

School of Studies in Forensic Science Vikram University, Ujjain (MP)

SYLLABUS

B. SC. (HONS.) FORENSIC SCIENCE FOUR YEARS (8 SEMESTER) CBCS (FOR UTD)

(As per the "Guidelines for Multiple Entry and Exit in Academic programmes offered in Higher Education Institutions" issued by UGC, New Delhi under National Education Policy 2020)
(Ordinance 14 A)

ORDINANCE FOR FOUR YEARS UNDERGRADUATE DEGREE (CBCS SEMESTER MODE)
(UNDER NEW EDUCATION POLICY 2020)

COURSE STRUCTURE

CHOICE BASED CREDIT SYSTEM (CBCS)

2021-2025 ONWARDS

PREAMBLE

The new course four years Undergraduate Degree (CBCS Semester Mode) has been prepared, as per the "Guidelines for Multiple Entry and Exit in Academic programmes offered in Higher Education Institutions" issued by UGC, New Delhi Under National Education Policy 2020 (Ordinance 14 A) and keeping in view, the unique requirements of B.Sc. (H) Forensic Science students.

Forensic Sciences includes essential components such as Forensic Pathology, Psychiatry, Psychology, Forensic Medicine and Odontology (Dentistry). It is chiefly laboratory-based science consisting of related elements of Chemistry, Biology, Toxicology, Ballistics, the Science of Fingerprinting, Questioned Documents and Impressions.

The discipline involves crime- scene investigation including fire and explosion scenes and drug laboratories. The subject applies scientific knowledge to aid in the administration of justice, and has no boundaries as far as subjects are concerned; it makes use of all faculties of science, such as Physics, Chemistry, Biology and Medicine, among others.

Technical skill can be developed through the curriculum. However, intelligence and aptitude required in solving a crime by viewing it from various angles needs to be developed by the student through practical exposure. Good academic skills with fundamental knowledge of various fields of science are necessary.

The field also demands an eye for detail, strong analytical skills, keen observation and scientific investigations. The ability to work with experts from other fields such as Psychology, Social Science, Non Clinical experts and Statistics is a must. Ideal candidates would be comfortable working both indoors and outdoors, besides possessing the following skill sets:

- Good hold on science subjects (especially Biology and Chemistry)
- An enquiring mind
- High degree of accuracy and attention to detail in one's nature of work
- Observation skills
- Patience
- Ability to work under pressure for long hours
- Team spirit

Objectives:

The Universal Declaration of Human Rights directs the member nations to create such conditions under which the ideals of free human beings, enjoying civil and political freedom from fear and want, can be achieved. The Constitution of India, through its various articles, strives to ensure security and safety of citizens in accordance with the principles of Universal Declaration of Human Rights. However, crime is a violation of these principles. In a country like India, where majority of population is uneducated, social set up is heterogeneous, public- police relations are not very cordial, poverty is rampant and unemployment widespread, it is not surprising that crime rate is increasing exponentially. If we have to create conditions conducive to harmonious development, we must mitigate the crime rate. This can best be achieved by relying on the support of forensic science system. Unfortunately, in our country, forensic science is not viewed as a core investigative skill in crime detection. In fact, there is a lack of understanding of the forensic process itself. It is for this reason that less than 10% of the police

cases are, at present, being referred for forensic examination. Less than 5% are solved by the application of forensic science. The rest are solved by third degree method – a practice which the human rights organizations will not allow in days to come.

In majority of serious crime cases, hi-tech measures are being adopted by perpetrators of crime. The counter measures have to be more sophisticated to surpass them. This calls for strengthening the foundations of forensic science at national level. It is with this aim that we wish to initiate a B.Sc. (Hons) Course in Forensic Science.

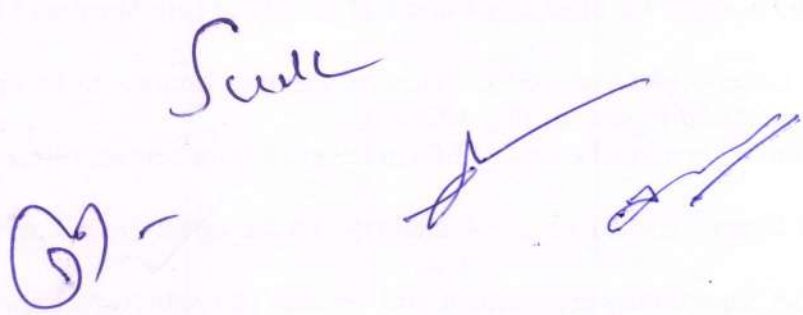
The following are the objectives of this course.

1. To emphasize the importance of scientific methods in crime detection.
2. To disseminate information on the advancements in the field of forensic science.
3. To highlight the importance of forensic science for perseverance of the society.
4. To review the steps necessary for achieving highest excellence in forensic science.
5. To generate talented human resource, commensuration with latest requirements of forensic science.
6. To provide a platform for students and forensic scientists to exchange views, chalk-out collaborative programs and work in a holistic manner for the advancement of forensic science.

Outcome of the Programme:

B.Sc. in Forensic Sciences is a 4-year (Eight Semesters) under graduate course which involves the application of scientific knowledge to the investigation of crimes. Professionals in this discipline apply their knowledge of science to analyze the evidence found at a crime scene. An analysis could involve anything from an object at the crime scene, to soil, blood stains, saliva, body fluids, bones, fingerprints, DNA profiling, recovering data from computers, researching new techniques/ technology etc. B.Sc. Forensic Sciences Syllabus includes essential components such as Forensic Pathology, Psychiatry, Psychology, Forensic Medicine and Odontology (Dentistry).

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VIKRAM UNIVERSITY, UJJAIN MP**B. Sc. (Hons) FOUR YEARS (EIGHT SEMESTERS), CBCS SCHEME (NEP-2020****SUBJECT-FORENSIC SCIENCE**

The Students will get:

1. Certificate after completion of 1st Year (40 credits)
2. Diploma after completion of 2nd Years (80 credits)
3. B. Sc.(Hons.) Degree after completion of 3rd Year (120 credits)
4. B. Sc.(Hons.) with Research degree after completion of 4th Year (160 credits)
- 5.

B.SC. (HONS) FIRST YEAR - SEMESTER- Ist

S.N.	Code	Name of Course	Type of Course	Distribution of Credits			Max. Marks		Total
				T	P	Total	Internal Max.	External Max.	
1	FSB 101	Introduction to Forensic Science	*Core-1 Major-I	3	-	3	40	60	100
2	FSB 102	Crime and Society	Core-2 Major-II	2	-	2	30	45=75	100
		Practical-I	-	-	1	1	10	15=25	
3	FSB 103	Chemistry	Minor-1	3	-	3	40	60	100
4	FSB 104	Food Adulteration	GEC-1	3	-	3	40	60	100
5	FSB 105	Medical diagnostics	**SEC -1	4	-	4	40	60	100
6	FSB 106	Hindi	AEC-1	2	-	2	20	30	50
7	FSB 107	English	AEC-2	2	-	2	20	30	50
Total Credits and Marks				19	1	20			600

Note:- A student has to take two major courses; one minor from any other department of same faculty, one minor from any department of any faculty, One Ability Enhancement Course (AEC) in Hindi and English, and One Vocational/Skill Enhancement Course. Student can choose MOOC or Online Course of equal credits in all the above categories.

*For the students of other department

Categories: Group Code

1. Core Courses (Two core courses of 3 credits each)
Major-I (3 credits)
Major-II (3 credits)
2. Minor-I (3 credits) : to be opted for other Department of faculty of Life Sciences Student and Can opt MOOC
3. Minor-II (3 credits) : Generic Electives (GE): (Generic Elective Course to be opted from other faculty (Department of different faculty/ MOOC)
4. Skill Enhancement Course/Vocational course (SEC) to be opted from courses offered by University/ MOOC
5. Ability Enhancement Course (AEC) (2+2 =4 credits)- To be opted from courses offered by University
6. Field Project/Internship/ Community engagement and services (4 credits)- Not applicable in First Semester and Applicable in Second Semester.

