DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD

Syllabus

Of

B.Sc. (Forensic Science)
First Year

SEMESTER SYSTEM

FIRST/SECOND SEMESTER

Effective from Academic Year

2009-2010 onwards

B.Sc. First Year

Forensic Science

Semester I & II

OBJECTIVE

This course is planned to aquatint the student with

i) Use of basic sciences like Biology, Chemistry and Physics in detection of crime.

ii) Detection of crime with scientific aid.

iii) Use of Forensic Psychology in interrogation of suspects.

iv) Extracting information and data from computer storage media in cyber crimes.

v) To make aware of techno crimes and use of new emerging techniques in crime detection.

vi) Role of forensic science in crime detection

vii) To aware them about starting private detective agencies in future.

B.Sc. FORENSIC SCIENCE EXAMINATION

The degree of Bachelor of Forensic science shall be conferred on a candidate who satisfies the following conditions:

O. 838 He must have passed the 12th Science examination conducted by H.S.C. Examination Board of Government of Maharashtra or an examination recognized as equivalent there to.

R. 1741 :- Examination pattern for theory and practical

The course of study for the B.Sc. Forensic Science examination is divided in six semesters. Each semester will have six theory courses and each paper will be scored for 30 marks. There will be one practical course completed in a year and each course has 40 marks.

1. Theory examination of 2 Hrs Duration would be conducted after each semester.
2. Practical examination of 4 Hrs Duration would be conducted only after completion of even semester.

R 1742 :- **Structure of class and practical examination**

Maximum number of students in a class for theory shall be 50.

Maximum number of students in a batch for practical at the First year shall consist of 16 students.

R 1743 :-Standard of Passing and Award of Division

(a) A candidate who secures minimum 40% of the marks in each subject/paper will be declared to have passed the examination.

(b) A candidate who secures 50% or more but less than 60% of the aggregate marks prescribed for all the semester (i.e. six semesters) shall be awarded a second Division.

(c) A candidate who secures a minimum 50% mark in each paper and an aggregate of 60% and above marks on the whole shall be declared to have passed the examination in first class.

(d) A candidate who secures a minimum of 40% marks in each paper and an aggregate of 70% and above marks on the whole shall be declared to have passed the examinations with Distinctions.

(e) ATKT Rules :- A Candidate who has failed in not more than five theory papers (theory and practical I and II semester taken together) at the first year examination shall be allowed to keep terms for the second year. He shall be permitted to clear those papers before or along second year examination.

Teachers Qualification:-

As per the U.G.C/State Government Norms and Experts from Forensic Science field and Related Industry with Minimum 3 years of Experience .

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD

FORENSIC SCIENCE
Structure of the B.Sc. Course.

First Year

Paper	Title of Paper	Marks				Credit for semester		Credit for practical	Work load Period/Week	
		Semester		Practical	Total	I	II		Theory	Practical
		I	II							
I	Basic of Forensic Science	30	30	40	100	3	3	2	4	3
II	Basic of Forensic Chemistry	30	30	40	100	3	3	2	4	3
III	Basic of Forensic Physics	30	30	40	100	3	3	2	4	3
IV	Basic of Forensic Biology	30	30	40	100	3	3	2	4	3
V	Basic of Forensic Psychology	30	30	40	100	3	3	2	4	3
VI	Basic of Digital and Cyber Forensics	30	30	40	100	3	3	2	4	3

Second Year

Paper	Title of Paper	Marks				Credit for semester		Credit for practical	Work load Period/Week	
		Semester		Practical	Total	I	II		Theory	Practical
		I	II							
I	Advanced Forensic Science	30	30	40	100	3	3	2	4	3
II	Advanced Forensic Chemistry	30	30	40	100	3	3	2	4	3
III	Advanced Forensic Physics	30	30	40	100	3	3	2	4	3
IV	Advanced Forensic Biology	30	30	40	100	3	3	2	4	3
V	Advanced Forensic Psychology	30	30	40	100	3	3	2	4	3
VI	Advanced Digital and Cyber Forensic	30	30	40	100	3	3	2	4	3

