

**UNIVERSITY OF MUMBAI**  
**No. UG/139 of 2011**

**CIRCULAR:-**

A reference is invited to the Ordinances, Regulations and syllabi relating to the B.Sc. degree course vide this office Circular No. UG/69 of 2011, dated 18<sup>th</sup> April, 2011, and the Principals of the affiliated colleges in Science are hereby informed that the recommendation made by the faculty of Science at its meeting held on 29<sup>th</sup> April, 2011, has been accepted by the Academic Council at its meeting held on 25<sup>th</sup> May, 2011 vide item No. 4.54 and that, in accordance therewith, the syllabus as per the Credit Based Semester and Grading System for First Year of B.Sc. Programme in Forensic Science is as per Appendix and that the same has been brought into force with effect from the academic year 2011-2012.

MUMBAI – 400 032  
14<sup>th</sup> June, 2011

(Prin. (Dr.) M.S.Kurhade)  
I/c. Registrar

Academic Council 25/05/2011

Item No. 4.54

**UNIVERSITY OF MUMBAI**



**Syllabus for the F.Y.B.Sc.**

**Program: B.Sc.**

**Course : Forensic Science**

(Credit Based Semester and Grading System with  
effect from the academic year 2011–2012)

## Preamble

### B.Sc. (Forensic Science)

**The existing Ordinances & Regulations remains the same as follows:-**

**O-5892:- Title of the Programme:-** B.Sc. Forensic Science

**O 5893:- Eligibility:-** 12<sup>th</sup> Science Pass

**R 8191:- Duration:-**

The duration of the programme shall be three years (Six Semesters).

**R 8193:- Intake Capacity:** 50 (Reservation as per State Government Rule)

**R 8194:- Teacher Qualifications:-** As per the U.G.C./State Government Norms and Experts from the Forensic Science Field and Related Industry with minimum 3 years of experience.

#### B.Sc. Forensic Science Semester Pattern 2011-2012

Year	SEM	Forensic Science	Forensic Chemistry	Forensic Physics	Forensic Biology	Forensic Psychology	Digital and Cyber Forensics	Foundation Course	Forensic Science & Forensic Chemistry (G1)	Forensic Physics & Forensic Biology (G2)	Forensic Psychology & Digital & Cyber Forensics (G3)	TOTAL
1	I	2	2	2	2	2	2	2	2	2	2	20
	II	2	2	2	2	2	2		3	2	3	20

- If a learner doesn't earn 120 credits in a period of three years, degree will be awarded only when he/she earns 120 credits in a maximum period of six years from the year of admission to Semester I.

**B. Sc. Forensic Science**

CLASS	TITLE	Class Room Instruction Face to Face						50 Hrs. = 1 Credit						
		Per Week		15 week(per sem)		Per Sem (Hrs.)		Notional Hrs.		Total Hrs.		Credits		Total Credits
		L (50 min)	P(50min)	Lect.	Pra.	Lect.	Pra.	Lect.	Pra.	Lect.	Pra.	Lect.	Pra.	
USFS 101	Basics of Forensic Science	4		60		50		50		100		2		2
USFS 102	Basics of Forensic Chemistry	4		60		50		50		100		2		2
USFS 103	Basics of Forensic Physics	4		60		50		50		100		2		2
USFS 104	Basics of Forensic Biology	4		60		50		50		100		2		2
USFS 105	Basics of Forensic Psychology	4		60		50		50		100		2		2
USFS 106	Basics of Digital & Cyber Forensics	4		60		50		50		100		2		2
USFS107	Foundation Course	4		60		50		50		100		2		2
USFS 1P1	Forensic Science & Forensic Chemistry		3		45		38		12	100		2	2	
			3		45		38		12					
USFS 1P2	Forensic Physics & Forensic Biology		3		45		38		12	100		2	2	
			3		45		38		12					
USFS 1P3	Forensic Psychology & Digital & Cyber Forensics		3		45		38		12	100		2	2	
			3		45		38		12					
<b>Total</b>		<b>28</b>	<b>18</b>	<b>420</b>	<b>270</b>	<b>350</b>	<b>228</b>	<b>350</b>	<b>72</b>	<b>700</b>	<b>300</b>	<b>14</b>	<b>6</b>	<b>20</b>

CLASS	F.Y. II Sem	TITLE	Class Room Instruction Face to Face					50 Hrs. = 1 Credit							
			Per Week		15 week(per sem)		Per Sem (Hrs.)		Notional Hrs.		Total Hrs.		Credits		Total Credits
			L (50 min)	P(50min)	Lect.	Pra.	Lect.	Pra.	Lect.	Pra.	Lect.	Pra.	Lect.	Pra.	
USFS201	Basics of Forensic Science	4		60		50		50		100		2		2	
USFS202	Basics of Forensic Chemistry	4		60		50		50		100		2		2	
USFS203	Basics of Forensic Physics	4		60		50		50		100		2		2	
USFS204	Basics of Forensic Biology	4		60		50		50		100		2		2	
USFS205	Basic Forensic Psychology	4		60		50		50		100		2		2	
USFS206	Basics of Digital & Cyber Forensics	4		60		50		50		100		2		2	
USFS 2P1	Forensic Science & Forensic Chemistry		3		45		38		37	150		3	3		
			3		45		38		37						
USFS 2P2	Forensic Physics & Forensic Biology		3		45		38		12	100		2	2		
			3		45		38		12						
USFS 2P3	Forensic Psychology & Digital & Cyber Forensics		3		45		38		37	150		3	3		
			3		45		38		37						
<b>Total</b>		<b>28</b>	<b>18</b>	<b>420</b>	<b>270</b>	<b>350</b>	<b>228</b>	<b>300</b>	<b>172</b>	<b>600</b>	<b>400</b>	<b>12</b>	<b>8</b>	<b>20</b>	