B.SC. (HONS) FIRST YEAR - SEMESTER- IInd CBCS FORENSIC SCIENCE

S.N.	Code	Name of Course	Type of Course	Distribution of Credits			Max. Marks		Total
				T	P	Total	Internal Max.	External Max.	
1	FSB 201	Criminal Law	*Core-3 Major-III	3	-	3	40	60	100
2	FSB 202	Forensic Psychology	Core-4 Major-IV	2	-	2	30	45=75	100
		Practical-I	-	-	1	1	10	15=25	
3	FSB 203	Physics	Minor-2	3	-	3	40	60	100
4	FSB 204	Intellectual Property Rights	GEC-2	3	-	3	40	60	100
5	FSB 205	Field project/Internship/Community engagement and Services		4	-	4	40	60	100
6	FSB 206	Environment Education	AEC-3	2	-	2	20	30	50
7	FSB 207	Yoga and Meditation	AEC-4	2	-	2	20	30	50
Total Credits and Marks				19	1	20			600

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VIKRAM UNIVERSITY, UJJAIN MP
B. Sc. (Hons) FOUR YEARS (EIGHT SEMESTERS), CBCS SCHEME (NEP-2020)
SUBJECT-FORENSIC SCIENCE

B.SC. (HONS) SECOND YEARS - SEMESTER- IIIrd CBCS FORENSIC SCIENCE

S.N.	Code	Name of Course	Type of Course	Distribution of Credits			Max. Marks		Total
				T	P	Total	Internal Max.	External Max.	
1	FSB 301	Police Science and Criminal Justice System	*Core-5 Major-V	3	-	3	40	60	100
2	FSB 302	Crime Scene Management	Core-6 Major- VI	2	-	2	30	45=75	100
		Practical-I	-	-	1	1	10	15=25	
3	FSB 303	Biology	Minor-3	3	-	3	40	60	100
4	FSB 304	Food Additives	GEC-3	3	-	3	40	60	100
5	FSB 305	Nursery and Gardening	**SEC -2	4	-	4	40	60	100
6	FSB 305		AEC-5	2	-	2	20	30	50
7	FSB 306		AEC-6	2	-	2	20	30	50
Total Credits and Marks				19	1	20			600

Note:- A student has to take two major courses; one minor from any other department of same faculty, one minor from any department of any faculty, One Ability Enhancement Course (AEC) in Hindi and English, and One Vocational/Skill Enhancement Course. Student can choose MOOC or Online Course of equal credits in all the above categories.

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Categories: Group Code

1. Core Courses (Two core courses of 3 credits each)
 - a. Major-I (3 credits)
 - b. Major-II (3 credits)
2. Minor-I (3 credits) : to be opted for other Department of faculty of Life Sciences Student and can opt MOOC
3. Minor-II (3 credits) : Generic Electives (GE): (Generic Elective Course to be opted from other faculty (Department of different faculty/ MOOC)
4. Skill Enhancement Course/Vocational course (SEC) to be opted from courses offered by University/ MOOC
5. Ability Enhancement Course (AEC) (2+2 =4 credits)- To be opted from courses offered by University
6. Field Project/Internship/ Community engagement and services (4 credits) - Not applicable in First Semester and Applicable in Second Semester.

B.SC. (HONS) SECOND YEARS -SEMESTER- IVTH CBCS FORENSIC SCIENCE

S.N.	Code	Name of Course	Type of Course	Distribution of Credits			Max. Marks		Total
				T	P	Total	Internal Max.	External Max.	
1	FSB 401	Introduction to Biometry	*Core-7 Major-VII	3	-	3	40	60	100
2	FSB 402	Economic Offence	Core-8 Major-VIII	2	-	2	30	45=75	100
		Practical-I	-	-	1	1	10	15=25	
3	FSB 403	Anthropology	Minor-4	3	-	3	40	60	100
4	FSB 404	Herbal Technology	GEC-4	3	-	3	40	60	100
5	FSB 405	Field project/Internship/Community engagement and Services		4	-	4	40	60	100
6	FSB 407		AEC-7	2	-	2	20	30	50
7	FSB 408		AEC-8	2	-	2	20	30	50
Total Credits and Marks				19	1	20			600

Note:- A student has to take two major courses; one minor from any other department of same faculty, one minor from any department of any faculty, One Ability Enhancement Course (AEC) in Hindi and English, and One Vocational/Skill Enhancement Course. Student can choose MOOC or Online Course of equal credits in all the above categories.

*For the students of other department

Categories: Group Code

1. Core Courses (Two core courses of 3 credits each)
 - a. Major-I (3 credits)
 - b. Major-II (3 credits)
2. Minor-I (3 credits) : to be opted for other Department of faculty of Life Sciences Student and can opt MOOC
3. Minor-II (3 credits) : Generic Electives (GE): (Generic Elective Course to be opted from other faculty (Department of different faculty/ MOOC)
4. Skill Enhancement Course/Vocational course (SEC) to be opted from courses offered by University/ MOOC
5. Ability Enhancement Course (AEC) (2+2 =4 credits)- To be opted from courses offered by University
6. Field Project/Internship/ Community engagement and services (4 credits)- Not applicable in First Semester and Applicable in Second Semester.

**SUBJECT: FORENSIC SCIENCE (HONS) FIRST YEAR, CBCS SCHEME
SEMESTER-I****COURSE CODE NO.: FSB 101: INTROCUCTION TO FORENSIC SCIENCE (*CORE-1 Major - I)****Course Objective:**

1. The significance of forensic science to human society.
2. The fundamental principles and functions of forensic science.
3. The divisions in a forensic science laboratory.
4. The working of the forensic establishments in India and abroad.

Course Outcome:

After studying this course the students will know

1. Tools and techniques used in forensic science
2. Qualifications, duties and code of conduct of forensic scientists.

Unit-I Basic of Forensic Science

1. An overview: History, Development & Scope of Forensic Science in India and Abroad.
2. Principles of Forensic Science.
3. Ethics of Forensic Scientist
4. Duties of Forensic Scientist.

Unit-II Domains of Forensic Science

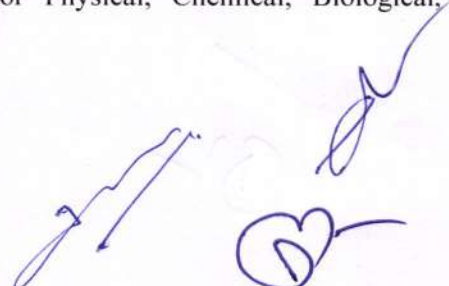
1. Various Domains of Forensic Science.
2. Forensic Photography: Crime scene and Laboratory Photography.
3. Introduction: Definition, Types of Physicals Evidences, General Idea of Examination involved in-
 - a) Forensic Biology, Forensic Toxicology.
 - b) Forensic Physics, Forensic Chemistry.
 - c) Forensic Ballistics, Forensic Psychology.
 - d) Fingerprints and Questioned Documents.
 - e) Cyber Forensics.

Unit-III Crime & Criminology

1. Definition and History of Crime.
2. Types of Crime and its Causes- Property crimes, Public order crimes and violent crimes.
3. White Collar Crime- Definition, History and Classification.
4. Definition, Scope and School of Criminology (Pre, Neo, Clinical & Positive Schools).
5. Administrative steps towards crime prevention and Present scenario of Crime in India.

Unit-IV Forensic Science Laboratories

1. State Forensic Science laboratories.
2. Central Forensic Science Laboratories.
3. Facilities provided in Forensic Science Laboratories For Physical, Chemical, Biological, Psychological, Digital and Cyber Crime.
4. Role of Forensic Scientist at scene of crime and laboratory.



Unit-V Experts and Institutions

1. Experts as per Indian Evidence Act.
2. Experts (Government and Private) in court and their function.
3. Central and State Government Expert, Medicolegal Expert.
4. Central and State Institution of Forensic Science.

Suggested Readings:

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).
4. W.G. Eckert and R.K. Wright in Introduction to Forensic Sciences, 2nd Edition, W.G. Eckert (ED.), CRC Press, Boca Raton (1997).
5. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey (2004).
6. W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's Techniques of Crime Scene Investigation, CRC Press, Boca Raton (2013).

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COURSE CODE NO.: FSB 102: CRIME AND SOCIETY (*CORE-2 Major-II)**Course Objective:**

To obtain knowledge about criminology i.e. crime and its causes, its impact on society and basic elements of justice delivery system

Course Outcome:

After studying this paper the students will know –

1. The importance of criminology.
2. The causes of criminal behavior.
3. The significance of criminal profiling to mitigate crime.
4. The consequences of crime in society.
5. The elements of criminal justice system.

Unit I: Basics of Criminology

Definition, aims and scope, Theories of criminal behavior – classical, positivist, sociological, criminal anthropology.

Unit II:

Criminal profiling, Understanding modus operandi, Investigative strategy, Role of media

Unit III: 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

Unit IV:

Victimology, Juvenile delinquency, Social change and crime, Psychological Disorders and Criminality, Situational crime prevention, Human rights and criminal justice system in India

Unit 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

Suggested Readings:

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).
3. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey (2004).
4. J.L. Jackson and E. Barkley, Offender Profiling: Theory, Research and Practice, Wiley, Chichester (1997).
5. R. Gupta, Sexual Harassment at Workplace, LexisNexis, Gurgaon (2014).

