of glass samples by mechanical fit and refractive index measurements. Analysis by spectroscopic methods. Fracture analysis and direction of impacts.

MODULE IV

FIRES AND EXPLOSIVES

Nature and Chemistry of fire, Classification, Igniters of fires, Phases of fires, Main types of fires, Examination of scene of fires Arson: Relevant IPC sections, Motives, Analysis of Accelerants. Classification, Comparison & characterization of explosives, Military & Commercial explosives, Detection of Explosophores (anions), Detection of Black powder, Nitrocellulose and Dynamite, Quantitative determination

MODULE V

INTRODUCTION TO TOXICOLOGY AND FORENSIC PHARMACOLOGY

Definition, Law relating to poison, Classification of poisons. Action of poisons & factors modifying its action, routes of administration of poisons.

Pharmacology and toxicology of Psychotropic Drugs: Sedatives, Stimulants, Opiates and drugs of abuse. Extraction, Isolation of drugs from viscera, tissues and body fluids.

Text Books :

1.Maudham Bassett etal; Vogel's Textbook of Quantitative Chemical Analysis, 6th Ed., Longma Essex (2004)
2. I. L. Finar; Organic Chemistry Vol. II Pearson Education (Singapore)
3. R.T. Morrison, R.N. Boyd; Organic Chemistry, 6th Ed., Prentice Hall, new Delhi (2003)
4. Brean S. Furniss etal; A.I Vogel Textbook of Practical Organic Chemistry, Addison Wesley Longman, Edinburg (1998)

Books Suggested :

1. A. Burger; Medicinal Chemistry, Vol. II, Wiley Interscience, NY (1970)
2. D A Skoog, D.M. West, F.J. Holler; Analytical Chemistry – An Introduction, 7th Ed., Saunders College Pub. Philadelphia, USA (2000)
3. Boudreau JE, etal; Arson & Arson Investigation, Survey & Assessment National Institute of Law Enforcement, U.S. Deptt of Justice, US Govt Printing Press (1977)
4. Dettean J D; Kirk's Fire Investigation, 5th Ed., Prentice Hall, Eaglewood Cliffs, N.J. (2002) w.e.f. 2005-2006
5. Yinon Jitrin; Modern Methods & Application in Analysis of Explosives, John Wiley & Sons, England (1993)
6.Clark, E.G.C., Isolation and identification of Drugs, Vol. I and Vol. II, Academic Press, 1986.
7.Cravey, R.H., Baselt, R.C., Introduction to Forensic Toxicology, Biochemical publications, Davis C A, 1981.Gleason, M.N. et.al, Clinical Toxicology of Commercial products, Williams and Williams, Baltimore.

FSH 117

QUESTIONED DOCUMENTS

L-T-P-C Structure 4-0-0-4 **Course Type: Core Theory**

COURSE OBJECTIVES: The objective of this course is to

CO1: Developing an understanding and appreciation for the scope of Questioned Documents.
CO2: Develop an understanding on different types of questioned documents, the types of forgeries and disguise generally encountered.
CO3: Brief description on general report writing, used in examination of Questioned Documents.
CO4: The significance of comparing hand writing samples.
CO5: The importance of detecting frauds and forgeries by analyzing questioned documents.

MODULE I

NATURE AND SCOPE OF QUESTIONED DOCUMENTS

Definition of Questioned Document, Types of Questioned Document, Preliminary Examination of Questioned Document. Basic Tools Needed for Forensic Document Examination- Ultraviolet, Visible, Infrared, and Fluorescence Spectroscopy, Photomicrography, Microphotography, Visible Spectral Comparator, Electrostatic Detection Apparatus. Determining the Age and Relative Age of Documents.

MODULE II

COMPARISON OF QUESTIONED DOCUMENTS

Comparison of Handwriting, Development of Individuality in Handwriting, Natural Variations and Fundamental Divergences in Handwriting, Class & Individual Characteristics. Merits and Demerits of Exemplar and Non-Exemplar Samples During Comparison of Handwriting. Standards for Comparison of Handwriting. Comparison of Paper, Ink, Printed Documents, Typed Documents, Xeroxed Documents.

MODULE III

FORGERIES

Alterations in Documents, Including Erasures, Additions, Over-Writing, and Obliterations. Indented and Invisible Writings. Charred Documents. Examination of Counterfeit Indian Currency Notes, Passports, Visas and Stamp Pads.

MODULE IV

DISPUTED DOCUMENTS

Disputed documents – wills, deeds, cheques, suicidal letter, threatening letters, anonymous letters, Tampered documents (alteration, additions, erasures, obliterations etc.)., Examination of disputed documents, age of the document and ink analysis.

