

STUDY & EVALUATION SCHEMES
OF
BACHELOR OF SCIENCE IN FORENSIC
SCIENCE (BFS)
(BFS- III-SEMESTER)

[Applicable w.e.f. Academic Session 2020-21]



INTEGRAL UNIVERSITY, LUCKNOW
DASAULI, P.O. BAS-HA KURSI ROAD, LUCKNOW – 226026

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Syllabus approved by Board of Study, Faculty Board, Academic Council,
Executive Council of the Integral University, Lucknow

INTEGRAL UNIVERSITY, LUCKNOW
INTEGRAL INSTITUTE OF ALLIED HEALTH SCIENCES & RESEARCH
DEPARTMENT OF PARAMEDICAL & HEALTH SCIENCES

STUDY & EVALUATION SCHEME
BACHELOR OF SCIENCE IN FORENSIC SCIENCE (BFS)
(W.e.f. July 2020)

II-Year

III-Semester

S. No.	Code	Name of the Subject	Periods			Credits	Evaluation Scheme				Subject Total
			L	T	P		Sessional			Exam	
							CT	TA	Total	ESE	
1.	FS 201	Forensic Medicine	3	1	0	4	40	20	60	40	100
2.	CH219	Forensic Chemistry-I	3	1	0	4	40	20	60	40	100
3.	FS 202	Forensic Physics- I	2	1	0	3	40	20	60	40	100
4.	FS 203	Forensic Biology-I	2	1	0	3	40	20	60	40	100
5.	FS 204	Forensic Psychology	2	1	0	3	40	20	60	40	100
6.	ES 101	Environmental Study	2	1	0	3	40	20	60	40	100
7.	FS 205	Forensic Medicine-Lab	0	0	2	1	40	20	60	40	100
8.	CH 220	Forensic Chemistry –I-Lab	0	0	2	1	40	20	60	40	100
9.	FS 206	Forensic Physics-I – Lab	0	0	2	1	40	20	60	40	100
10.	FS 207	Forensic Biology-I - Lab	0	0	2	1	40	20	60	40	100
11.	FS 208	Forensic Psychology-Lab	0	0	2	1	40	20	60	40	100
		Total	14	06	10	25	440	220	660	440	1100

L: Lecture T: Tutorials P: Practical C: Credit CT: Class Test

TA: Teacher Assessment ESE: End Semester Examination

Sessional Total: Class Test + Teacher Assessment

Subject Total: Sessional Total + End Semester Examination (ESE)

SUBJECT- BASICS OF FORENSIC MEDICINE
SUBJECT CODE-FS201

L T P
3 1 0

LEARNING OBJECTIVES: To understand and identification of informed Medico-legal responsibility.

UNIT-I DEATH INVESTIGATIONS- (8 hours)

Fundamental aspects and scope of forensic medicine. Approaching the crime scene of death. Obtaining first hand information from the caller. Rendering medical assistance to the victim, if alive. Protecting life. Recording dying declaration. Identifying witnesses and, if possible, suspect. Interviewing onlookers and segregating possible witnesses. Suspect in custody – initial interrogation and searching for evidence.

UNIT-II ROLE OF FORENSIC MEDICINE IN COURT- (8 hours)

Meaning and Scope Inquest Nature and Powers of Criminal Courts in India Procedure of calling a witness to court.

Procedure in court: Oath Examination in chief, Cross Examination and Re-Examination Medical Evidence Medico legal Reports and Dying declaration Doctor as medical/ Expert witness

UNIT-III MEDICAL AUTOPSY: (8 hours)

Introduction and objectives, rules for medico legal autopsy, external and internal examination of body, collection of Ante-mortem and post-mortem samples, autopsy report.

UNIT-IV THANATOLOGY- (8 hours)

Definition of death. Types of death(somatic and molecular).Medico-legal aspects of death – Causes of death such as asphyxia(strangulation, hanging, drowning etc), electrocution, thermal trauma, heat burns, starvation, natural death, sudden death etc. Changes after death (immediate, early and late changes) and Determination of time since death.