Third Year

Paper	Title of Paper	Marks				Credit for semester		Credit for practical	Work load Period/Week	
		Semester		Practical	Total	I	II		Theory	Practical
		I	II							
I	Applied Forensic Chemistry	30	30	40	100	3	3	2.5	4	3
II	Applied Forensic Physics	30	30	40	100	3	3	2.5	4	3
III	Applied Forensic Biology	30	30	40	100	3	3	2.5	4	3
IV	Applied Forensic Psychology	30	30	40	100	3	3	2.5	4	3
V	Applied Digital and Cyber Forensic	30	30	40	100	3	3	2.5	4	3
VI	Project work in Forensic Science	--	--	--	100	--	--	2.5	4	3

Note:- for Theory paper 1 credit = 15 periods and for Practical paper 1 credit = 30 periods

B. Sc. I year (Semester –I)

FORENSIC SCIENCE
Paper I

Title:- Basic of Forensic Science
Semester:-I **Max Marks:-30**
3 credits (45 Periods)

Sr. No.	Topics	No. of Periods
Unit-I	Introduction to crime, Sociological aspect in society, Criminal behavior, Types of crime, Monitoring system in society, Crime scenario in India.	15
Unit-II	Detection of Crime, Different agencies involved in crime: Police, Medico-legal expert, Judicial officers	15
Unit-III	Scope and development of forensic science, Forensic science in India, Growth of Core laboratories, set up in country.	15
	Total	**45**
	Semester –II **Max. Marks:-30**	**3 credits (45 Periods)**
Unit-IV	Facilities provided in forensic Science laboratories for chemical, physical, biological psychological, digital and cyber crime detection and analysis	15
Unit-V	Detection of crime scene, Crime scene management, Role of forensic scientists, investigative officers, forensic doctors, fire brigade, judiciary	15
Unit-VI	Importance of physical evidence, collection of physical evidence in crimes like murder theft, extortion, explosion etc.	15

B. Sc. I year (Semester –I)

FORENSIC SCIENCE
Paper I

Practical: - Basic of Forensic Science

Max Marks:-40
2 credits (60 Periods)

Every candidate appearing for examination must produce a journal showing that he has completed **not less** than fifteen experiments during the semester. The journal must have been examined and signed periodically by a member of laboratory staff and certified at the end of semester by head of the Department.

Sr. No.	Topics	
1	Collection and Handling of toxicological samples	2 nos.
2.	Collection and Handling of Petroleum samples	2 nos.
3.	Collection and Handling of murder case samples	2 nos.
4.	Collection and Handling of toxicological samples	2 nos.
5.	Study of Bomb Blast scene	2 nos.
6.	Collection and Handling of firing crime scene samples	2 nos.
7.	Collection and Handling of Hit and run crime scene samples	2 nos.
8.	Collection and Handling of fire crime scene samples	2 nos.

B.Sc. I year (Semester –I)
FORENSIC SCIENCE
Paper II

Title:- Basic of Forensic Chemistry
Semester:-I **Max Marks:-30**
3 credits (45 Periods)

Sr. No.	Topics	No. of Periods
Unit-I	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 distillations, vacuum distillations. Conductance, conductometry, electro motive force, potentiometery	15
Unit-II	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 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.	15
Unit-III	Study of modern periodic table, long form of periodic table, periodic properties, atomic radii, ionization potential, electron affinity electro negativity, metallic characters, non metallic characters and magnetic properties, comparative study of S and P block elements.	15
	Semester-II **Max. Marks:-30**	**3 credits (45 Periods)**
Unit IV	Gravimetric analysis, volumetric analysis, chromatographic separation, the liquid chromatography, Electrophoresis, Thermal methods	15
Unit-V	Empirical and molecular formulae, hybridization, nature of chemical bonding, polarization, hydrogen bonding, Vander walls forces, IUPAC nomenclature of alkanes, alkenes, haloalkanes, alcohol ether aldenydes, ketones, carboxylic acids, nitro compounds, nitrites including cyclic analogues and also aromatic compounds, naphthalene, anthrones and phenanthrones, reactive intermediates and related reactions.	15
Unit-V	Heterocyclic chemistry: natural products, petroleum products, drugs, insecticides, pesticides etc introduction to dyes, paints, polymers.	15

B. Sc. I year (Semester –I)

FORENSIC SCIENCE

Paper II

Practical: - Basic of Forensic Chemistry

Max Marks:-40
2 credits (60 Periods)

Sr. no.	Name of experiment	
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.
5.	To determine strength of given acid	2 nos.
6.	Inorganic micro / semi micro qualitative analysis	2 nos.
7.	Identification of organic compound	3 nos.