# B. Sc. FORENSIC SCIENCE

## Semester I - Theory

### USFS 101: Basics of Forensic Science

Total Marks	Lecture Per Week	Credit
100	4	2

Units with Description	Total Lectures
<b>SEMISTER – 1</b>	
<b>UNIT: I – CRIME SCENARIO IN INDIA</b>	15 Lectures
<ul style="list-style-type: none"><li>• Introduction to crime and history</li><li>• Sociological aspects of crime and criminals in society</li><li>• Types of crime and its causes – property crimes, public order crimes, violent crimes, cyber crimes, juvenile delinquency</li><li>• Society-Criminal interaction and various types of crimes in India</li><li>• Criminal behavior - Theories and literature studies, criminal inheritance and factors responsible</li></ul>	
<b>UNIT: II – CRIMINOLOGY &amp; LAW</b>	15 Lectures
<ul style="list-style-type: none"><li>• Procedures involved in detection of crime – latest evidence based research in detection and prevention of crime</li><li>• Administrative steps towards crime prevention</li><li>• Different agencies involved in crime detection and prevention</li><li>• Indian Police System – State &amp; Central level, The Police Act of 1861, Medico-legal experts, Judiciary system</li></ul>	
<b>UNIT: III – DEVELOPMENTAL GROWTH OF FORENSIC SCIENCE</b>	15 Lectures
<ul style="list-style-type: none"><li>• Introduction to Forensic science – nature, need and function</li><li>• Laws and Principles, basics of Forensic Science</li><li>• Historical development and scope of Forensic Science in India</li></ul>	

## USFS 102: Basics of Forensic Chemistry

Total Marks	Lecture Per Week	Credit
100	4	2

Units with Description	Total Lectures
<b>SEMISTER - 1</b>	
<b>UNIT: I - LIQUID STATE AND SOLUTIONS</b>	15 Lectures
<ul style="list-style-type: none"> <li>• 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</li> <li>• Solutions: Method of exploring concentration of solutions, binary liquids, vapor pressure, composite diagram of binary liquids and solutions, distillation, fractional distillation, vacuum distillation</li> </ul>	
<b>UNIT: II - CHEMICAL THERMODYNAMICS AND CHEMICAL KINETICS</b>	15 Lectures
<ul style="list-style-type: none"> <li>• Chemical thermodynamics and kinetics, first law of thermodynamics, internal energy, enthalpy, second law of thermodynamics, entropy and its significance, free energy and work function</li> <li>• 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</li> </ul>	
<b>UNIT: III - INTRODUCTION OF PERIODIC TABLE &amp; PHYSICAL INSTRUMENTS</b>	15 Lecturers
<ul style="list-style-type: none"> <li>• Study of Modern Periodic Table, Long form of Periodic Table, periodic properties, atomic radiation, ionization potential, electron affinity, electro negativity, metallic characters, Non-metallic characters and magnetic properties, Comparative study of S and P block elements</li> <li>• Conductance, Conductometry, Electro Motive Force, Potentiometry</li> </ul>	

## USFS 103: Basics of Forensic Physics

Total Marks	Lecture Per Week	Credit
100	4	2

Units with Description	Total Lectures
<b>SEMISTER - 1</b>	
<b>UNIT: I – NEWTON’S LAW OF MOTION, ELASTICITY &amp; FLUID DYNAMICS</b>	15 Lectures
<ul style="list-style-type: none"> <li>• Interpretation and applications of Newton’s laws of motion, Pseudo forces, elastic properties of matter, elastic constants and their interrelations</li> <li>• Fluid dynamics, equation of continuity, Bernoulli’s equation, stream line and turbulent flow, lines of flow in air foil, Purseuille’s equation</li> </ul>	
<b>UNIT: II – STUDY OF SOUND</b>	15 Lectures
<ul style="list-style-type: none"> <li>• Velocity of sound, noise and sound intensity measurement, echo, reverberation, Sabine’s Formula, absorption coefficient, acoustics of buildings and factors affecting acoustics of buildings</li> <li>• Sound distribution in an auditorium, introduction to ultrasonic, production of ultrasonic waves, applications of ultrasonics</li> </ul>	
<b>UNIT: III – STUDY OF LIGHT</b>	15 Lectures
<ul style="list-style-type: none"> <li>• Refraction through thin layers, thick lens, thick lens and lens combinations, aberrations, interference in thin films, fringes in wedge shaped films, Newton’s rings, simple table spectrophotometer, total internal reflection.</li> </ul>	