MODULE V

REPORT WRITING AND CASE PRESENTATION

Comparison with standards: admitted and specimen samples, report writing, Moot court - case presentation, Experts testimony, Expert as witness, Cross examination, re-examination and direct examination in Court of Law.

Text Books:

1. Ashbaugh D. R. (1999). Quantitative and Qualitative Friction ridge analysis. India, CRS Press.
2. Hardless H.R. (1988). Disputed Documents, Handwriting and Thumbs – Print Identification, Profusely Illustrated. India: Low Book Co.
3. Lee H. C. & Ganesslen R. E. (1991). Advances in Finger Print Technology. London: RC Press, Boca Raton.

Books Suggested :

1.Osborn A. S. (1998). The Problem of Proof. India, Universal Law Publishing.
2. Pierce D. S. (2011). Mechanics of Impression Evidence. India, CRC Press.
3. Stiefel C. (2011). Fingerprints: Dead People Do Tell Tales. USA, Enslow Publishers.

FSH 119
FORENSIC BIOLOGY

L-T-P-C Structure 4-0-0-4 **Course Type: Generic Elective Course**

COURSE OBJECTIVES: The objective of this course is to

CO1: The significance of biological and serological evidence.
CO2: The forensic importance of hair evidence.
CO3: The importance of biological fluids – blood, urine, semen, saliva, sweat and – in crime investigations.
CO4: The forensic importance of fiber evidence
CO5: How forensic entomology assists in death investigations.

MODULE I

IDENTIFICATION AND EXAMINATION OF BIOLOGICAL FLUIDS AND BODY REMAINS

Blood, Semen, Saliva, Urine, Feces etc., Bone: Estimation of Height, Age and Sex, Facial Reconstruction. Hair: Hair Anatomy and Examination of Hairs from Animal and Human Origin.

MODULE II

INTRODUCTION TO FIBER

What is fiber, Classification of fiber, Class and individual characteristics of fiber, Collection, Handling and preservation of fiber, fiber as Evidence, Types of fibers, Natural-Plants, Vegetables, Animal, Inorganic and Manmade, Methods of collecting fibers, Chemical composition, Manufacturing process of fibers, Comparison of shape and structure of various fibers, Comparison of physical properties of fiber, Examination of fiber.

MODULE III

DNA PROFILING

Structure of DNA, Damage to DNA, Variation in DNA, DNA as Excellent Polymorphic Marker, Basis of DNA Typing and Techniques.

MODULE IV

FORENSIC BOTANY

Forensic Botany: Introduction, Nature & Scope, Woods & their Identification and Matching, Diatoms and their Forensic Significance in Drowning Cases, Study and Identification of Pollen Grains.

MODULE V

FORENSIC ENTOMOLOGY

General Entomology, Significance of terrestrial and aquatic insects in forensic investigations and their role in crime detection, insect's succession and its relationship to determine time since death. Impact of ecological factors on insect's developments.

Text Books:

1. E.J. Gardner, M. 1. Simmons and D.P. Snustad; Principles of Genetics; John Wiley, New York; (1991)
2. H.G. Greenish & E. Collin; An anatomical Atlas of vegetable Powders; J&A Churchill, London; (1904)
3. Richard Saferstein; Forensic Science Hand Book; Ed.; Prentice Hall, Englewood Cliff, New Jersey;(1982)
4. P. L. Williams and R. Warwick; Gray's anatomy; Churchill Livingston, London;(1980)
5. Biology Methods manual; Metropolitan Police Forensic Science Laboratory, London; (1978)

Books Suggested :

1. Herbert R. Mauersberger; Mathews Textile Fibres – their physical, Microscopic and chemical properties; John Wiley, New York; (1954)
2. R.P. Pandey, Plant Anatomy; S. Chand, new Delhi; (1998)
3. Kimball, John W; Biology; Arvind Publishing Co. New Delhi (1974)
4. Edwin, H. Mc Caney – Human Genetics, The Molecular Revolution, Jones & Bartlett Pub. London, (1993)
5.Albert's, B, Bray, D, Lewis, J, Roberts K & Watson, J.D; Molecular Biology of Cell,2nd ed. Garland Pub. New Yark (1989)

FSH 116
INTRODUCTION TO FORENSIC CHEMISTRY LAB

L-T-P-C Structure 0-0-4-2 **Course Type: Core Practical**

COURSE OBJECTIVES: The objective of this course is to

CO1: Theoretical understanding of major concepts in Forensic Chemistry

CO2: Range of practical skills in Forensic Chemistry, and

CO3: Knowledge and skills applicable to academia, industry, and government

CO4: The methods of analyzing trace amounts of petroleum products in crime scene evidence.