UNIT-V WOUNDS AND INJURIES (8 hours)

Definition of wounds and injuries and laws governing them. Types and classification of injuries. Ante mortem and post mortem injuries. Aging of injuries. Artificial injuries. Difference between suicidal, homicidal and accidental injuries.

LEARNING OUTCOME: After studying this paper the students will know –

1. The duties of the first responding officer who receives a call on homicide or suicide case and the steps involved in processing the death scene.
2. The importance of Death and death scene to ascertaining whether the crime was staged to appear as suicide, accident, homicide.
3. The importance of External and internal autopsy findings in determining medico legal aspects of death.
4. The importance of forensic pathology in giving medicolegal answers of various modes of deaths.

RECOMMENDED BOOKS:

1. Forensic medicine and toxicology: principles and practice, Professor Krishna Vij
Publisher: Elsevier , 5 edition ,2014
2. Practical Aspects of Forensic Medicine, Dr T.D. Dogra Dr. AD Aggrawal jaypee publishers,2014.
3. Parikh's textbook of medical jurisprudence, forensic medicine and toxicology
Professor C. K. Parikh ,CBS; 6 edition, 2007
4. The essentials of forensic medicine and toxicology Professor K.S. Narayan Reddy
Jaypee Brothers Medical Publishers; 34th edition 2017
5. Principles of forensic medicine Professor Apurva Nandy New Central Book Agency;
3rd Revised edition edition 2010
6. A Textbook of Medical Jurisprudence and Toxicology Dr. Jaising P. Modi (Edited by
Justice K Kannan ,Lexis Nexis; 24th edition 2012

SUBJECT- FORENSIC CHEMISTRY- I

SUBJECT CODE- CH219

L T P
3 1 0

LEARNING OBJECTIVES: Understand and to appreciate the breadth and diversity of analytical science in respect of forensic science.

UNIT-I INTRODUCTION TO FORENSIC CHEMISTRY:

Chemical analysis of evidences:

Screening, sampling-methods of collection, , different standard methods

Inorganic analysis

Micro-chemical method

UNIT-II CHROMATOGRAPHY:

Basic principle and types

1. TLC- Principle, Theory, instrumentation and applications.
2. Ion exchange, Gel Permeation Chromatography, Adsorption chromatography

UNIT-III

General idea and basic principle of distillation, various types of distillation techniques

Sample treatment techniques – Centrifuge, Filtration, Evaporation, Crystallization

Distribution Law ,Solvent extraction technique like LLE, SPE, SPME.

UNIT-IV POLYMERS-

Introduction-General idea of structures, types, polymerization processes with examples, radical and ionic mechanism of polymerization, characteristic properties of polymers, Structure, preparation and applications of Polyethylene (types and Ziegler-Natta process), Teflon, PVC, Polystyrene

UNIT-V

Fibre Types of fibres, forensic aspects of fibre examination- fluorescence, optical properties, refractive index, birefringence, dye analysis. Physical fit and chemical testing. TLC, IR-micro spectroscopy, Py-MS. Difference between natural and man-made fibres. Fibre comparison of dye Component.

LEARNING OUTCOMES: After studying this paper the students will know –

1. To gain knowledge of the different classes of materials examined as forensic evidence, including fibers, polymers.
2. To understands the chemistry of common types of forensicevidences.
3. To gain an understanding of the analytical toolsused to interpret forensic data
4. The techniques of chromatography, distillation, conventional and modern methods of sample extraction.

RECOMMENDED BOOKS:

1. Instrumental Method of Chemical Analysis. Chatwal & Anand, Himalya Publication, 5th edition 2004.
2. Settle F. A.: Handbook of Instrumental Technique for Analytical Chemistry, Prentice Hall 1997.
3. Introduction of Forensic Science in Crime Investigation by Dr. (Mrs.) R. Krishnamurthy, Selective & Scientific Books (2015).
4. Handbook of Instrumental Technique for Analytical Chemistry by Settle F. A, Prentice Hall; Har/Cdr edition (4 June 1997)
5. Laboratory Procedure Manual: Petroleum Products, Directorate of Forensic Science, MHA, Govt. of India, 2005.
6. Working Procedure Manual on Chemistry; Directorate of Forensic Science MHA Govt. of India.