## USFS 104: Basics of Forensic Biology

Total Marks	Lecture Per Week	Credit
100	4	2

Units with Description	Total Lectures
<b>SEMISTER – 1</b>	
<b>UNIT: I – CELL BIOLOGY, ORGANIC AND BIOCHEMICAL COMPOUND</b>	15 Lectures
<ul style="list-style-type: none"> <li>• Cell theory, Cell Structure and Function in Prokaryotes and Eukaryotes.</li> <li>• Unicellular and Multicellular organisms</li> <li>• Composition of blood, study of blood components and its functions and body fluid analysis.</li> <li>• Properties, Classification and function of carbohydrates, proteins, nucleic acids and lipids</li> </ul>	
<b>UNIT: II – PLANT MORPHOLOGY AND ANATOMY</b>	
<ul style="list-style-type: none"> <li>• Principles of Taxonomy and systems of classification of angiosperms (Bentham and Hooker) and Gymnosperms (Chamberlain)</li> <li>• Mechanical and conducting tissue systems in plants</li> <li>• Morphology of root, leaf, stem, flowers and their modifications.</li> <li>• Anatomy of mono and dicot roots, leaves and stems - secondary growth, growth rings, calculation of life of wood</li> </ul>	15 Lectures
<b>UNIT: III - HUMAN PHYSIOLOGY AND ANATOMY</b>	
<ul style="list-style-type: none"> <li>• Nutrition - BMR, Calorie value, balanced diet, obesity, digestive system.</li> <li>• Skeletal Muscle physiology and Nervous system Physiology, coordination systems, brain functions and receptor organs</li> <li>• Respiratory system physiology - exchange of gases, process of pulmonary respiration</li> <li>• Mechanism of blood circulation, cardiac mechanism.</li> <li>• Morphological study of human body parts and regions - Gross and Microscopic, Microbe-Human interaction</li> </ul>	15 Lectures

## USFS 105: Basics of Forensic Psychology

Total Marks	Lecture Per Week	Credit
100	4	2

Units with Description	Total Lectures
<b>SEMISTER – 1</b>	
<b>UNIT: I - THE SCIENCE OF PSYCHOLOGY</b>	
<ul style="list-style-type: none"> <li>• Concepts of psychology - Definition of psychology, goals of psychology</li> <li>• History of psychology - Development of psychology, role of psychologist</li> <li>• Different perspectives in Psychology - Modern perspectives, Humanistic, behaviouristic, cognitive, psychodynamic.</li> <li>• Types of psychology professions - Psychiatrist, Psychologist, Counselor</li> <li>• The science and research methods - Interview, observation, case study method</li> <li>• Professional and Ethical issues in psychology - APA code of conducts for Psychologist</li> </ul>	15 Lectures
<b>UNIT: II – BIOLOGICAL PERSPECTIVE</b>	
<ul style="list-style-type: none"> <li>• Nerve and neuron - Building the network, structure of neuron, neural impulses, neurotransmitters</li> <li>• Nervous System -Central nervous system, structure and function of CNS, types of amnesia, Peripheral nervous system</li> <li>• Human brain - structure and function, significance of left and right brain, types of Amnesia</li> <li>• Endocrine system- Pituitary gland, Thyroid gland, Neurotransmitters</li> </ul>	15 Lectures
<b>UNIT: III - CONSCIOUSNESS &amp; PERCEPTION</b>	
<ul style="list-style-type: none"> <li>• Consciousness - Definition of consciousness, states of consciousness</li> <li>• Altered state of consciousness - Dreams, awake states including day dreaming</li> <li>• Rhythms of consciousness (Circadian rhythms) Sleep – stages of sleep, Dreams – Content, REM sleep and non-REM sleep</li> <li>• Altered states – Hypnosis, Meaning, Hypnotic Phenomena, Hypnotic stages</li> <li>• Attention and awareness - Attention: Definition, characteristics, selective attention and divided attention</li> <li>• Sensation and perception- Basic concepts in perception, Gestalt Principles, problems in attention and perception, assessment attention and perception</li> </ul>	15 Lectures

## USFS 106: Basics of Digital and Cyber Forensics

Total Marks	Lecture Per Week	Credit
100	4	2

Units with Description	Total Lectures
<b>SEMISTER – 1</b>	
<b>UNIT: I – BASICS OF COMPUTERS</b>	15 Lectures
<ul style="list-style-type: none"> <li>• Computer organization, Components of computers – Input &amp; Output devices, CPU</li> <li>• Memory Hierarchy and types of Memory (RAM and ROM and their types) external storage devices</li> <li>• Application Software and System Software</li> </ul>	
<b>UNIT: II – DATA REPRESENTATIONS</b>	15 Lectures
<ul style="list-style-type: none"> <li>• Integers, real, binary, octal, hexadecimal &amp; their conversions</li> <li>• Logic gates – Negation, OR, AND, XOR etc. and their combinations</li> </ul>	
<b>UNIT: III - INTRODUCTION TO OPERATING SYSTEM</b>	15 Lectures
<ul style="list-style-type: none"> <li>• Basics of Operating System, memory structure, concurrency, scheduling, synchronization &amp; memory management, process description and control</li> <li>• Introduction to Operating System (Batch Operating System, Distributed operating system, etc) Introduction to Windows and Linux operating System</li> </ul>	

## USFS 107: FOUNDATION COURSE

Total Marks	Lecture Per Week	Credit
100	4	2

### Social Awareness and Personality Development

#### A. Indian Society and Contemporary Issues: An Overview

##### 1. Analysis of Indian Society:

Indian Society as pluralistic: Multi-lingual, multi-ethnic, multi-religious, and multi-cultural society; regional differences: rural, urban, tribal dimensions.

##### 2. Concept of Diversity and Disparity and relate Social Issues:

(a) Understand diversity as difference and disparity as inequality; Inter-group conflicts: Communalism, Castelism, linguistic differences, regionalism.

(b) Patriarchy and gender disparity: declining sex ratio, violence against women, women and mass media.

(c) Disparities arising due to disability: issues of the physically and mentally challenged, services available.

##### 3. Unifying factors in Indian Society:

(a) The Indian Constitution: Basic features, strengths are fundamental: duties of the Indian Citizen.