CO5: The techniques of locating hidden explosives.

CO6: The classification and characteristics of the narcotics, drugs and psychotropic substances.

1. Separation and identification of volatile liquid by simple distillation.
2. Identification of salts and metals by simple color test and group analysis.
3. Identification of different vegetable poison by color test, chromatography etc.
4. Identification of insecticides and pesticides by TLC/ color test.
5. Extraction and identification of drugs/ toxicants from biological matrix and their detection.
6. To compare glass samples by refractive index method.
7. Microcrystalline tests for drugs
8. Analysis of fire residues by GC
9. Separation of lipids by TLC
10. Analysis of high explosives by color test and TLC.

Text Books :

1.Maudham Bassett etal; Vogel's Textbook of Quantitative Chemical Analysis, 6th Ed., Longma Essex (2004)
2. I. L. Finar; Organic Chemistry Vol. II Pearson Education (Singapore)
3. R.T. Morrison, R.N. Boyd; Organic Chemistry, 6th Ed., Prentice Hall, new Delhi (2003)
4. Brean S. Furniss etal; A.I Vogel Textbook of Practical Organic Chemistry, Addison Wesley Longman, Edinburg (1998)

Books Suggested :

1. A. Burger; Medicinal Chemistry, Vol. II, Wiley Interscience, NY (1970)
2. D A Skoog, D.M. West, F.J. Holler; Analytical Chemistry – An Introduction, 7th Ed., Saunders College Pub. Philadelphia, USA (2000)
3. Boudreau JE, etal; Arson & Arson Investigation, Survey & Assessment National Institute of Law Enforcement, U.S. Deptt of Justice, US Govt Printing Press (1977)
4. Dettean J D; Kirk's Fire Investigation, 5th Ed., Prentice Hall, Eaglewood Cliffs, N.J. (2002) w.e.f. 2005-2006
5. Yinon Jitrin; Modern Methods & Application in Analysis of Explosives, John Wiley & Sons, England (1993)
6.Clark, E.G.C., Isolation and identification of Drugs, Vol. I and Vol. II, Academic Press, 1986.
7.Cravey, R.H., Baselt, R.C., Introduction to Forensic Toxicology, Biochemical publications, Davis C A, 1981.Gleason, M.N. et.al, Clinical Toxicology of Commercial products, Williams and Williams, Baltimore.

FSH 118

QUESTIONED DOCUMENTS LAB

L-T-P-C Structure 0-0-4-2 **Course Type: Core Practical**

COURSE OBJECTIVES: The objective of this course is to

CO1: Developing an understanding and appreciation for the scope of Questioned Documents.
CO2: Develop an understanding on different types of questioned documents, the types of forgeries and disguise generally encountered.
CO3: Brief description on general report writing, used in examination of Questioned Documents.
CO4: The significance of comparing hand writing samples.
CO5: The importance of detecting frauds and forgeries by analyzing questioned documents.

1. Examination of various ink samples using planer chromatographic techniques.
2. Decipherment of secret, erased, obliterated, indented hand writing using physical/chemical technique.
3. Matching of hand writing and signatures (genuine/forged)
4. Examination of type written and printer generated prints.
5. Print your own 10 digit finger print card using black ink.
6. Primary and secondary classification of given finger print chart.
7. Location, development and lifting of latent finger print.
8. Casting and matching of foot/footwear print on soft surface.
9. Comparison of finger prints.

Text Books:

1. Ashbaugh D. R. (1999). Quantitative and Qualitative Friction ridge analysis. India, CRS Press.
2. Hardless H.R. (1988). Disputed Documents, Handwriting and Thumbs – Print Identification, Profusely Illustrated. India: Low Book Co.
3. Lee H. C. & Ganesslen R. E. (1991). Advances in Finger Print Technology. London: RC Press, Boca Raton.

Books Suggested :

1.Osborn A. S. (1998). The Problem of Proof. India, Universal Law Publishing.
2. Pierce D. S. (2011). Mechanics of Impression Evidence. India, CRC Press.
3. Stiefel C. (2011). Fingerprints: Dead People Do Tell Tales. USA, Enslow Publishers.