COURSE CODE NO.: FSB 103: CHEMISTRY (MINOR-1)**Course Objective:**

Development of analytical problem solving skills in the major areas of chemical study, Understanding of the underlying theoretical principles that explain chemical behavior at the atomic, molecular, and macroscopic levels

Course Outcome:

1. Be able to demonstrate problem solving and critical thinking skills and also discuss forensic chemical principles
2. Be able to apply modern methods of forensic analysis in a laboratory setting
3. Be able to design appropriate experiments to achieve results in a safe and environmentally sensitive manner

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, potentiometry

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.

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;

Unit IV:

Gravimetric analysis, volumetric analysis, chromatographic separation, the liquid chromatography, Electrophoresis, Thermal methods

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 aldehydes, ketones, carboxylic acids, nitro compounds, nitrites including cyclic analogues and also aromatic compounds, naphthalene, anthrones and phenanthrones, reactive intermediates and related reactions.




Suggested Readings:

1. Handbook of Chemistry – R P Singh



Stull

2. Basic concept of Chemistry – Peegassus
3. Basic organo metallic Chemistry – Anil elais
4. Basics concepts of Analytical Chemistry – S M Khopkar


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COURSE CODE NO.: FSB 104: FOOD ADULTERATION (GEC-1)**Course Objective:**

1. To provide theoretical basis of adulteration test of food products and learn adulteration testing methods of food through hands-on experience.
2. To provide hands-on training using the latest analysis techniques, instruments and methods to analyzed food samples

Course Outcome:

1. To introduce students to food safety and standardization act and quality control offoods.
2. To educate about common food adulterants and their detection.
3. To impart knowledge in the legislative aspects of adulteration.
4. To educate about standards and composition of foods and role of consumer

Unit – I

Food adulteration – Introduction of Food adulteration, definition; new adulterants in foods, Historical Food legislation in India; Central food laboratory, Municipal laboratories, Export inspection council laboratory, Central grain analysis laboratory, standards of weights and measures act, solvent extracted oil deoiled meal and edible flour order, export and quality control and inspection act and other acts and orders.

Unit – II

Food Safety and Standards Act 2006. vertical standards Vs horizontal standards
Food safety officer; powers, procedures, role of food analyst most important international laws; Codex alimentarius, FDA, USDA, FAO and WHO
Other International regulatory bodies like EFSA –European food safety authority Food standards of Australia and Newzealand , Soudi Arabia food regulations

Unit– III

Consumer protection; role of voluntary agencies such as, Agmark, I.S.I. Quality control laboratories of companies ,private testing laboratories, Quality control laboratories of consumer co-operatives,.

Unit-IV

Standardization of Foods; Definition, Standards of Quality, for cereals, starchy foods, spices and condiments, sweetening agents, meat and meat products, vinegar, sugar and confectionary, beverages-alcoholic and non alcoholic , carbonated water etc., Milk and milk products , oils and fats , Canned foods , fruits and vegetables products.

Unit-V

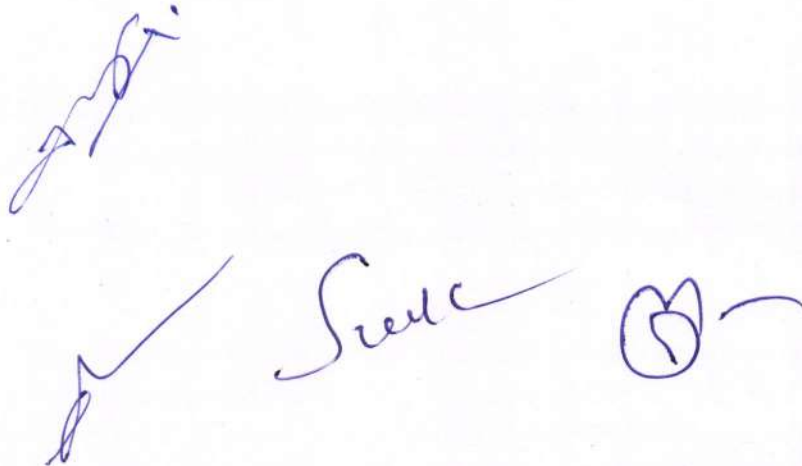
Food additives – classification, nature and characteristics and use of additives in foods such as antioxidants, chelating agents, coloring agents, curing agents, emulsions, flavors and flavor enhancers, flour improvers, humectants and anti caking agents, nutrient supplements, non-nutritive sweeteners, pH control agents, stabilizers and thickeners. Raising agents – types and their role in food processing,., artificial colors Artificial flavors

Consumer education, consumer's problems rights and responsibilities, copra 1986, tips for wise

purchasing, redressal measures how to give complaints and proforma of complaints

Suggesting Readings:

1. A first course in Food Analysis – A.Y. Sathe, New Age International (P) Ltd., 1999.
2. Food Safety, case studies – Ramesh. V. Bhat, NIN, 1992.



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COURSE CODE: FSB 105: MEDICAL DIAGNOSTICS (VOCATIONAL COURSE) (SEC-1)****Course Objective:**

The major objective of this paper is to give idea about detection of pathogens in clinical samples and different diagnostics methods used in pathological laboratories.

Course Learning Outcome:

Upon successful completion of the course, the student:-

1. Understand the importance and challenges in detecting pathogens.
2. Learn about the collection and transport of clinical samples.
3. Learn about different diagnostic methods.

Unit-I:

Types of Diseases- Bacterial (Tuberculosis, Cholera and Typhoid), Viral (Influenza, Herpes and HIV), Fungal (Aspergillosis, Blastomycosis and Candidiasis) and Protozoan (Malaria, Balantidiasis and Amoebiasis), Pathogenesis,

Unit-II:

Collection of clinical samples (Oral cavity, throat, Urine, Skin, Blood, CSF and feces) and their precautions
Methods of transport of clinical samples to laboratory and storage, Laboratory diagnosis of clinical samples

Unit-III:

Types of Culture Media, Preparation and use of culture media- PDA, SDA, Nutrient Agar, Blood Agar, Mac Conkey Agar, L-J media, and Differential media, selective and Enrichment media.
Cultivation of clinical sample, Identification of Pathogenic Microorganisms by Gram's staining, Acid fast staining, Giemsa staining, Lacto-phenol Cotton Blue Staining,

Unit IV:

Biochemical methods- IMViC, TSIA, Oxides, catalase, Pathogenicity test: Blood Agar, Coagulase test, Fibrinolyses,, Serological Methods- Agglutination, ELISA, SEM, PCR, Electrophoresis. Widal test, Khan's test, Blood grouping,


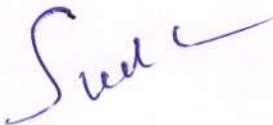

Unit V:

Antibiotic sensitivity test for Bacteria and Fungi, Determination of resistance/Sensitivity of bacteria using antibiotics disc diffusion method, Determination of MIC and LD50.

Reference Books:

- 1- Topley and Wilson's Microbiology and Microbial infections. 8 volumes 2005 10th edition
- 2- Color Atlas and Textbook of Diagnostic Microbiology: Elmer W Koneman -2006, 6 th edition
- 3- Mandell, Douglas and Bennett's Principles and Practice of Infectious Diseases-2004, 6th edition
- 4- Microbiology and Clinical Practice: Shanson-1999, 3rd edition
- 5- Immunology: Janis Kuby- 2003.
- 6- Basic Clinical Immunology. Fudenburg, Stites, Caldwell, Weils.
- 7- Control of Hospital Infection- A practical handbook (most recent edition)-2000,4th edition
- 8- Bailey and Scott's Diagnostic Microbiology.

- 9- Text book of Parasitology - Chatterjee K.D.
- 10- Microbiology in Clinical Practice Shanson D.C.
- 11- Text book of Parasitology – P.C.Beaver
- 12- Text book of microbiology –Ananthanarayan
- 13- Text book of microbiology – P. chakraborty
- 14- Text book of Parasitology – Damale & Karyakante
- 15- Mackie & MacCartney's Practical microbiology Further Reading
- 16- Mycology - Rippons
- 17- Essentials of Immunology- Roitt
- 18- Virology- Clinical Virology by Rich
- 19- Gradwohl's Clinical Laboratory Methods and Diagnosis.
- 20- Biochemical tests for the Identification of Medical Bacteria- MacFaddin JF
- 21- Manual of Clinical Microbiology- ASM press

COURSE CODE NO.: FSB 106: HINDI (AEC-1)

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COURSE CODE NO.: FSB 107: ENGLISH (AEC-2)

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**SUBJECT: FORENSIC SCIENCE (HONS) FIRST YEAR, CBCS SCHEME
SEMESTER-II**

COURSE CODE NO.: FSB 201: CRIMINAL LAW (*CORE-3 Major III)

Course Objective:

This course is a study of the nature of criminal law; philosophical and historical development; major definitions and concepts; classification of crime; elements of crimes and penalties using Texas statutes as illustrations; and criminal responsibility.