(b) Promotion of National Integration and tolerance as crucial to maintain the pluralistic and social fabric of Indian Society

- Role of youth in promoting communal harmony.

#### B. Growing Social Problems and Role of NGOs

(30 Marks Weightage)

(a) Substance abuse - tobacco, alcohol, drugs - impact on youth and challenges for the future.

(b) HIV/AIDS - awareness and redressal.

(c) Problems of the elderly - causes Implications and response.

(d) Problem of child labour - magnitude, causes, effects, and response.

#### C. Globalization and Indian Society: Emerging Issues.

1. Concepts of Liberalization; Privatization and Globalization; role of MNCs

2. Economic and Socio-cultural Impact of Globalization

(a) Impact on employment: Privatization and labour in organized and unorganized sectors emerging issues of employment: outsourcing, growth of contractual labour, migration.

(b) Impact on culture: growth of consumerism and market orientation; changing values and lifestyles. Positive and negative impact on culture due to media explosion.

(c) Impact of globalization on agricultures: changing land use; agrarian crisis.

(d) Impact on urbanization and effects on health, housing and sanitation.

## D. Self and Society

### 1. Role of Heredity and Environment in Individual Development

(a) Nature and nurture; agents of, socialization; role of ethics, values and prejudices in the development of the individual

(b) Maslow's Theory of Self-Actualisation

### 2. Management of conflicts and stress in individual and public domain:

(a) Conflict and stress management and the use of coping mechanisms.

(b) Aggression and violence as public displays of conflict and stress and efforts towards communal harmony and peace.

### 3. Career Planning

(a) Realistic goal setting

(b) Time management

(c) Significance of Aptitude tests

(d) I Q and EQ

# Practical

## USFS 1P1: Forensic Science and Forensic Chemistry

Total Marks	Period Per week (50Min. Each)	Credit
100	6	2

### Part A: Basics of Forensic Science

1. Collection and Packaging of Toxicological samples 2 nos.
2. Collection and Packaging of Petroleum samples 2 nos.
3. Collection and Packaging of Homicide case samples 2 nos.
4. Collection and Packaging of biological samples 1 nos.
5. Collection and Packaging of Trace samples 4 nos.

### Part B: Basics of Forensic Chemistry

1. To determine the density of given liquid 2 nos.
2. To determine the viscosity of given liquid 2 nos.
3. To determine the surface tension of given liquid 2 nos.
4. Standardization of given liquid by primary standard 2 nos.

## USFS 1P2: Forensic Physics and Forensic Biology

Total Marks	Period Per week (50Min. Each)	Credit
100	6	2

### Part A: Basics of Forensic Physics

1. Fly wheel 1 nos.
2. Y by vibration 1 nos.
3. Poisseuli Method 1 nos.
4. Spectrophotometer (determination of angle of prism A) 1 nos.
5. Refractive index of liquid by using LASER 1 nos.
6. Ultrasonic interferometer 1 nos.
7. Sound Intensity measurement 1 nos.
8. Laser parameter 1 nos.
9. Solar cell 1 nos.
10. Combination of lenses 1 nos.

### Part B: Basics of Forensic Biology

1. Qualitative analysis of sugars, proteins, lipids and nucleic acids 1 nos.
2. Study of morphological types of red blood cells 1 nos.
3. Study of Plant Material ( Wild and Cultivated from families Magnoniaceae, Combretaceae, Amaranthaceae, Convolvulacea) 2 nos.
4. Study of morphological plant parts with modification 2 nos.
5. Study of anatomical features of secondary growth in angiospermic stem and root. 1 nos.
6. Study of conducting tissue- Xylem and phloem elements in Angiosperms and Gymnosperms as seen in L.S. and R.L.S. 2 nos.
7. Preparation of media and sterilization 1 nos.

## USFS 1P3: Forensic Psychology and Digital and Cyber Forensics

Total Marks	Period Per week (50Min. Each)	Credit
100	6	2

### Part A: Basics of Forensic Psychology

1. Introduction of Psychology Practicals. 1 nos.
2. Conduction of Personality Test.
  - D.A.P. 2 nos.
  - H.T.P. 2 nos.

### Part B: Basics of Digital and Cyber Forensics

1. Finding results of different logic gates & their combinations. 2 nos.
2. Working with Windows – File (creation, modification, deletion, attributes), Folder (creation, nesting, attributes) 2 nos.
3. Working with Linux – File (creation, modification, deletion, attributes), Various commands on Linux (basic utility commands e.g. Date, Cal etc.) 2 nos.
4. Obtaining the system and process information (Windows) 2 nos.
5. Obtaining the system and process information (Linux) 2 nos.
6. Demonstration of in-built system tools (Backup, Disk cleanup, Disk Defragmenter, System restore, cmd etc) 2 nos.