Note:-Minimum 12 experiments should be conducted

B. Sc. I year (Semester –I)

FORENSIC SCIENCE
Paper III

Title:- Basic of Forensic physics
Semester:-I **Max Marks:-30**
3 credits (45 Periods)

Sr. No.	Topics	No. of Periods
Unit-I	Interpretation and application of Newton's laws of motion, pseudo forces, Elastic properties of matter, elastic constants and their interrelation. Fluid dynamics, Equation of continuity, Bernoulli's equation, stream line and turbulent flow, lines of flow in air foil, purseuille's equation	15
Unit-II	Velocity of sound, noise and sound intensity measurement, echo, reverberation, Sabine's formula, absorption coefficient, Acoustics of buildings and factors affecting acoustics of buildings, sound distribution in an auditorium, Introduction to ultrasonic, production of ultrasonic waves, application of ultrasonics.	15
Unit-III	Refraction through thin layers, thick lens, and lens combinations, Aberrations, interference in thin films, fringes in wedge shaped films, Newton's rings, simple table spectrophotometer, total internal reflection.	15
	Semester-II **Max. Marks:-30**	**3 credits (45 Periods)**
Unit- IV	Production of LASER, types of LASER, properties and application of LASER, optical fibers, propagation of light through optical fiber, Angle of acceptance and numerical aperture, losses solar cells.	15
Unit-V	Review of nuclear composition, nuclear properties and half life, Radioactive decay schemes, Applications of Radio Isotopes, Radiometric dating.	15
Unit-VI	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 application, Flip flops and counters.	15

B.Sc. I year (Semester –I)

FORENSIC SCIENCE

Paper-III

Practical: - Basic of Forensic Physics

Max Marks:-40
2 credits (60 Periods)

Sr. no.	Name of experiment	
1.	Fly wheel	
2.	Y by vibration	
3.	ŋ of posseuli Method	
4.	Spectrophotometer (determination of angle of prism A)	
5.	Refractive index of liquid by using LASER	
6.	Ultrasonic interferometer	
7.	Sound Intensity measurement	
8.	Laser Parameter	
9.	Solar cell	
10.	Combination of lenses	
11.	Newton's rings	
12.	Wedge shaped film	
13.	Frequency of AC mains	
14.	LDR characteristics	
15.	LCR series resonance	
16.	Bridge ratifer (to study load regulation)	
17.	Transistor (CE) characteristics	
18.	Dc morgan's theorems	
19.	Ex or gate, NAND and NOR as universal building blocks	

Note:- Minimum 12 experiments should be conducted.

B. Sc. I year (Semester –I)

FORENSIC SCIENCE

Paper IV

Title:- Basic of Forensic Biology

Semester:-I **Max Marks:-30**

3 credits (45 Periods)

Sr. No.	Topics	No. of Periods
Unit-I	Cell structure and function in prokaryotes and eukaryotes Properties, classification and function of carbohydrates, proteins, nucleic acids and lipids, Study of blood components and body fluids	15
Unit-II	Principles of taxonomy and system of classification of angio sperms (Bentham and Hooker) and Gymnosperms (chamberlain) Origin of life and Geological time scale. Mechanical and conducting tissue systems in plants	15
Unit-III	Acid, base, and buffers, Beer and Lambert's law, colorimetry and spectrophotometry, principles methods and application of chromatography and electrophoresis	15
	Semester-II **Max. Marks:-30**	**3 credits (45 Periods**
Unit-IV	Basics of microbiology and concept of pure culture technique microscopy principle and types of microscopy Broad classification of microorganisms	15
Unit-V	Immunity and immune system, Structure and Interaction of antigens and antibody, ELISA, western blot, and southern blot techniques.	15
Unit-VI	Genetic materials – structural organization and function. Mende lian principles, sex linkage and sex determination Recombinant DNA technology and its applications in health, and diseases.	15

B.Sc. I year (Semester –I)