Subject- BASICS OF FORENSIC PHYSICS- I

Subject Code- FS202

Learning Objectives: Understand and to appreciate the breadth and diversity of Physical science in respect of forensic science.

Unit-I

Paint - Types of paint and their composition, cases involve, collection and preservation of paint evidences .microscopic analysis of paint pigments, micro-chemical analysis- solubility test, chemical and instrumental analysis of paint evidences.

Unit-II

Glass -Types of glass and their composition. Matching and comparison. Forensic examinations of glass fractures- rib marks, hackle marks, cone fracture, wavy, backward fragmentation, concentric and radial fractures. Colour, fluorescence, physical measurements, refractive index, density gradient, becke-line, specific gravity examination and elemental analysis of glass evidence.

Unit-III

Soil--Types and composition of soil, sample preparation, removal of contaminants, colour, molecular particle size distribution, turbidity test, pH measurements, microscopic examination, density gradient analysis, ignition-loss test, elemental analysis, interpretation of soil evidence.

Unit- IV

Cement and Concrete-Cement- bromoform test, fineness test, ignition-loss test. Identification of adulterated cement. Mortar and concrete analysis.

UNIT -V

Fibre Types of fibres, forensic aspects of fibre examination- fluorescence, optical properties, refractive index, birefringence, dye analysis. Physical fit and chemical testing. TLC, IR-micro spectroscopy, Py-MS. Difference between natural and man-made fibres.

Fibre comparison of dye Component

Learning Outcomes: After studying this paper the students will know –

1. To gain knowledge of the different classes of materials examined as forensic evidence, including fibers, paint, soil, cement and glass and their significance at crime scene .
2. To understand the physics of common types of forensic evidences.
3. To gain an understanding of the analytical tools used to interpret forensic data

SUGGESTED READINGS

1. Caddy, B; Forensic Examination of Glass and Paint Analysis and Interpretation, CRC Press, New York, 2001.
2. Shaw, D; Physics in the Prevention and Detection of Crime, Contem Phys. Vol.17, 1976.
3. Saferstein, R; Forensic Science Handbook. Vol. I,II, (Edition), Prentice Hall, New Jersey, 1988.
4. Working Procedure Manual; Physics BPR&D Publication, 2000
5. Sharma, B.R; Forensic Science in Criminal Investigation and Trials (3rd Edition.), Universal Law Publishing Co., New Delhi, 2001.
6. Working Procedure Manual- Physics, BPR&D Publication. 2000

Subject- BASICS OF FORENSIC BIOLOGY-I

Subject Code- FS203

Learning Objectives: Aims To Provide Students The Specific Biological Skills That Are Very Important In The Forensic Science Workplace and Gain an appreciation of the different biology evidence types and their applications in the investigative process.

UNIT-I

Forensic Biology-- Introduction, Evidences of Biological Importance, Nature, scope of crime scene presence and characterization (blood, semen, vaginal fluids, saliva, urine, sweat, skin, nails, tissue, tooth, bones, uterine fluid, vomit, vitreous humor, CSF, colostrum. Botanical materials, diatoms, wild life samples and other biological evidences),

UNIT-II

Crime Scene Investigation:

1. Protection of Biological Evidences
2. Documentation
3. Chain of Custody

Recognition of Biological evidences encountered in various cases, Search & Collection of Biological Evidences, Packaging & transportation of Biological Evidences

UNIT-III

Hair: Hair trichology – Collection, determination of origin, biochemistry and forensic examination (origin, nature, source, sex determination and DNA profiling)

Fiber: - Types of fiber, natural (plant animal and mineral), synthetic (nylon, polyester, terylene, carbonnanotube fiber), and blended (terrycloth, rayon)

UNIT IV

Definition, Types of Body Fluids,(Blood, Semen, Saliva, Sweat, Urine) their properties, Significance, collection, preservation, preliminary and confirmatory test

UNIT V

Bloodstain Pattern Analysis--Bloodstain characteristics. Impact bloodstain patterns. Cast- off bloodstain patterns. Projected bloodstain patterns. Contact bloodstain patterns.