FSH 120
FORENSIC BIOLOGY LAB

L-T-P-C Structure 0-0-4-2 **Course Type: Core Practical**

COURSE OBJECTIVES: The objective of this course is to
CO1: The significance of biological and serological evidence.
CO2: The forensic importance of hair evidence.
CO3: The importance of biological fluids – blood, urine, semen, saliva, sweat and – in crime investigations.
CO4: The forensic importance of fiber evidence
CO5: How forensic entomology assists in death investigations.

1. Primary and secondary identification of blood/ semen sample.
2. Identification of species from the given hair sample.
3. Examination of given fiber by physical and chemical method.
4. Identification of microscopic fiber.
5. Identification of fiber by Burn Test
6. Difference between animal and Human Hair fiber.
7. Determine ABO and Rh factor of human blood.
8. Detection of salivary stains.
9. Draw and label bones of human body. Determine age and sex from long bones and skull.

Text Books:

1. E.J. Gardner, M. 1. Simmons and D.P. Snustad; Principles of Genetics; John Wiley, New York; (1991)
2. H.G. Greenish & E. Collin; An anatomical Atlas of vegetable Powders; J&A Churchill, London; (1904)
3. Richard Saferstein; Forensic Science Hand Book; Ed.; Prentice Hall, Englewood Cliff, New Jersey;(1982)
4. P. L. Williams and R. Warwick; Gray's anatomy; Churchill Livingston, London;(1980)
5. Biology Methods manual; Metropolitan Police Forensic Science Laboratory, London; (1978)

Books Suggested :

1. Herbert R. Mauersberger; Mathews Textile Fibres – their physical, Microscopic and chemical properties; John Wiley, New York; (1954)
2. R.P. Pandey, Plant Anatomy; S. Chand, new Delhi; (1998)
3. Kimball, John W; Biology; Arvind Publishing Co. New Delhi (1974)
4. Edwin, H. Mc Caney – Human Genetics, The Molecular Revolution, Jones & Bartlett Pub. London, (1993)
5.Albert's, B, Bray, D, Lewis, J, Roberts K & Watson, J.D; Molecular Biology of Cell,2nd ed. Garland Pub. New Yark (1989)

FSH 142
ECONOMICS

L-T-P-C Structure 4-0-0-4 **Course Type: Generic Elective Course**

COURSE OBJECTIVES: The objective of this course is to

CO1: Demonstrate the concept and types of economics and its application in managerial environment.

CO2: Understand the basic theories behind consumer behavior (demand) and producer behavior (supply) and identify the determinants of the demand and supply of goods.

CO3: Analyse the different costs in the product and study the long run and short run relationship of costs.

CO4: Understand the major characteristics of different market structures and the implications of the degrees of competition in a market on firms pricing and output decision.

CO5: Apply special pricing strategies for multi-product and transfer price.

MODULE I

INTRODUCTION TO MANAGERIAL ECONOMICS

Definition of Economics - Important concept of Economics – Basic Economic problem – Relationship between Micro and Macroeconomics – Managerial Economics – meaning, concept, significance and scope.

MODULE II

BASIC OF DEMAND AND SUPPLY

Demand Function, Supply function- Market Equilibrium Changes in market Equilibrium – Demand elasticity & Supply Elasticity – Effects of taxes, subsidies, price control, price support, Tariff and Quota Theory of consumer behavior, cardinal utility theory, ordinal utility theory (indifference curves, budget line, consumer choice, price effect, substitution effect, income effect for normal, inferior and giffen goods), revealed preference theory.

MODULE III

THEORY OF PRODUCTION AND COST ANALYSIS

Factors of Production, Production function -total product, average product and marginal product, Law of variable proportion, Returns to scale, Optimum factor combination. Different concepts of Cost & Revenue: short–run and long–run costs and revenues–economics, and diseconomies of scale.

MODULE IV

MARKET STRUCTURE AND PRICING DECISIONS

Market Structure, degree of competition, pricing decisions, Features of perfect competition, monopoly, monopolistic competition and oligopoly. Perfect competition: Price and output decisions in the short run and the long run. Monopoly and Monopolistic Competition: Price and output decisions short run and long run equilibrium under monopoly and monopolistic competition- price discrimination by degree. Oligopoly: kinked demand curve- price leadership models –Collusion model: The Cartel.

MODULE V

SPECIAL PRICING STRATEGIES

Cost-plus pricing, the multi-product pricing, Transfer Pricing, Peak-Load pricing, Product bundling.

Text Books:

1.Lipsey and Chrystal. Economics. 11th edition- Oxford University Press - New Delhi- (2008).
2. Dominick Salvatore. Principles of Microeconomics -5th Edition. Oxford University Press-New Delhi- (2009).