FORENSIC SCIENCE
Paper-IV

Practical: - Basic of Forensic Biology

Max Marks:-40

Semester-I **2 credits (60 Periods)**

Sr. No.	Name of experiment	
1.	Qualitative analysis of sugar, proteins, lipids and nucleic acids	1
2.	Study of morphological types of red blood cells	1
3.	Study of plant-material (wild and cultivated from families, magnoniaceae, combretaceae, amaranthaceae, convolovalacea	2
4.	Study of conducting tissue, -xylem and phloem elements in angiosperms and Gymnosperms as seen in L.S. and R.C.S.	2
5.	Preparation of media and sterilization	1
6.	Antigen-antibody reaction (blood groupings)	1
7.	Study of body fluids	1
8.	Radial immune diffusion analysis	1
9.	Isolation of chromosomal DNA	1
10	Restriction digestion of DNA	1
11	Chromatography- separation of Amino acids, sugars, lipids using paper chromatography and thin layer chromatography, determination of RF values	2

Note:- Minimum 12 experiments should be conducted

B. Sc. I year (Semester –I)

FORENSIC SCIENCE
Paper V

Title: - Basic of Forensic Psychology
Semester:-I **Max Marks:-30**
3 credits (45 Periods)

Sr. No.	Topics	No. of Periods
Unit-I	THE SCIENCE OF PSYCHOLOGY Concepts of psychology, History of psychology, modern perspectives, types of psychological professionals psychology, The science and research methods, professional and ethical issues in psychology	15
Unit-II	BIOLOGICAL PRESPECTIVE Nerves Neurous: Building the network , central nervous system, peripheral nervous system, Human brain structure and function; sensory systems endocrine system.	15
Unit-III	CONSCIOUSNESS OF PERCEPTION Consciousness, Altered states of consciousness, attention and awareness, sensation and perception, problems in Attention and perception, assessment attention and perception.	15
	Semester-II **Max. Marks:-30**	**3 credits (45 Periods)**
Unit-IV	LEARNING AND MEMORY Learning process, Types of learning, models of memory, stages of memory, encoding, retention and retrieval, forgetting, brain and memory, problem in learning and memory.	15
Unit-V	COGNITION, MOTIVATION AND EMOTION Thinking, decision making and problem solving intelligence and language, motivation: Types of approaches Emotion, stress and coping.	15
Unit-VI	THEORIES OF PERSONALITY Understanding personality, type and Trait, theories of personality, psychoanalytic model, behavioristic model social cognitive model, Humanistic model, Biological model assessment of personality.	15

B. Sc. I year (Semester –I)

FORENSIC SCIENCE
Paper-V

Practical: - Basic of Forensic Psychology

Max Marks:-40
2 credits (60 Periods)

Sr. No.	Name of experiment	
1.	Minimum twelve experiments based on Unit I to Unit VI of theory paper will be taken	

B. Sc. I year (Semester –I)

FORENSIC SCIENCE
Paper VI

Title:- Basic of Digital and Cyber Forensics

Max Marks:-30

Semester:-I **3 credits (45 Periods)**

Sr. No.	Topics	No. of Periods
Unit-I	Basics of computers: Computer organization, components of computers – input output device, CPU, memory-RAM, ROM and external storage devices.	15
Unit-II	Data representations: integers, real, binary, octal hexadecimal & their conversions logic gates – Negation, OR, AND, X OR etc.	15
Unit-III	Introduction to operating system: Basics of operating system, memory structure, concurrency, scheduling, synchronization and memory management examples of operating systems-Windows and Linux	15
	Semester –II **Max Marks:-30**	**3 credits (45 Periods)**
Unit-IV	File system and networking:- Introduction to file system, FAT12, FAT16, FAT32, NTFS, EXT2, EXT3, HFS, Basics of networking- types of topologies, LAN, MAN, WAN.	15
Unit-V	Introduction to internet: World wide web, E-mails, chat, search engines, networking protocols, network security-threats, vulnerabilities, Access control, virus, Trojans etc, security plan and policies	15
Unit-VI	Cyber crime and digital evidence: what is cyber crime, types of cyber crimes, digital evidence, Digital Vs Physical Evidence, Nature of Digital Evidence, Precautions, while dealing with Digital Evidence.	15

B. Sc. I year (Semester –I)

FORENSIC SCIENCE
Paper-VI

Practical: - Basic of Digital and Cyber Forensics

Max Marks:-40
2 credits (60 Periods)

Sr. No.	Name of experiment	
1.	Finding results of different logic gates and their combinations	
2.	Working with windows file (creation, modification, deletion, attributes) folder (creation, nesting, attributes)	
3.	Working with Linux- file (Creation, modification, deletion, attributes), folder (creation, nesting attributes).	
4.	Working with external storage devices using windows- Reading and writing data on floppy, CD,DVD, USB thumbdrive	
5.	Working with external storage devices using Linux-reading writing data on floppy, CD, DVD, USB, thumb drive.	
6.	Understanding LAN-client/server, user creation, password protection.	
7.	Use of internet- visiting websites with given URL, searching in formation using search engine.	
8.	Use of E-mail, creating e-mail, sending and receiving e-mails with attachments.	
9.	Networking commands- like ping, IP config. etc, with various switches.	
10.	Tracing E-mail, finding senders IP address, of received email, tracing route of email received using tool available on internet, e.g. Visual Trace Route etc.	