Course Outcome:

After studying this paper the students will know –

1. Elements of Criminal Procedure Code related to forensic science.
2. Acts and provisions of the Constitution of India related to forensic science.
3. Acts governing socio-economic crimes.
4. Acts governing environmental crimes.

Unit I: Law to Combat Crime

Classification – civil, criminal cases, Essential elements of criminal law, Constitution and hierarchy of criminal courts, Criminal Procedure Code, Cognizable and non-cognizable offences, Bailable and non-bailable offences, Sentences which the court of Chief Judicial Magistrate may pass.

Unit II: Summary trials – Section 260(2)

Judgments 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

Unit III:

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.

Unit IV: Constitution of India

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

Unit 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

Suggested Readings

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).

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).

Sum 

COURSE CODE NO.: FSB 202: FORENSIC PSYCHOLOGY (CORE-4 Major IV)**Course Objective:**

1. Students will identify the major mental illnesses encountered in forensic psychology and apply this knowledge to case analyses.
2. Students will learn basic case and statutory law related to forensic psychology.
3. Students will be able to identify causes of criminality.
4. Student will learn criminal and civil applications of forensic psychology.

Course Outcome:

After studying this paper the students will know –

5. The overview of forensic psychology and its applications.
6. The legal aspects of forensic psychology.
7. The significance of criminal profiling.
8. The importance of psychological assessment in gauging criminal behavior.
9. The tools and techniques required for detection of deception.
10. The critical assessment of advanced forensic techniques like polygraphy, narco analysis and brain electrical oscillation signatures.

Unit I: Basics of Forensic Psychology

Definition and fundamental concepts of forensic psychology and forensic psychiatry, Psychology and law, Ethical issues in forensic psychology,

Unit II:

Assessment of mental competency, Mental disorders and forensic psychology, Psychology of evidence – eyewitness testimony, confession evidence, Criminal profiling, Psychology in the courtroom, with special reference to Section 84 IPC.

Unit III: Psychology and Criminal Behavior

Psychopathology and personality disorder, Psychological assessment and its importance, Serial murderers, Psychology of terrorism, Biological factors and crime – social learning theories, psycho-social factors, abuse.

Unit IV

Juvenile delinquency – theories of offending (social cognition, moral reasoning), Child abuse (physical, sexual, emotional), juvenile sex offenders, legal controversies.

Unit V: Detection of Deception

Tools for detection of deception – interviews, non-verbal detection, statement analysis, voice stress analyzer, hypnosis.

Polygraphy—operational and question formulation techniques, ethical and legal aspects, the guilty knowledge test.


Narco analysis and brain electrical oscillation signatures – principle and theory, ethical and legal issues

Suggested Readings

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).
 4. J. Niehaus, Investigative Forensic Hypnosis, CRC Press, Boca Raton(1999).



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COURSE CODE NO.: FSB 203: PHYSICS (Minor-2)**Course Objective:**

- 1.To develop strong student competencies in Physics and its applications in a technology-rich, interactive environment.
- 2.To develop strong student skills in the research, analysis and interpretation of complex information
- 3.To prepare the students to successfully compete for employment in Electronics, Manufacturing and Teaching industry.

Course Outcome:

1. Students will demonstrate skills in scientific inquiry, problem solving and laboratory techniques
2. Students will demonstrate understanding of places in the physical universe
3. Students demonstrate a broad base of knowledge in physics.
4. Students will demonstrate understanding of laws of nature.

Unit I:

Mechanics: Force, conservative and non conservative force, rotational motion of inertia, expression of M.I. of regular shaped bodies; Kepler's law; Acceleration due to gravity. Simple Harmonic motion and compound pendulum; Newton's law of motion;

Unit II:

Thermal Physics: concept of temperature, ideal gas equation and its law. Vander Waal's equation, reversible and irreversible process, Zeroth law, first, second and third law of thermodynamics; Carnot's cycle;

Unit III

Electromagnetism: Coulomb's law; Electric field, Magnetic field due to current, Gauss's theorem and its application, Ampere's law, Kirchhoff's law and their applications; Wheat-stone bridge and its sensitivity; Rectifiers, Amplifiers, semiconductor and its type of junction; Paramagnetic, diamagnetic, ferromagnetic materials and properties;

Unit IV

Waves and Oscillations: Resonance and its application, Doppler Effect, Photo electric effect, Electron microscope. Optics: Combination of lens and prism, direct vision spectroscope. Diffraction –the phenomenon, diffraction at a straight edge, slit and wire, Resolving power of a telescope an eye, wave front, polarization of light and Polarimetry, Optical instrument (eg. Eye, Camera, Microscope, Telescope).

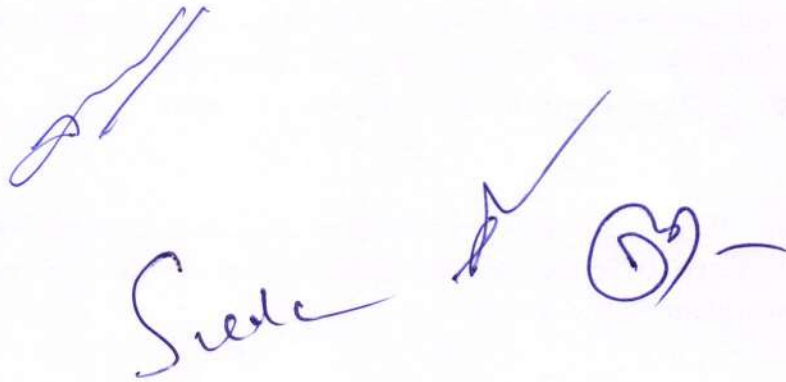
Unit V

Atomic Physics: Black body radiation, Planck's theory, De Broglie waves; Heisenberg's Uncertainty principle, Rutherford's atomic model; Bohr's atomic model of Hydrogen atom and atomic spectra, Schrodinger wave equation; Moseley's experiment on X-rays, diffraction of X-rays and its application, Radioactivity.

Suggestive Readings:

- 1.Basic physics: a self teaching guide – II edition – Carl F Kuhn

2. Handbook of Physics –
3. New simplified physics – S L Arora
4. A Master Resource book in Physics – D B Singh



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COURSE CODE NO.: FSB 204: INTELLECTUAL PROPERTY RIGHTS (GEC-2)**Course Objective:**

1. To introduce fundamental aspects of Intellectual property Rights to students who are going to play a major role in development and management of innovative projects in industries.
2. To disseminate knowledge on patents, patent regime in India and abroad and registration aspects
3. To disseminate knowledge on copyrights and its related rights and registration aspects
4. To disseminate knowledge on trademarks and registration aspects
5. To disseminate knowledge on Design, Geographical Indication (GI), Plant Variety and Layout Design Protection and their registration aspects
6. To aware about current trends in IPR and Govt. steps in fostering IPR

Course Outcome:

1. The students once they complete their academic projects, shall get an adequate knowledge on patent and copyright for their innovative research works
2. During their research career, information in patent documents provides useful insight on novelty of their idea from state-of-the art search. This provide further way for developing their idea or innovations
3. Pave the way for the students to catch up Intellectual Property (IP) as an career option: R&D IP Counsel , Government Jobs – Patent Examiner, Private Jobs, Patent agent Patent agent and Trademark agent, Entrepreneur

Unit I: Introduction to intellectual property right (IPR):

Concept and kinds; Economic importance; IPR in India and world: Genesis and scope, some important examples. PR and WTO (TRIPS, WIPO).

Unit II: Patents:

Objectives, Rights, Patent Act 1970 and its amendments; Procedure of obtaining patents; working of patents; Infringement

Copyright: Introduction, Works Infringement. protected under copyright law, Rights, Transfer

Trademarks: Objectives, Types, Rights, Protection of goodwill, Infringement, Passing off, Defenses', Domain name.

Unit III: Geographical Indications:

Objectives, Justification, International Position, Multilateral Treaties, National Level; Indian Position;

Protection of Traditional Knowledge: Objective, Concept of Traditional Knowledge, Holders, Issues concerning, Bio-Prospecting and Bio-Piracy, Alternative ways, Protect ability, need for a Sui-Generis regime, Traditional Knowledge on the International Arena, at WTO, at National level, Traditional Knowledge Digital Library.