# Semester II - Theory

## USFS 201: Basics of Forensic Science

Total Marks	Lecture Per Week	Credit
100	4	2

Units with Description	Total Lectures
<b>SEMISTER – 2</b>	
<b>UNIT: I - FORENSIC SCIENCE LABORATORIES AND FACILITIES</b>	15 Lectures
<ul style="list-style-type: none"><li>• Growth of Forensic Science Laboratories in India – Central and State level laboratories</li><li>• Educational setup in Forensic Science in India</li><li>• Services and functionalities provided by various FSLs</li><li>• Various divisions in the FSL – Ballistics, Biology, Chemistry Documents, Physics, Psychology, Serology, Toxicology</li></ul>	
<b>UNIT: II - CRIME SCENE MANAGEMENT</b>	15 Lectures
<ul style="list-style-type: none"><li>• Types of crime scenes – primary, secondary, crime scenes based on size of evidence</li><li>• Crime scene Management – initial response, role of first responding officer, duty management</li><li>• Forensic Scientists, Investigating officers and their assigned role and duties</li><li>• Role of the Police and Judiciaries, Fire Brigade, Medico-legal officers and other experts</li></ul>	
<b>UNIT: III - PHYSICAL EVIDENCE COLLECTION &amp; PACKAGING</b>	15 Lectures
<ul style="list-style-type: none"><li>• Physical evidence, types and importance in a criminal investigation</li><li>• Protecting a scene of crime – various steps involved, contamination issues.</li><li>• Recovery and preservation of samples from a crime scene – biological, toxicological, petroleum, explosives, trace items, projectiles and bullets</li></ul>	

## USFS 202: Basics of Forensic Chemistry

Total Marks	Lecture Per Week	Credit
100	4	2

Units with Description	Total Lectures
<b>SEMISTER – 2</b>	
<b>UNIT: I – INTRODUCTION OF ANALYTICAL TECHNIQUES</b>	
<ul style="list-style-type: none"> <li>• Introduction of Gravimetric analysis and Volumetric analysis</li> <li>• Chromatographic separation, liquid chromatography (paper, column and TLC)</li> </ul>	15 Lectures
<b>UNIT: II – INTRODUCTION OF INORGANIC AND ORGANIC CHEMISTRY</b>	
<ul style="list-style-type: none"> <li>• Empirical and molecular formulae, hybridization, nature of chemical bonding, polarization, hydrogen bonding, Van der Waals 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</li> <li>• Reactive intermediates and related reactions</li> </ul>	15 Lectures
<b>UNIT: III – INTRODUCTION OF CHEMICAL COMPOUNDS</b>	
<ul style="list-style-type: none"> <li>• Heterocyclic Chemistry: Natural products, Petroleum products, insecticides, pesticides etc.</li> <li>• Introduction to dyes, Paints, polymers</li> </ul>	15 Lectures

## USFS 203: Basics of Forensic Physics

Total Marks	Lecture Per Week	Credit
100	4	2

Units with Description	Total Lectures
<b>SEMISTER – 2</b>	
<b>UNIT: I - LASER &amp; FIBER OPTICS</b>	15 Lectures
<ul style="list-style-type: none"> <li>• Production of LASER, Types of LASER, Properties and applications of LASER, Optical fibers, Propagation of light through optical fiber, Angle of acceptance and numerical aperture, losses, Solar cells</li> </ul>	
<b>UNIT: II - RADIO ACTIVITY</b>	15 Lectures
<ul style="list-style-type: none"> <li>• Review of nuclear composition, nuclear properties and half life, Radioactive decay schemes</li> <li>• Applications of Radio Isotopes, Radiometric dating</li> </ul>	
<b>UNIT: III - ELECTRONICS CIRCUITS &amp; DIGITAL ELECTRONICS</b>	15 Lectures
<ul style="list-style-type: none"> <li>• Basics of LR, CR, LCR circuits, Rectifier circuits, Timer circuits, Transistor and its characteristics, Introduction to OPAM, remote sensing and controlling, Photo-sensors, Logic gates and their applications, Flip- flops and counters</li> </ul>	

## USFS 204: Basics of Forensic Biology

Total Marks	Lecture Per Week	Credit
100	4	2

<b>Units with Description</b>	<b>Total Lectures</b>
<b>SEMISTER – 2</b>	
<b>UNIT: I – MICROBIOLOGY AND BIOTECHNOLOGY</b>	15 Lectures
<ul style="list-style-type: none"> <li>• Microscopy - Principles and types</li> <li>• Historical introduction to microbiology</li> <li>• Basics of Microbiology and concepts of Pure culture techniques.</li> <li>• Broad classification of microorganismis</li> <li>• Recombinant DNA technology and its application in Heath and Diseases, Western and Southern Blot techniques</li> </ul>	
<b>UNIT: II – EVOLUTION AND GENETICS</b>	15 Lectures
<ul style="list-style-type: none"> <li>• Origin of life and Geological time scale</li> <li>• Theories and evidences of evolution - Darwinism, Lamarkism, fossil record and biochemical evidences.</li> <li>• Origin and Concept of Species - specification and isolation, geographical and reproductive.</li> <li>• Genetic Materials - Structural organization and functions</li> <li>• Mendelian Principles, Mendels Laws and Ratio</li> <li>• Sex linked inheritance, sex determination and crossing over - Karyotyping analysis, Chromosomal mapping, DNA and RNA structural types</li> </ul>	
<b>UNIT: III - IMMUNOLOGY</b>	15 Lectures
<ul style="list-style-type: none"> <li>• Immunity and Immune System</li> <li>• Structure and interaction of antigens and antibody</li> <li>• Virology and Bacteriology - structure, genetics and diseases</li> <li>• B cell / T cell development, diversity and recognition</li> <li>• Immunoglobulins structure - transplantation and types, immune system disorders.</li> <li>• Various types of microbial cultures</li> <li>• Failures of Body defenses</li> </ul>	