Books Suggested:

1.Vanita Agarwal- Managerial Economics- Pearson Education- New Delhi. (2013).
2. Koutosyannis- Modern Micro Economics- Palgrave Macmillan- (1979).
3. Pindyck, Rubinfeld and Mehta. Micro Economics.
4. State Crime Branch, Haryana*, Investigation of Economic Offences*

FSH 142
ECONOMICS LAB

L-T-P-C Structure 0-0-4-2 **Course Type: Generic Elective Course**

COURSE OBJECTIVES: The objective of this course is to

CO1: Demonstrate the concept and types of economics and its application in managerial environment.

CO2: Understand the basic theories behind consumer behavior (demand) and producer behavior (supply) and identify the determinants of the demand and supply of goods.

CO3: Analyse the different costs in the product and study the long run and short run relationship of costs.

CO4: Understand the major characteristics of different market structures and the implications of the degrees of competition in a market on firms pricing and output decision.

CO5: Apply special pricing strategies for multi-product and transfer price.

1.To prepare a draft on fraudulent bankruptcy.

2. To cite a case of money laundering and hawala transactions in India and prepare a note on it.

3. To cite a case involving bank fraud and suggest measures to prevent such crimes.

4. To study a case involving illicit drug trafficking and trace the route by which the item was being smuggled.

5. To prepare a report on trafficking of heritage artefacts, including religious deities in India.

Text Books:

1.Lipsey and Chrystal. Economics. 11th edition- Oxford University Press - New Delhi- (2008).
2. Dominick Salvatore. Principles of Microeconomics -5th Edition. Oxford University Press-New Delhi- (2009).

Books Suggested:

1.Vanita Agarwal- Managerial Economics- Pearson Education- New Delhi. (2013).
2. Koutosyannis- Modern Micro Economics- Palgrave Macmillan- (1979).
3. Pindyck, Rubinfeld and Mehta. Micro Economics.
4. State Crime Branch, Haryana*, Investigation of Economic Offences*

FSH 146
HANDWRITING IDENTIFICATION AND RECOGNITION

L-T-P-C Structure 4-0-0-4 **Course Type: Core Ability Enhancement Course**

COURSE OBJECTIVES: The objective of this course is to

CO1: Developing an understanding and appreciation for the scope of Handwriting Identification and Examination.

CO2: Develop an understanding on handwriting and their characteristics, principles of identification.

CO3: Give brief description on various methods of their detection and examination.

CO4: Develop comprehensive knowledge on type written documents, common styles and their examination.

MODULE I

HANDWRITING

Handwriting, Class and Individual characteristics, Natural variations, Principles of handwriting identification, External and internal factors which influence handwriting, ethnic and gender variability of handwriting, various types of forgeries and their detection.

MODULE II

SIGNATURE EXAMINATION

examination of signatures – characteristics of genuine and forged signatures, identification of forger, identification of writer of anonymous letters and application of Forensic Stylistics/Linguistics in the identification of writer, examination of built-up documents and determination of sequence of strokes.

MODULE III

FORGED AND DISGUISE HANDWRITING

Forged documents, disguised documents, characteristics features and variations found in handwriting characteristics due to forgery/ disguise, types of forgeries and their identification.

MODULE IV

TYPEWRITTEN AND PRINTED DOCUMENTS

Identification of typescripts-identification of typist, various types of printing processes, identification of printed matter including printing of security documents and currency notes, identification of electronic typewriters, dot matrix, inkjet and laser jet printers, examination of black and white and color photocopies, fax messages and carbon copies.

MODULE V

TYPEWRITING IDENTIFICATION

Type written documents/ scripts, Comparison of type written documents, common types of styles and examination of typewritten documents.

Text Books:

1. Albert, S. Osborn, Questioned Documents, Second Ed., Universal Law Publishing, Delhi, 1998.
2. Charles, C. Thomas, I.S.Q.D. Identification System for Questioned Documents, Billy Prior Bates, Springfield, Illinois, USA, 1971.
3. Kelly, J. S. Lindblom, B. S. (2006). *Science, Handwriting Examination and the Courts. Scientific Examinations of Questioned Documents*, 2nd edition, CRC Press, Taylor & Francis group.

Books Suggested:

1. Huber, A. R. Headrick, A. M. (1999). *The Discrimination and Identification of writing. Handwriting Identification Facts and Fundamentals*, CRC Press, Boca Raton London.
2. James, S. H. And Nordby, J. J. (Eds), Forensic Science; An Introduction to Scientific and Investigative Techniques, CRC Press, London, 2003.