Unit IV: Industrial Designs:

Objectives, Rights, Assignments, Infringements, Defenses' of Design Infringement

Protection of Plant Varieties: Plant Varieties Protection-Objectives, Justification, International Position, Plant varieties protection in India; Rights of farmers, Breeders and Researchers; National gene bank, Benefit sharing; Protection of Plant Varieties and Farmers' Rights Act, 2001;

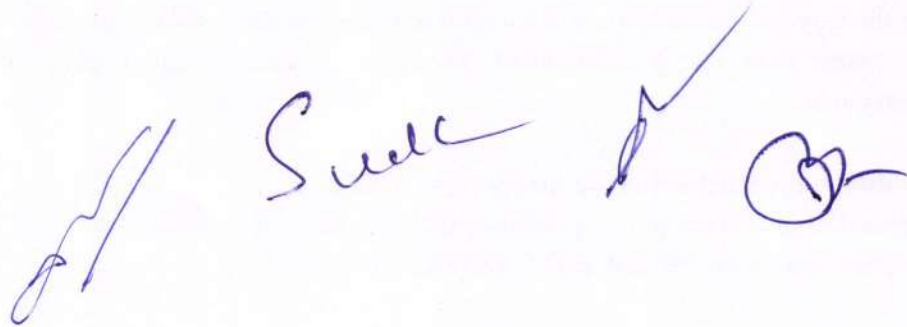
Unit V: Information Technology Related Intellectual Property Rights:

Computer Software and Intellectual Property, Database and Data Protection, Protection of Semiconductor chips, Domain Name Protection Semi-

Biotechnology and Intellectual Property Rights: Patenting Biotech Inventions: Objective, Applications, Concept of Novelty, Concept of inventive step, Microorganisms, Moral Issues in Patenting Biotechnological inventions.

Suggested Readings

- 1) N.S. Gopalakrishnan & T.G. Agitha, (2009) Principles of Intellectual Property Eastern Book Company, Lucknow.
- 2) Kerly's Law of Trade Marks and Trade Names (14th Edition) Thomson, Sweet & Maxweel.
- 3) Ajit Parulekar and Sarita D' Souza, (2006) Indian Patents Law – Legal & Business Implications; Macmillan India Ltd.
- 4) B.L.Wadehra (2000) Law Relating to Patents, Trade Marks, Copyright, Designs & Geographical Indications; Universal law Publishing Pvt. Ltd., India.
- 5) P. Narayanan (2010) Law of Copyright and Industrial Designs; Eastern law House, Delhi.



COURSE CODE NO.: FSB 205: (AEC-3)

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COURSE CODE NO.: FSB 206: (AEC-4)

Swati   

**COURSE CODE NO.: FSB 207: FIELD PROJECT/INTERNSHIP/
COMMUNITY ENGAGEMENT AND SERVICES**

Course Objective:

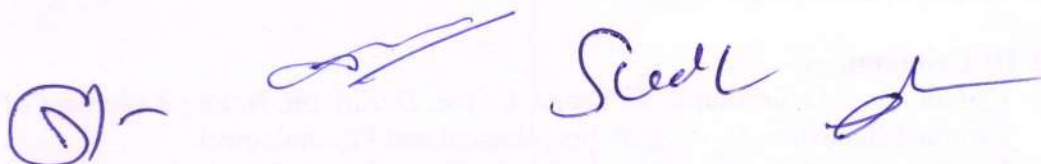
1. Field project/Internships/Community engagements are designed to expand the depth and breadth of academic learning for you in your particular areas of study.
2. It is an opportunity for you to receive experience in applying theories learned in the classroom to specific experiences in the community and work world.
3. An internship can also heighten your awareness of community issues, motivate you to create opportunities, embrace new ideas, and give direction to positive change.
4. A successful internship can give you valuable information in making decisions about the direction of future studies or employment.
5. An internship is an opportunity to not only use and develop industry-related knowledge and skills, but also to enhance some of the skills that are transferable to any professional work setting.
6. This internship may be your first introduction to the world of work, or maybe you have been exposed to professionalism many times before.
7. No matter where your skills and understanding of professionalism lie, your internship is a chance to develop them even further.

Course Outcome:

By the end of the internship, our hope is that you will have:

- 1- Linked academic theory to practice in your discipline;
- 2- Applied your knowledge, skills, experience to a work environment;
- 3- Acquired new learning through challenging and meaningful activities;
- 4- Reflected on the content and process of the learning experience;
- 5- Advocated for your own learning in alignment with internship goals;
- 6- Demonstrated professional skills in the workplace;
- 7- Built and maintained positive professional relationships;
- 8- Demonstrated awareness of community and/or organizational issues;
- 9- Identified, clarified and/or confirmed professional direction as it relates to your academic studies and future career path;
- 10- Developed self-understanding, self-discipline, maturity and confidence;
- 11- Developed strong networking/mentoring relationships.

The students will be expected to undergo training/internship in forensic laboratories /Fields to get hands- on experience in the field of investigating a crime scene and to develop the analytical skills required for a forensic scientist. The report about the training/internship will be based on the work undertaken in Forensic Science Laboratory and the same will be evaluated. The training/internship should be undertaken during the vacation of



B. Sc. (Hons) FOUR YEARS (EIGHT SEMESTERS), CBCS SCHEME (NEP-2020)
SUBJECT-FORENSIC SCIENCE
SECOND YEARS: SEMESTER- III
COURSE CODE NO.: FSB: 301: POLICE SCIENCE AND CRIMINAL JUSTICE SYSTEM
(Core-5 Major-V)

Course Objective:

The learning objectives of this module are as follows:

1. To discuss and debate the meaning, definitions and Scope of Police Science.
2. To comprehend the theories about Police Science.
3. To discuss the origin and development of Police organizations in India.
4. It will make students research the genesis of Police organizations in different world jurisdictions and make a comparative study on the Police System, including the US, UK, and Australia.
5. To analyse the various comparative schools of thought concerning Police and their various roles in the community.
6. To deliberate upon the need for filling the trust deficit gap between Police and society.

Course Outcome:

Students completing the course will be able to: Guide them about evolution, need and relevance of Police organisation.

1. Describe the role of Police and Community vis a vis nature and scope of reform measures needed in Modern Policing in India; Define the subject domain knowledge of major police systems of world and India;
3. Analyse and deliberate on opinions formed at various National Police Conferences and Workshops and will help them to research the material on its reforms; Understanding of basis of Police System in modern democratic context;
5. Examine various recommendations given by Police Commissions and evaluate crime mapping them; To determine the schemes related to the upliftment of Police families;
7. To analyse the various Police, jail and prison manuals;
8. It will help students to learn and identify the concerns of police organisations in India

UNIT-I Forensic Science

Forensic Science in India: Organizational Set up of Forensic Science Laboratories, Hierarchical Set up of CFSL, State FSL, GEQDs, Finger print Bureaus, LNJP-NICFS, Directorate of Forensic Science and Mobile Crime Laboratories. Police Services of Crime Laboratories, Duties of forensic Scientists, Code of Conduct for Forensic Scientists, Qualifications of Forensic Scientists.

UNIT –II Police Science -

Ministry of Home affairs, Central Armed Police Forces - BSF, CRPF, CISF, ITBP, NSG, Assam Rifle, Special Protection Group's.

Central Investigation & Intelligence Institutions – CBI, IB, NIA, RAW, Narcotic Control Bureau, National Police Academy, BPR&D, NCRB – Research & Training etc.

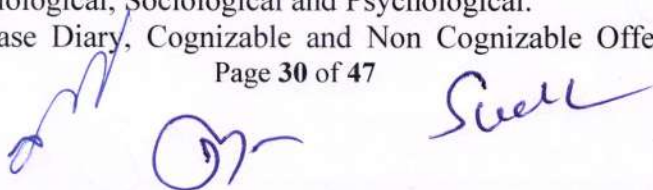
Forensic Science in International Perspectives Including INTERPOL; USA – CIA, FBI;

State Police Forces – State Armed Police Forces, Home Guards, Traffic Police, CID, STF, Community Policing.

UNIT III Criminology -

Criminology: Definition & its Scope, Crime: Definition, Nature & Element of Crime, Theories of Criminal Behavior– Biological, Sociological and Psychological.

Investigation: FIR, Case Diary, Cognizable and Non Cognizable Offences, Police Custody &



Judicial Custody, Bailable and Non-Bailable Offences, Procedure of Filing Charge Sheet.

UNIT IV Judiciary System & Indian Constitution -

Classification – Civil & Criminal Cases, Introduction to Labour Court, Juvenile Court etc.

Constitution and Hierarchy of Criminal Courts - Organization of Courts at Block, District and State levels; Supreme Court & High Courts of India

Indian Constitution in Brief – Preamble, Fundamental Rights Art; 13, 14, 15, 19, 20, 21, 22, 32; Directive Principle of State Policy Art; 40, 44, 51 and Fundamental Duties

UNIT V Indian Penal Code (IPC), CrPC and Indian Evidence Act (IEA)–

Indian Penal Code (1860) - 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

IPC (1860) - Pertaining to Offences Against Property Sections – 378, 383, 390, 391, 405, 415, 420, 441, 463, 497, 498A, 499, 503, 511

CrPC (1873) - 26, 27, 29, 31, 144, 154-158, 176, 291, 292, 293

IEA (1872) - 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, 114(A) 135, 136, 137, 138, 141.