## USFS 205: Basics of Forensic Psychology

Total Marks	Lecture Per Week	Credit
100	4	2

Units with Description	Total Lectures
<b>SEMESTER – II</b>	
<b>UNIT: I – LEARNING AND MEMORY</b>	
<ul style="list-style-type: none"> <li>• Learning: Definition, and types of learning.</li> <li>• Classical conditioning – Conditioned stimulus, unconditioned stimulus</li> <li>• Operant Conditioning – Thorndike’s law of effect   basics of operant conditioning, generalization, discrimination, shaping, chaining. Schedules of reinforcement</li> <li>• Reinforcement – Primary And Secondary ; Positive Reinforces, Punishment Schedules of reinforcement</li> <li>• Cognitive Learning – latent learning; observational learning</li> <li>• Basic Processes of Memory – Encoding, Storage, Retrieval. Sensory – Iconic Memory and Echoic</li> <li>• Memory ; STM – Working Memory, LTM</li> <li>• Types of memory: Declarative, Procedural, Semantic, Episodic Memory. Explicit memory And Implicit memory.</li> <li>• Associative models of memory – LOP, PDP, Information processing approach.</li> <li>• Techniques to improve memory: Rehearsal, Chunking, Mnemonics.</li> <li>• Forgetting – Decay Theory: Interference Theory; Perspective Memory; Absence Of Retrieval Cues; Tip – Of – The – Tongue</li> </ul>	15 Lectures
<b>UNIT: II – COGNITION, MOTIVATION AND EMOTION</b>	
<ul style="list-style-type: none"> <li>• Thinking-Theories and models of thinking, types of Thinking</li> <li>• Decision making and problem solving: Stages of problem solving, methods of problem of problem solving, theories of decision making.</li> <li>• Concept formation: Types of concepts.</li> <li>• Intelligence: Definition, Tests of intelligence, concepts of. IQ.</li> <li>• Motivation: types and approaches of motivation and emotion.</li> <li>• Stress and coping endocrine system : Types of stresses, relaxation techniques</li> </ul>	15 Lectures
<b>UNIT: III - THEORIES OF PERSONALITY</b>	
<ul style="list-style-type: none"> <li>• Understanding personality: Definition- mainly all part’s definition, stressing uniqueness, enduring characteristics, temperament.</li> <li>• Approaches – Psychodynamic (Freud, Jung &amp; Adler), Humanistic (Rogers &amp; Maslow) Dispositional approaches – Type (Jung. Type A &amp; B, Rotter and Big – 5 and Trait (Catelli) Behavioral Approaches - Locus of control and Social learning theory.</li> <li>• Assessment of personality – Questionnaires, Rating Scales and Projective tests, biological model assessment of personality</li> </ul>	15 Lectures

## USFS 206: Basics of Digital and Cyber Forensics

Total Marks	Lecture Per Week	Credit
100	4	2

Units with Description	Total Lectures
<b>SEMISTER – II</b>	
<b>UNIT: I – FILE SYSTEMS &amp; NETWORKING</b>	
<ul style="list-style-type: none"> <li>• Introduction to file systems – FAT12, FAT16, FAT32, NTFS, Ext2, Ext3 &amp; HFS.</li> <li>• Structure of File System, Inode etc.</li> <li>• Basics of Networking – Introduction to Networking Types of topologies, LAN, MAN, WAN and related terminologies, Networking Devices (Switches, hub, bridge)OSI Reference Model, TCP/IP Protocol Model</li> </ul>	15 Lectures
<b>UNIT: II – INTRODUCTION TO INTERNET</b>	
<ul style="list-style-type: none"> <li>• World Wide Web, E-mails, Chat, Search Engines, Network Security – Threats, Vulnerabilities, Access Control, Malicious Code (Virus, Worms, Trojans, etc.)</li> <li>• Introduction to Security and Security model(CIA triad)</li> </ul>	15 Lectures
<b>UNIT: III – CYBER CRIME &amp; DIGITAL EVIDENCE</b>	
<ul style="list-style-type: none"> <li>• What is cyber crime, types of cyber crimes, Digital evidence, Digital Vs Physical evidence, nature of digital evidence, precautions while dealing with digital evidence</li> </ul>	15 Lectures

# Practical

## USFS 2P1: Forensic Science and Forensic Chemistry

Total Marks	Period Per week (50Min. Each)	Credit
100	6	2

### Part A: Basics of Forensic Science

1. Study of Bomb Blast Scene 2 nos.
2. Collection and Packaging of Fire-arm crime scene samples 2 nos.
3. Collection and Packaging of Hit and run crime scene samples 2 nos.
4. Collection and Packaging of Arson crime scene samples 3 nos.

### Part B: Basics of Forensic Chemistry

1. To determine strength given acid 2 nos.
2. Inorganic micro/ semi micro qualitative analysis 2 nos.
3. Identification of organic compound 3 nos.

## USFS 2P2: Forensic Physics and Forensic Biology

Total Marks	Period Per week (50Min. Each)	Credit
100	6	2

### Part A: Basics of Forensic Physics

1. Newton's rings 1 nos.
2. Wedge shaped film 1 nos.
3. Frequency of AC mains, 1 nos.
4. LDR characteristics 1 nos.
5. LCR series resonance 1 nos.
6. Bridge rectifier (to study load regulation) 1 nos.
7. Transistor (CE) characteristics 1 nos.
8. DeMorgan's Theorems 1 nos.
9. Ex-or gate, NAND and NOR as universal building blocks. 1 nos.

### Part B: Basics of Forensic Biology

1. Antigen- Antibody reaction (Blood Groupings) 1 nos.
2. Study of body fluids 1 nos.
3. Radial Immunodiffusion Analysis 1 nos.
4. Isolation of Chromosomal DNA 1 nos.
5. Restriction digestion of DNA 1 nos.
6. Chromatography- Separation of Amino acids, sugars, lipids using  
Paper chromatography and Thin layer Chromatography. Determine RF values 2 nos.
7. Microtome sectional cutting of plants and animal tissue 2 nos.
8. Study of microbial colonies by using PDA Agar culture 1 nos.