List of Books

Paper: I

1) Henry Lee's Crime Scene handbook by Henry Lee

2) Forensic Biology by Shrikant H. Lade

3) Crime Scene processing and laboratory work book by Patric Jones.

4) Forensic Science: An introduction to scientific and investigative Techniques by Stuart H. James.

5) Criminalitics : An Introduction to forensic science, by Richard Saferstein.

6) Computer crime and computer forensic by A.K. Tiwari

7) Criminal profiling: An introduction to a behavioral evidence analysis by Brent E. Turvey.

8) Forensic Science in criminal investigation and trial by B.R. Sharma

9) Handbook of forensic psychology by Veerraghavan

10) Text book of medical purisprudence, forensic medicine and toxicology by C.K. Parikh.

11) The identification of firearms and forensic Ballistics by Barrard and Gerald.

12) Illustrated guide to crime scene investigation by Nicholas Petraco Hallsherman.

13) Techniques of crime scene investigation by Barry A.J. Fischer.

List of Books

Paper: II

1) Thermodynamics for chemistry by S. Glasstone

2) Principles of physical chemistry by Puri, Sharma and Pathania.

3) Advanced inorganic chemistry by Madan, Malik & Tuli.

4) Concise inorganic chemistry by J.D. Lee.

5) Organic Chemistry by Morison and Boyed

6) Heterocyclic chemistry by Gupta & Kumar Vol I & Vol II

7) Insecticides with modes of Action by I. Ishaya and D. Deghilee.

8) Natural products by S.U. Bhat.

9) Instrumental analysis by Skoog, Holler & Crouch.

10) Physical chemistry practicals J.B. Yadav.

11) Qualitative analysis by Vogel.

12) Essentials of Physical Chemistry, A. Bahl, B.S. Bahl and G.D. Tuli.

13) Instrumental methods of chemical analysis by G.R. Chatwal & S.K. Anand.

List of Books

Paper: IV

1) Principle of Biochemistry by Lehninger
2) Harper's Biochemistry by Murray
3) Biological spectroscopy by LaKowicz
4) Analytical Biochemistry by Holme
5) Enzyme Kinetics by Plownan
6) Biophysical chemistry by Upadhyay.
7) General microbiology by Powar-Dayinawala
8) DNA cloning by Clover
9) Plant Anatomy by Faha
10) Gymnospherm by Chamberlein

List of Books

Paper: V

1) Psychology: The University of Mumbai edition (New Delhi: Pearson edition) by Ciccorelli, S.K. and Meyor G.E.

2) Psychology: from science to Practice by Baron, R.A. Kolsher M J .

3) Understanding Psychology by Fieldman R.S.

4) Psychology: An introduction by Lahey B.B.

5) Introduction to Psychology by Kalat J.W.

6) Introduction to Psychology by King & Morgan

7) Forensic Psychology by Christopher Cronin.

8) History of Forensic Psychology by Bartol, C.R. and Bartol, A.M.

List of Books

Paper: VI

1) Cyber law in India by Farooq Ahmand- Pioneer Books

2) Information technology law and Practice by Vakul Sharma

3) The Indian cyber law by Suresh T. Vishwanathan

4) Guide to Cyber & E. commerce laws by P.M. Bukhi

5) Guide to Cyber laws by Rodney D. Ryder

6) The information technology Act 2008 Bare Act

7) Computer Forensic Principle and practice by Linda Volonino, Reynaldo, Anzaldua and Jana Godwin

8) First Responder's guide to computer forensics by Richard Nolan et.al.

9) Digital evidence and computer Forensics Crime

10) The regulation of cyber space by Andrew Murray, 2006 Routledge-Cavendish.

11) Scene of the cyber crime: Computer forensics Handbook by syngress.

12) List of websites for more information available on" http://www.gary/essler.net library/forensinus/html