Essential Readings:

1. Criminal Procedure Code, 1973.
2. Dennis S., (1976). Physics in the Prevention and Detection of Crime, Vo U7. US, Quantum Phys.
3. Indian Evidence Act, 1872.
4. Indian Penal Code, 1860.
5. Nickolls L.C. (1956). Scientific Investigation of Crime. London, Bulterwest.
6. Saferstein R. (1995). Criminalistics – An Introduction to Forensic Science. USA, Prentice hall Inc.
7. Sharma B.R. (2003). Forensic Science in Criminal Investigation and Trials. India, Universal Law House.
8. Sharma J. D.(1988). Vidhivigyan Avem Vish Vigyan. India, Madhya Pradesh Hindi Granth Academy.
9. Sharma J. D. (2011). Apradh ka Vigyanik Anveshan. India, Madhya Pradesh Hindi Granth Academy.
10. Working Procedures Manual: Ballistics. (2000). India, BPR & D Pub.

Suggested Reading:

1. Brain J. H. (1997). Hand book of Firearms and Ballistics. England, John Willey.
2. Hatcher, Jury & Weller. (1977). Firearms Investigation, Identification and Evidence. Harrisburg, Stackpole Books.
3. Johari M. (1980). Identification of Firearms, Ammunition and Firearms Injuries. New Delhi, BPR&D.
4. Karl G. S. (1994). Wound Ballistics and the Scientific Background. London, Elsevier.
5. Vincent D. M. & P. A. (1999). Gunshot Wounds. USA, CRC Press.
6. Warlow T. A., (1996). Firearms, The Law and Forensic Ballistics. London, Taylor and Francis.

COURSE CODE NO.: FSB: 302: CRIME SCENE MANAGEMENT (CORE-6, Major-VI)**Course Objectives:**

This Course will cover the types of crime scene, management of crime scene along with various types of prints and voice analysis.

Course Outcomes:

1. Concept of types of crime scene, management of crime scene
2. Types of physical evidences
3. Types analysis of tool marks
4. Speaker identification
5. Types prints and impressions

UNIT-I Crime Scene Management-

Introduction to Crime Scene, Classifications of Crime Scenes (Primary and Secondary, Indoor, Outdoor and Mobile, Macroscopic and Microscopic, other Specific type of Crime Scene), Securing and Isolating the Crime Scene, Physical Evidence in Criminal Investigation.

UNIT-II Crime Scene Procedure-

Role of the First Responding Officer (First Officer at the Scene, Recording the Time, Assisting the Victim, Search for and Apprehension of Accused, Securing the Crime Scene), Initial Crime Scene Response, Crime Scene Communication, Legal Implications for Crime Scene Searches.

UNIT-III Crime Scene Documentation-

Plan of Action, Note Taking, Crime Scene Search, Crime Scene Photography, Types of Cameras, Types of Media, Number of Photographs, Admissibility of Photographs, Videography of the Crime Scene.

UNIT-IV Collection & Preservation of Physical Evidence-

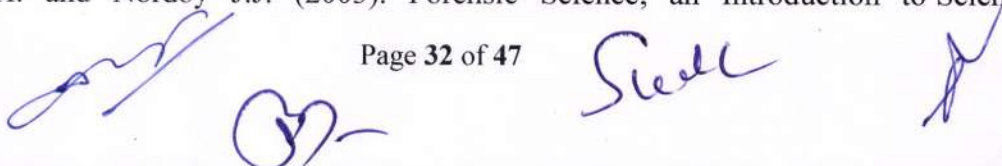
Fingerprints, Impression Evidence, Hair and Fiber Evidence, other Trace Evidence (Glass, Paint and Soil), Firearms and Tool Marks, Biological Evidence (Blood, Body Fluids and Tissue), Accelerants and Flammable Fluids, Explosive Material, Questioned Document, Drug Evidence, Bite Mark Evidence, Entomological Evidence.

UNIT-V Crime Scene Search & Preservation-

Crime Scene Search (Collection, Preservation, and Packaging of Physical Evidence), Sketching the Crime Scene, Information Included in Crime Scene Sketches, Equipment, Types of Sketches, Locating Objects in the Sketch, Admissibility of Sketches, Comparison of Sketching and Photography.

Essential Readings:

1. Aitken C.G.G. and Stoney D.A. (1991). The use of Statistics in Forensic Science. England, Ellis Harwood Limited.
2. Horswell J. (2016). The Practice of Crime Scene Investigation. USA, CRC Press.
3. James S.H. (2014). Forensic Science: An Introduction to Scientific and Investigative Techniques. UK, Taylor & Francis.
4. James, S.H. and Nordby J.J. (2003). Forensic Science; an Introduction to Scientific and

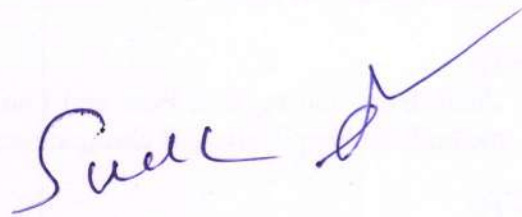


Investigative Techniques. USA, CRC Press.

5. O' Hara & Osterberg (1949). An Introduction to Criminalistics. New York, The Macmillan Company.
6. Saferstein R. (1995). Criminalistics – An Introduction to Forensic Science. USA, Prentice hall Inc.
7. Sharma B. R. (2003). Forensic Science in Criminal Investigation and Trials. India, Universal Law Publishing Company.
8. Sharma J. D. (1988). Vidhivigyan Avem Vish Vigyan. India, Madhya Pradesh Hindi Granth Academy.
9. Sharma J. D. (2011). Apradhon ka Vigyanik Anveshan. India, Madhya Pradesh Hindi Granth Academy.

Suggested Reading:

1. Burke R.H. (2013). An Introduction to Criminological Theory. USA, Routledge.
2. Criminal Procedure Code.
3. Indian Evidence Act.
4. Indian Penal Code.
5. Nordby J. (1999). Dead Reckoning – The Art of Forensic Science Detection. USA, CRC Press.
6. Unnithan N. P. (2013). Crime and Justice in India. India: SAGE Pub. India.



COURSE CODE NO.: FSB: 303: BIOLOGY (MINOR-3)**Course Objective:**

Define basic biological concepts and processes. Describe levels of organization and related functions in plants and animals. Identify the characteristics and basic needs of living organisms. Explain the processes of growth and development in individuals and populations.

Course Outcome:

The students will be able to:

1. Read, understand, and critically interpret the primary biological literature
2. Design, conduct analyse and communicate biological research
3. Will be able to explain the organic evolution and its principles and mechanism

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

UNIT: II

Principles of taxonomy and system of classification of angiosperms (Bentham and Hooker) and Gymnosperms (chamberlain) Origin of life and Geological time scale. Mechanical and conducting tissue systems in plants

UNIT: III

Acid, base, and buffers, Beer and Lambert's law, colorimetry and spectrophotometry, principles methods and application of chromatography and electrophoresis

UNIT: IV

Basics of microbiology and concept of pure culture technique microscopy principle and types of microscopy Broad classification of microorganisms - Immunity and immune system, Structure and Interaction of antigens and antibody, ELISA, western blot, and Southern blot techniques.

UNIT: V

Genetic materials – structural organization and function; Mendelian principles, sex linkage and sex determination Recombinant DNA technology and its applications in health, and diseases

Suggestive Readings

1. A Dictionary of ecology – Michael Alleby
2. Encyclopedia of evolution – Stanley rice
3. Desk encyclopedia of microbiology – Moselio

COURSE CODE NO.: FSB: 304: FOOD ADDITIVES (GEC-3)**Course Objective:**

1. To describe various food additives and contaminants.
2. To illustrate the functionality of food additives.
3. To exemplify the limits of permissible additives in processed foods

Course Outcome:

After the completion of the course, the students will be able to:

1. Understand the role of food additives in manufacturing of food products.
2. Have the knowledge regarding permissible additives and their limits in the processed food
3. Perceive the contaminants from various sources.
4. Comprehend the effects of contaminants on human health.

UNIT-I

Additives in food processing and preservation: Classification, need, properties, functions and safety, quality evaluation of additives, Food labeling, Laws and regulations for food additives

UNIT-II

Chemistry, uses and functions: Chemical preservative, bio-preservatives, fortification, antioxidants, emulsifiers, humectants, stabilizers, chelating agents, pH control agents and acidulants, texturizing agents, plasticizers, flavor enhancers, enzymes, coloring agents, sweeteners, flavoring agents

UNIT-III

Food contaminants: biological, chemical, physical and environmental contaminants, Inorganic and organometallic food contaminants, Sources and their impact on human health

UNIT-IV

Food contaminants from industrial wastes: Heavy metals, polychlorinated polyphenyls, dioxins, Toxicants formed during food processing polycyclic aromatic hydrocarbons, nitrosamines, veterinary drug residues and melamine contaminations, Pesticide residues in food

UNIT-V

Their importance and utilization, Flavoring agents and related substances, clarifying agents, Description of generally recommended as safe (GRAS) food additives.