## USFS 2P3: Forensic Psychology and Digital and Cyber Forensics

Total Marks	Period Per week (50Min. Each)	Credit
100	6	2

### Part A: Basics of Forensic Psychology

1. Conduction of Personality Test.
  - a. Eyescenk Personality Inventory 2 nos.
  - b. Children Personality Questionnaire 2 nos.
  - c. Sack's Sentence Completion test. 2 nos.
2. Visit to Rehabilitation centre, Mental Hospital/ FSL.

### Part B: Basics of Digital and Cyber Forensics

1. Working with external storage devices using Windows and linux– Reading & Writing data on Floppy, CD, DVD, USB Thumb drive. 2 nos.
2. Use of Internet – Visiting websites with given URL, searching information using search engine. 2 nos.
3. Use of E – mail – Creating e – mail ID, sending & receiving e – mails with attachments. 2 nos.
4. Tracing and analysis of E – mail – Finding senders IP Address of received e – mail, tracing route of e – mail received using tools available on internet 2 nos.
5. Networking commands – like ping, IPConfig, etc. in windows and linux (Diagnostics Command) 2 nos.
6. Networking commands – Connectivity Command 2 nos.

## ***List of Books***

### **Paper I: Basics of Forensic Science**

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

### **Paper II: Basics of Forensic Chemistry**

1. Thermodynamics for Chemists by S, Glasstone
2. Principles of Physical Chemistry and Puri, Sharma and Pathania
3. Advanced Inorganic Chemistry by Madan, Malik and Tuli
4. Concise Inorganic Chemistry by J.D. Lee
5. Organic Chemistry by Moris and Boyed
6. Heterocyclic Chemistry by Gupta and Kumar Vol I and Vol II
7. Insecticides with Modes of Action by I. Ishaya and D. Deghilee
8. Natural Products by S.V. Bhat
9. Instrumental Analysis by Skoog, Holler and Crouch
10. Practical Books:
11. Physical Chemistry Parcticals by J.B. Yadav
12. Qualitative Analysis by Vogel

### **Paper III: Basics of Forensic Physics**

1. Principle of Electronic by V.K. Gupta
2. Digital Electronics by Malnino
3. Digital Electronics by Flloyd
4. Op-amp by Gaikwad
5. Engineering Physics by Gaur and Gupta

#### **Paper IV: Basics of Forensic Biology**

1. Principles of Biochemistry by Lehninger
2. Harper's Biochemistry by Murray
3. Physical Chemistry by Atkins
4. Physical Chemistry by Castellan
5. Biological Spectroscopy by Lalcowicz
6. Analytical Biochemistry by Holme
7. Enzyme Kinetics by Plowman
8. Enzyme Structure and Mechanism by Ferst
9. Biophysical Chemistry by Upadhyay
10. Biochemistry by Satyanarayam
11. Microbiology by Pelczar
12. Microbiology by Devis
13. General Microbiology by Powar- Daginawala
14. Cell Biology by Powar
15. Principles of genetics by Gardner
16. DNA Cloning by Glover
17. Molecular Cloning by Maniatis
18. Fundamental Immunology by Paul
19. Essential Immunology by Roitt
20. Molecular Biology of Gene by Watson
21. Transgenic animals by Grosveld
22. Transgenic Plants by Hiatt
23. Industrial Microbiology by Casida
24. Nucleic acid and protein sequence analysis- A practical approach by Bishop
25. Gymnosperms by Chamberlein
26. Flora of Bentham by R. Hooker
27. Genes and Evolution by Jha
28. Plant Anatomy by Faha
29. Ecology by Odum

#### **Paper V: Basics of Forensic Psychology**

1. General Psychology by Cicarelli
2. General Psychology by Vipin Kumar
3. Cognitive Psychology by Galloti
4. Mannuals of Respective Test
5. Psychological testing by Anastasi
6. Abnormal Psychology by Barlow and Durand.
7. Psychology and Work, by Schultz D (2006), 8<sup>th</sup> edi.

8. Experimental Psychology, Solso .R.L.(2008)
9. Social Psychology, Barron and Barron.
10. Behavior Modification, Martin Garry,(2002),7<sup>th</sup> edi.
11. Introduction to Psychology, Morgan, King, Weiss and Schopler, VII edition, (1989) McGraw Hill, India.
12. Abnormal psychology & modern life,Carson RC & Butcher JN (10th Ed) Harper-Collins NY
13. The Counseling process Patterson, Lewis E. ; & Welfel, Elizabeth Reynold – [2000] Hilgard,
14. Introduction to Psychology, Atkinson and Atkinson, (1975) Oxford IBH Publishing Co. Pvt. Ltd.
15. Introduction to Forensic Science in Crime Investigation By Dr.(Mrs.) Rukmani Krishnamurthy