Use of additives in bakery, fruits, vegetables, milk and meat products, Determination of adulteration in milk, cereals, oils & fats, spices.

Books Recommended:

1. Food Chemistry, O.R.Fennema
2. Food Chemistry, Belitz, Grosch
3. Food Facts & Principles by Shakuntala Manay N & Shadoksharaswamy N, 1996, New Age, World Publishers.



**COURSE CODE NO.: FSB: 305: NURSERY AND GARDENING
(VOCATIONAL COURSE) (SEC-II)****Course Objective:**

1. Know what the attributes of high-quality stock are.
2. Understand how nursery culture is based on the natural growth cycle of trees and why this is important for post-planting performance.
3. Know the phases of nursery culture including, sowing, control of shoot and root morphology, dormancy induction, lifting, storage, and shipping.
4. It is possible to grow and maintain a large number of plants per unit area.
5. Small and expensive hybrid seeds can be raised more effectively due to better care and management.
6. When seeds are sown in seedbeds, their germination percentage increases, and the vigour of the seedlings also improves.
7. The management of seedlings can be done in a better way with minimum care, cost, and maintenance as the nursery area is small.
8. Manipulation of growing conditions for plants becomes easy.

Course Outcome:

- 1- Better and uniform crop growth can be obtained in the main field by selecting vigorous and healthy seedlings.
- 2- Off-season sowing of seeds becomes possible, which ultimately results in fetching more returns.
- 3- The seed requirement of nursery-raised crops is less as compared to direct seed sowing of the same crop due to better management.
- 4- Sowing seeds in a nursery allows additional time for doing preparatory tillage in the main plot. Harvesting of the previous crop can also be prolonged if needed.
- 5- Management of insect pests, diseases, and weeds is easy in a nursery

UNIT I: Nursery:

Definition, objectives and scope and building up of infrastructure for nursery, planning and seasonal activities - Planting - direct seeding and transplants.

UNIT II: Seed:

Structure and types - Seed dormancy; causes and methods of breaking dormancy - Seed storage: Seed banks, factors affecting seed viability, genetic erosion - Seed production technology - seed testing and certification.

UNIT III: Vegetative propagation:

Air-layering, cutting, selection of cutting, collecting season, treatment of cutting, rooting medium, and planting of cuttings - Hardening of plants - greenhouse - mist chamber, shed root, shade house, and glasshouse.

UNIT IV: Gardening:

Definition, objectives, and scope - different types of gardening - landscape and home gardening - parks and its components - plant materials and design - computer applications in landscaping- Gardening operations: soil laying, manuring, watering, management of pests and diseases and harvesting.

UNIT V:

Sowing/raising of seeds and seedlings - Transplanting of seedlings - Study of cultivation of

different vegetables: cabbage, brinjal, lady's finger, onion, garlic, tomatoes, and carrots
Storage and marketing procedures;

Suggested Readings

1. Bose T.K. & Mukherjee, D., 1972, Gardening in India, Oxford & IBH Publishing Co., New Delhi.
2. Sandhu, M.K., 1989, Plant Propagation, Wile Eastern Ltd., Bangalore, Madras.
3. Kumar, N., 1997, Introduction to Horticulture, Rajalakshmi Publications, Nagercoil.
4. Edmond Musser & Andres, Fundamentals of Horticulture, McGraw Hill Book Co., New Delhi.
5. Agrawal, P.K. 1993, Hand Book of Seed Technology, Dept. of Agriculture and Cooperation, National Seed Corporation Ltd., New Delhi.
6. Janick Jules. 1979. Horticultural Science. (3rd Ed.), W.H. Freeman and Co., San Francisco, USA.

COURSE CODE NO.: FSB 306:

(AEC-V)

Success
100%

COURSE CODE NO.: FSB 307:

(AEC-VI)

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B. Sc. (Hons) FOUR YEARS (EIGHT SEMESTERS), CBCS SCHEME (NEP-2020)
SUBJECT-FORENSIC SCIENCE
SECOND YERS: SEMESTER- IV

COURSE CODE NO.: FSB: 401: INTRODUCTION TO BIOMETRY (Core-7 Major-VII)

Course Objective:

Biometrics has emerged as a specialized field in criminal forensics, public safety surveillance, user authentication and identification. Expansions of biometric modalities are ranged from fingerprint, face and other traits to multimodal biometric traits. Objectives of this course include scientific foundations needed for the design, implementation, and evaluation of large scale biometric identification systems.

Course Outcome:

After studying this paper the students will know –

1. Understand the technological uplifts with biometrics compared to traditional securing mechanisms.
2. Gain knowledge in building blocks of research fields like Pattern Recognition, Image Processing and Machine Learning etc.
3. Evaluate and Design security systems with biometrics.

UNIT I: Fundamental Aspects

Definition, characteristics, and operation of the biometric system; Classification of biometric systems – physiological and behavioral; Strength and weakness of physiological and behavioral biometrics

UNIT II:

Multimodal biometrics; Key biometric processes – enrollment, identification, and verification; Positive and negative identification;

UNIT III:

Performance measures used in biometric systems – FAR, FRR, GAR, FTA, FTE, and ATV; Biometric versus traditional technologies;

UNIT IV: Physiological Biometrics

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

UNIT V: Behavioral Biometrics

Handwriting, signatures, keystrokes, gait, and voice;

Suggested Readings

1. S. Nanavati, M. Thieme and R. Nanavati, Biometrics, Wiley India Pvt. Ltd. (2002).
2. P. Reid, Biometrics for Network Security, New Delhi (2004).
3. Jain, A. K., Flynn, P., & Ross, A. A. Handbook of biometrics. Springer Science & Business Media (2007).
4. J.R. Vacca, Biometric Technologies and Verification Systems, Butterworth-Heinemann, Oxford (2007).



COURSE CODE NO.: FSB: 402: ECONOMIC OFFENCE (Core-8 Major-VIII)**Course Objective:**

This course intends to impart knowledge of the economic offences that leads to gross damage to the economy at large and the penal provisions enacted by the Indian Parliament to curb those offences.

Course Outcome:

After studying this paper the students will know –

1. Understand the meaning and nature of crimes.
2. Analyze economic offences vis-à-vis traditional crimes.
3. Trace the steps involved in the commission of these offences to detect any future issues.
4. Learn the procedure of filing a case on various economic offences.
5. Critically evaluate India's position in context of international economic offences.
6. Appreciate and critique the role of Legislature, Executive and Judiciary in curbing economic offences.

UNIT I: Taxonomy of Economic Offences/Criminogenic Factors

Fundamentals of economics in economic offences; Tax evasion; Excise duty evasion; fraudulent bankruptcy; White collar crime; Economic exclusion; Black money.

UNIT II:

Corruption and bribery of public servants; Money laundering and hawala transactions; Insurance frauds; Corporate frauds; Bank frauds; Ponzi scheme; Pyramid scheme; Illicit trafficking in contraband goods; Illicit trafficking in arms; Illicit trafficking in explosives; Illicit drug trafficking; Trafficking in human organs; Cultural objects trafficking; Racketeering in employment; Racketeering in false travel documents;

UNIT III: Applied Economics in Processing Evidence

Forensic accountancy and forensic auditing; Valuation of economic losses; Violation of Intellectual Property Rights;

UNIT IV: Prevention of Economic Offences

Legislations to deal with different forms of economic offences; RBI Act; SEBI Act; Competition Commission of India Act; Credit card frauds;

UNIT V:

Enforcement agencies to deal with different forms of economic offences; International perspectives – measures adopted by FBI and INTERPOL; Case histories of economic offences;

Suggested Readings

1. R.V. Clarke, Situational Crime Prevention: Successful Case Studies, 2nd Edition, Criminal Justice Press, New York (1997).
2. S.P. Green, Lying, Cheating, and Stealing: A Moral Theory of White Collar Crime, Oxford University Press, Oxford (2006).
3. G. Geis, R. Meier, L. Salinger (Eds.), White-Collar Crime: Classic & Contemporary Views, Free Press, New York (1995).
4. J. Reiman, The Rich get Richer and the Poor get Prison, Allyn & Bacon, Boston (1998).
5. Indian Audit and Accounts department, Audit of Fraud, Fraud Detection and Forensic Audit, 2007.
6. State Crime Branch, Haryana, Investigation of Economic Offences.

COURSE CODE NO.: FSB 403: ANTHROPOLOGY (MINOR-4)**Course Objective:**

1. Discuss, evaluate, and apply core concepts in archaeology (e.g. artifacts, biofacts, architecture, landscape, culture history, evolution, ecology).
2. Discuss, evaluate, and apply core concepts in cultural anthropology (e.g. culture, cultural relativism, social organization, kinship, functionalism, structuralism, colonialism, postmodernism, globalization).
3. Discuss, evaluate, and apply core concepts in physical anthropology (e.g. evolution, paleontology, morphology, genetic inheritance, human adaptation and variation, migration, behavioral ecology, conservation biology).

Course Outcome:

After studying this paper the students will know –

1. Identify ethical principles and/or anti-bias approaches used in anthropology, and explain why they are necessary for both science and social justice;
2. Critically evaluate quantitative and/or qualitative anthropological approaches;
3. Analyze academic and societal debates about human diversity and human society (for example, genetic determinism, race, 'human nature,' and evolution);
4. Integrate and apply concepts and methods from the subfields of anthropology to investigate human issues (for example, sociocultural, environmental, health, evolution) worldwide;
5. Convey analysis of anthropological knowledge and approaches in writing.

UNIT I: Significance of Forensic Anthropology

Scope of forensic anthropology, Study of the human skeleton; Nature, formation, and identification of human bones; Determination of age, sex, stature from skeletal material;

UNIT II: Personal Identification – Somatoscopy and Somatometry

Somatoscopy – observation of hair on head, forehead, eyes, the root of nose, nasal bridge, nasal tip, chin, Darwin's tubercle, ear lobes, supra-orbital ridges, physiognomic ear breadth, the circumference of the head. Scar marks and occupational marks.

UNIT III:

Somatometry – measurements of the head, face, nose, cheek, ear, hand and foot, body weight, height. Indices - cephalic index, nasal index, cranial index, upper facial index.

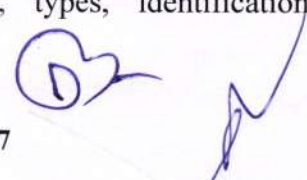
UNIT IV: Facial Reconstruction

Portrait Parle/ Bertillon system; Photofit/identi kit; Facial superimposition techniques; Craniofacial superimposition techniques – photographic superimposition; video superimposition, Roentgenographic superimposition;

UNIT V:

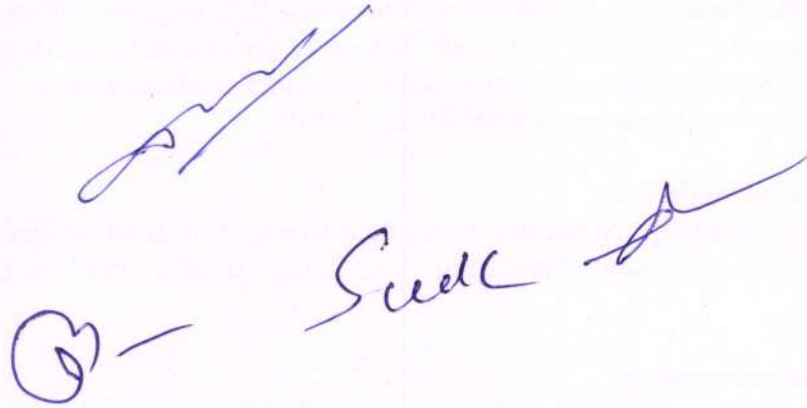
Use of Somatoscopic and Craniometric methods in reconstruction; Importance of tissue depth in facial reconstruction;

Genetic and congenital anomalies – causes, types, identification, and their forensic significance;



Suggested Readings

1. M.Y. Iscan and S.R. Loth, The scope of forensic anthropology in, Introduction to Forensic Sciences, 2nd Ed., W.G. Eckert (Ed.), CRC Press, Boca Raton (1997).
2. D. Ubelaker and H. Scammell, Bones, M. Evans & Co., New York (2000).
3. S.Rhine, Bone Voyage: A Journey in Forensic Anthropology, University of Mexico Press, Mexico (1998).



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COURSE CODE NO.: FSB: 404: HERBAL TECHNOLOGY (GEC-4)**Course Objective:**

This subject gives the student the knowledge of basic understanding of the herbal drug industry, the quality of raw material, guidelines for quality of herbal drugs, herbal cosmetics, natural sweeteners, nutraceuticals, etc. The subject also emphasizes Good Manufacturing Practices (GMP), patenting, and regulatory issues of herbal drugs

Course Outcome:

Upon completion of this course the student should be able to:

1. Understand raw material as a source of herbal drugs from cultivation to herbal drug product
2. Know the WHO and ICH guidelines for evaluation of herbal drugs
3. Know the herbal cosmetics, natural sweeteners, nutraceuticals
4. Appreciate patenting of herbal drugs, GMP.

UNIT I: Herbal medicines:

History and scope; definition of medical terms; the role of medicinal plants in Siddha systems of medicine; cultivation - harvesting - processing - storage - marketing and utilization of medicinal plants.

UNIT II: Pharmacognosy

Systematic position medicinal uses of the following herbs in curing various ailments; Tulsi, Ginger, Fenugreek, Indian Gooseberry, and Ashoka

UNIT III: Phytochemistry

Active principles and methods of their testing - identification, and utilization of the medicinal herbs; *Catharanthus roseus* (cardiotonic), *Withania somnifera* (drugs acting on the nervous system), *Clerodendron phlomoides* (anti-rheumatic), and *Centella asiatica* (memory booster).

UNIT IV: Analytical pharmacognosy

Drug adulteration - types, methods of drug evaluation - Biological testing of herbal drugs - Phytochemical screening tests for secondary metabolites (alkaloids, flavonoids, steroids, triterpenoids, phenolic compounds)

UNIT V:

Medicinal plant banks micropropagation of important species (*Withania somnifera*, neem, and tulsi- Herbal foods-future of pharmacognosy)

Suggested Readings

1. Glossary of Indian medicinal plants, R.N.Chopra, S.L.Nayar and I.C.Chopra, 1956. C.S.I.R, New Delhi.
2. The indigenous drugs of India, Kanny, Lall, Dey and Raj Bahadur, 1984. International Book Distributors.
3. Herbal plants and Drugs Agnes Arber, 1999. Mangal Deep Publications.
4. Ayurvedic drugs and their plant source. V.V. Sivarajan and Balachandran Indra 1994. Oxford IBH publishing Co.
5. Ayurveda and Aromatherapy. Miller, Light and Miller, Bryan, 1998. Banarsidass, Delhi.
6. Principles of Ayurveda, Anne Green, 2000. Thomsons, London.
7. Pharmacognosy, Dr.C.K.Kokate et al. 1999. Nirali Prakashan.

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**COURSE CODE NO.: FSB 405: FIELD PROJECT/INTERNSHIP/
COMMUNITY ENGAGEMENT AND SERVICES****Course Objective:**

8. Field project/Internships/Community engagements are designed to expand the depth and breadth of academic learning for you in your particular areas of study.
9. It is an opportunity for you to receive experience in applying theories learned in the classroom to specific experiences in the community and work world.
10. An internship can also heighten your awareness of community issues, motivate you to create opportunities, embrace new ideas, and give direction to positive change.
11. A successful internship can give you valuable information in making decisions about the direction of future studies or employment.
12. An internship is an opportunity to not only use and develop industry-related knowledge and skills, but also to enhance some of the skills that are transferable to any professional work setting.
13. This internship may be your first introduction to the world of work, or maybe you have been exposed to professionalism many times before.
14. No matter where your skills and understanding of professionalism lie, your internship is a chance to develop them even further.

Course Outcome:

By the end of the internship, our hope is that you will have:

- 12- Linked academic theory to practice in your discipline;
- 13- Applied your knowledge, skills, experience to a work environment;
- 14- Acquired new learning through challenging and meaningful activities;
- 15- Reflected on the content and process of the learning experience;
- 16- Advocated for your own learning in alignment with internship goals;
- 17- Demonstrated professional skills in the workplace;
- 18- Built and maintained positive professional relationships;
- 19- Demonstrated awareness of community and/or organizational issues;
- 20- Identified, clarified and/or confirmed professional direction as it relates to your academic studies and future career path;
- 21- Developed self-understanding, self-discipline, maturity and confidence;
- 22- Developed strong networking/mentoring relationships.

The students will be expected to undergo training/internship in forensic laboratories /Fields to get hands- on experience in the field of investigating a crime scene and to develop the analytical skills required for a forensic scientist. The report about the training/internship will be based on the work undertaken in Forensic Science Laboratory and the same will be evaluated. The training/internship should be undertaken during the vacation of



COURSE CODE NO.: FSB 406:

(AEC-VII)



See ✓ (5)-

COURSE CODE NO.: FSB 407:

(AEC-VIII)



Sudha