#### **Paper VI: Basics of Digital and Cyber Forensics**

1. Introduction to Forensic Science in Crime Investigation By Dr.(Mrs.) Rukmani Krishnamurthy
2. Cyber Law in India by Farooq Ahmad- Pioneer Books
3. Information Technology Law and Practice by Vakul Sharma- Universal Law Publishing Co. Pvt. Ltd.
4. The Indian Cyber Law by Suresh T. Vishwanathan- Bharat Law House New Delhi
5. Guide to Cyber and E- Commerce Laws by P.M. Bukshi and R.K. Suri- Bharat Law House, New Delhi
6. Guide to Cyber Laws by Rodney D. Ryder- Wadhwa and Compney, Nagpur
7. The Information technology Act, 2000- Bare Act- Professional Book Publishers, New Delhi.
8. Computer Forensics: Principles and Practices by Linda Volonino, Reynaldo Anzaldua and Jana Godwin -Pearson Prentice-Hall 2007.
9. First Responder's Gude to Computer Forensics by Richard Nolan et al.- Carnegi Mellon, 2005.
10. Digital Evidence and Computer Crime, 2<sup>nd</sup> ed. By Eoghan Casey- Acdemic Press, 2004.
11. The Regulation of Cyberspace by Andrew Murray, 2006- Routledge –Cavendish.
12. Scene of the Cybercrime: Computer Forensics Handbook by Syngress.
13. Security and Incident Response by Keith J. Jones, Richard Bejtlich and Curtis W. Rose
14. List of Websites for more information is available on :  
[Http://www.garykessler.net.library/forensicsurl.html](http://www.garykessler.net.library/forensicsurl.html)
15. Operating system by Willam Stalling
16. Computer Networking by Tanenbaum
17. Computer Security Basics By Rick Lehtinen

**R 8192: Fees Structure:-** As per the State Government Rules

Particular	First Year	Second Year	Third Year
	Fees in Rs.		
Tuition Fees	800	800	800
Library Fees	200	200	200
Gymkhana Fees	200	200	200
Other Fees / Extracurricular Activities	250	250	250
Disaster relief fund	10	10	10
E-suvidha	50	50	50
Examination Fees	600	600	600
Enrollment Fees	220	----	----
Admission processing	300	300	300
Document verification fees	400	400	400
Utility Fees	250	250	250
Magazine Fees	100	100	100
ID. Card and Library Card	40	40	40
Group Insurance	20	20	20
Student Welfare Fund	50	50	50
Development fund	500	500	500
Vice Chancellors Fund	20	20	20
UNI sports and Cultural Activities	30	30	30
E- Charges	20	20	20
Project Fees		---	500
Laboratory Fees	800	800	800
<b>Sub Total</b>	<b>4860</b>	<b>4640</b>	<b>5140</b>
<b>Refundable Fees</b>			
Caution Money	150	---	---
Library Deposit	250	---	---
Laboratory Deposit	800	---	---
Sub Total	1200	---	---
<b>Total amount payable</b>	<b>6060</b>	4640	5140

**Wherever Applicable**

Admin Form_Prost+Inform Brouchere	100	100	100
Transfer Certificate	100	100	100
Bonafied Certificate	20	20	20
No Objection Certificate	20	20	20
Computer Practical fees	600	600	600
Alumni Association Fees (to be collected from the student at the time of admission)	25	25	25

## Performance Assessment

The performance of the learners shall be evaluated into two parts. The learner's performance shall be assessed by Internal Assessment with 40 Marks and external assessment with 60 Marks by conducting semester end examination. The allocation of marks for the Internal Assessment and external assessment are as shown below:-

### Theory Examination

( a ) Internal assessment : 40 Marks.

Sr. No	Evaluation type	Marks
1	Two Assignments/Case study/Project	20
2	One class Test/Tutorial	10
3	Active participation in routine class instructional deliveries(case studies/ seminars//presentation)	05
4	Overall conduct as a responsible student, manners, skill in articulation, leadership qualities demonstrated through organizing co-curricular activities, etc.	05

( b ) External assessment : 60 Marks.

i) **Duration** – These examinations shall be of **2 Hours** duration.

ii) **Theory Question Paper Pattern:-**

- There shall be four questions each of 15 marks. Question No. one will be based on First Unit, Question No. two will be based on Second Unit, Question No. Three will be based on Third Unit and Question No. Four will be based on First, Second and Third Unit.
- All questions shall be compulsory with internal choice within the questions.  
(Each question will be of 20 to 23 marks with options.)
- Question may be subdivided into sub-questions a, b, c... and the allocation of marks depend on the weightage of the topic.

### Practical Examination

( a ) Internal Assessment : 40 Marks

Sr No	Evaluation type	Part A	Part B	Marks
1	One/Two best practicals depending on the practical group.	10	10	20
2	Journal	05	05	10
3	Viva	05	05	10

( b ) External Assessment : 60 Marks

Sr No	Evaluation type	Part A	Part B	Marks
1	Long Experiment	15	15	30
2	One/Two Short experiment	10	10	20
3	Viva	05	05	10

### Illustration 1: format for Theory Examination

Course	Assignment		Class Test	Presentation	Overall Performance	Int. Asst. 40	Sem End. 60	Total	Grades	Grade Points	Credit Points
	A1	A2									
	10	10	10	05	05	16/40	24/60	100			
USFS 101	8	8	7	3	3	29	30	59	B	5	2
USFS 102	6	7	8	3	4	28	45	73	O	7	2

### Illustration 2: Format for Practical Examination

Course	Practical										Total 100	Grades	Grade Points	Credit Points		
	P1		P2		J		Viva		Internal 40						External 60	
	A	B	A	B	A	B	A	B	A2 0	B2 0					A 30	B 30
	5	5	5	5	5	5	5	5	5	16/40	24/60	40/100				
USFS 1P1	4	4	4	4	5	5	3	3	32	40	72	O	7	2		
USFS 1P2	4	4	4	5	4	5	4	4	34	40	74	O	7	2		
USFS 1P3	4	4	5	5	4	4	4	4	34	50	84	O	7	2		