Blood trails. Bloodstain drying times. Documentation of bloodstain pattern evidence.
Crime scene reconstruction with the aid of bloodstain pattern analysis.

Learning Outcomes: After studying this paper the students will know –

1. Demonstrate proper crime scene investigation and reconstruction
2. Be able to apply basic principles and laboratory procedures of biology to forensic science
3. The forensic analysis of biological fluids – blood, urine, semen, saliva, sweat and milk – in crime investigations.

SUGGESTED READING:

1. Forensic Biology by Richard Li CRC Press; 2nd edition (27 April 2015)
2. Practical Skills in Forensic Science – Alan Langford, John Dean et al Addison-Wesley Longman Ltd (February 1, 2005)
3. Scientific & Legal Applications of Bloodstain Pattern Interpretation – Stuart H. James CRC Press; 1st edition (June 29, 1998)

Subject- BASICS OF FORENSIC PSYCHOLOGY

Subject Code- FS204

Learning Objectives: This course is designed to introduce students to the interface of psychology and the law, with a specific focus on forensic psychology. Critical issues, such as Not Guilty By Reason of Insanity pleas, will be addressed. Students will be introduced to the roles and responsibilities of a forensic psychologist including psychological assessments, expert testimony, offender treatment, and correctional psychology

Unit- I

Basics of Forensic Psychology-- History of Forensic Psychology, Defining Forensic Psychology, Importance of Forensic Psychology, Ethical Standards of Forensic Psychology, Services provided by Forensic Psychologists.

Unit-II

Theories of crime -Biological factors , social learning theories, psychological factors .
Juvenile Delinquency: Definition, Concept Juvenile delinquency Child abuse (physical, sexual, emotional), juvenile sex offenders, legal controversies. Antisocial Personality Disorder

Unit-III

Investigative Psychology

1. Criminal profiling
2. Polygraph
3. Norco Analysis
4. BEOS

Unit-IV

Psychology and Law--Application of Forensic Psychology in Civil and Criminal Legal Proceedings-Civil Proceedings- Assessment of Civil Competency, Criminal Proceedings, **McNaughten rule insanity** – Nature of Insanity, Insanity Assessment, *Competency to stand trial*, Criminal responsibility and insanity defence.

Unit-V

Legal aspect- Mental Health Act, 1987 [Reception Order, Object, Establishment or Maintenance of Psychiatric Hospitals and Psychiatric Nursing Homes, Procedures on Production of Mentally Ill Person in front of Magistrate]

Learning Outcomes: After studying this paper the students will know –

1. To survey the major areas of interests shared by psychology and the law
2. To become familiar with the types of forensic evaluations conducted in criminal and civil cases
3. The importance of psychological assessment in gauging criminal behavior.
4. The tools and techniques required for detection of deception like polygraphy, narco analysis and brain electrical oscillation signatures.

SUGGESTED READINGS:

1. Criminal Profiling-An Introduction to Behavioural Evidence analysis', Brent Turvey, Academic Press; 4th edition (13 May 2011)
2. Handbook of Forensic Psychology', Prof Dr. Vimala Veeraraghwan, Edition 1st, Elsevier
3. Handbook of Forensic Psychology', Irving B. Weiner, Allen K. Hiss, Edition 3rd , 2006, Wiley Publication.
4. Theoretical Psychology', Moazziz Ali Beg, Sangeeta Gupta Beg, Vol [04], Edition 2nd, 2013, Global Vision Publishing House, New Delhi.
5. 'Abnormal Psychology-The Problem of Maladaptive Behaviour', Irwin G. Sarson, Barbara R. Sarson, Edition 11th, 2012, PHI Publication, New Delhi.
6. 7 'Abnormal Psychology', James N. Butcher, Susan M. Mineka, Jill M. Hooley, Edition 15th, 2014, Pearson.
7. 'Psychological Interventions of Mental Disorders', S. K. Shrivastava, Nayanika Singh, Shivani Kant, Edition 1st, 2013, Sarup Book Publishers, PVT. LTD.
8. 'Psychology and Crime', Nageshwar Singh, Edition 1st, 2013, RBSA Publishers, Jaipur.
9. 'Criminology' [2005] S. M. A. Qadri, fifth edition, EBC Publication, Lucknow

SUBJECT: ENVIRONMENTAL STUDIES

LEARNING OBJECTIVE:

SUBJECT CODE: ES101

The student will be made aware of our environment in general, natural resources, ecosystems, environmental pollution and social issues related to environment.

UNIT-I INTRODUCTION TO ENVIRONMENT AND ECOSYSTEMS:

Environment, its components and segments, Multidisciplinary nature of Environmental studies, Concept of Sustainability and sustainable development, Environmental movements , Ecosystem, Structure & Function, Energy flow in the Ecosystem, Ecological Pyramids and Ecological Succession.

UNIT-2 NATURAL RESOURCES:

Energy Resources: Renewable and non renewable, Soil erosion and desertification, Deforestation, Water: Use and over exploitation, Impacts of large Dams, Case studies.

UNIT-3 BIODIVERSITY AND CONSERVATION:

Levels of biological diversity, Hot spots of biodiversity, India as a Mega Diversity Nation, Endangered and endemic species of India, Threats to Biodiversity, Conservation of Biodiversity, Ecosystem and biodiversity services.

UNIT-4 ENVIRONMENTAL POLLUTION, POLICIES AND PRACTICES:

Environmental pollution, Solid waste management , Ill effects of fireworks, Climate change, Ozone layer depletion, acid rain and impacts on human communities and Environment,

Environmental Laws: Environment Protection Act, Wildlife protection Act, Forest conservation Act, Convention on Biological Diversity (CBD), Tribal rights, Human wildlife conflicts.

UNIT-5 HUMAN POPULATION AND THE ENVIRONMENT:

Human population growth: Impacts on environment, human health and welfare, Resettlement and rehabilitation of project affected persons, Environmental ethics, Environmental communication and public awareness, case studies.

RECOMMENDED BOOKS:

1. Agarwal, K.C. 2001 Environmental; Biology, Nidi Pub. Ltd. Bikaner.
2. Bharucha Erach, The Biodiversity of India, Mapin Pub. Pvt. Ltd., Ahemdabad-380, India.
3. Brunner R.C. 1989. Hazardous waste incineration, Mc Graw Hill.
4. Clark R.S. Marine Pollution, Clanderon Press Oxford (TB).
5. Cunningham W.P.2001.Cooper, T.H. Gorhani, E & Hepworth, Environmental encyclopedia, Jaicob Publication House, Mumbai.
6. De . A.K. Environmental chemistry Willey Eastern Limited.
7. Glick, H.P.1993 water in crisis, Pacific Institute for studies in dev, Environment & security, Stockholm Env, Institute, Oxford Univ, Press 473 p.
8. Hawkins R .E. Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay.

Subject- BASICS OF FORENSIC MEDICINE- LAB

Subject Code- FS205

1. To design a questionnaire for the first responder to the death scene.
2. To design a protocol to deal with the media at the crimescene.
3. To design a checklist for the forensic scientists at the death scene.
4. To design a canvass form giving description of an unidentified victim.
5. To analyze and preserve bite marks.
6. To study different stages of changes after death
7. To identify shooter on the basis of firearm injuries
8. To identify different causes of death
9. To study post-mortem findings of a cadaver

SUGGESTED READINGS:

1. Forensic medicine and toxicology: principles and practice, Professor Krishna
Vij Publisher: Elsevier , 5 edition ,2014
2. Practical Aspects of Forensic Medicine, Dr T.D. Dogra Dr. AD Aggrawal jaypee
publishers,2014.
3. Parikh's textbook of medical jurisprudence, forensic medicine and
toxicology Professor C. K. Parikh ,CBS; 6 edition, 2007
4. The essentials of forensic medicine and toxicology Professor K.S. Narayan
Reddy Jaypee Brothers Medical Publishers; 34th edition 2017
5. Principles of forensic medicine Professor Apurva Nandy New Central Book
Agency; 3rd Revised edition edition 2010
6. A Textbook of Medical Jurisprudence and Toxicology Dr. Jaising P. Modi (Edited by
Justice K Kannan ,Lexis Nexis; 24th edition 2012

Subject- FORENSIC CHEMISTRY- I LAB

Subject Code- CH220

- General procedure of distillation and difference among various distillation.
- Identification and comparison of fibres

- TLC preparations

- Identification of polymers

- General procedure for centrifuge ,soxhlet extraction

- Separation of leaf pigment by TLC

- Separation of amino acids by TLC

SUGGESTED READINGS:

1. Instrumental Method of Chemical Analysis. Chatwal & Anand, Himalya Publication, 5th edition 2004.
2. Settle F. A.: Handbook of Instrumental Technique for Analytical Chemistry, Prentice Hall 1997.
3. Introduction of Forensic Science in Crime Investigation by Dr. (Mrs.) R. Krishnamurthy, Selective & Scientific Books (2015).
4. Handbook of Instrumental Technique for Analytical Chemistry by Settle F.A, Prentice Hall; Har/Cdr edition (4 June 1997)
5. Laboratory Procedure Manual: Petroleum Products, Directorate of Forensic Science, MHA, Govt. of India, 2005.
6. Working Procedure Manual on Chemistry; Directorate of Forensic Science MHA Govt. of India.

Subject- BASICS OF FORENSIC PHYSICS- I LAB

Subject Code- FS206

1. Preliminary examination of, soil, paint, Glass.
2. Examination of physical properties of, soil, cement and paint evidences.
3. Analysis of paint and pigment by microscopic, chemical analysis

To compare glass and soil samples by refractive index method

SUGGESTED READINGS

1. Caddy, B; Forensic Examination of Glass and Paint Analysis and Interpretation, CRC Press, New York, 2001.
2. Shaw, D; Physics in the Prevention and Detection of Crime, Contem Phys. Vol.17, 1976.
3. Saferstein, R; Forensic Science Handbook. Vol. I,II, (Edition), Prentice Hall, New Jersey, 1988.

Subject- BASICS OF FORENSIC BIOLOGY- I LAB

Subject Code- FS207

1. Microscopic Comparison of Hair
 - a. Animal Hair
 - b. Human Hair
2. Microscopic Comparison of Fibres
3. Presumptive Tests for Blood
 - a. Phenolphthalein Assay
 - b. Benzidine
 - c. Leucomalachite Green (LMG)
 - d. Luminol Test
4. Confirmatory Tests for Blood
 - a. Crystallization Assays
5. ABO Grouping & Rhesus Factor
6. Techniques of species identification from various biological fluids
 - a. Electrophoresis
 - b. Precipitin tests
 - c. Acid Phosphatase test for semen
 - d. Prostate Specific Antigen (PSA)
7. Microscopic examination of spermatozoa
8. Detection of Amylase activity
 - a. Starch-Iodine Assay

SUGGESTED READING:

1. Forensic Biology by Richard Li CRC Press; 2nd edition (27 April 2015)
2. Practical Skills in Forensic Science – Alan Langford, John Dean et al Addison-Wesley Longman Ltd (February 1, 2005)
3. Scientific & Legal Applications of Bloodstain Pattern Interpretation – Stuart H. James CRC Press; 1st edition (June 29, 1998)

Subject- BASICS OF FORENSIC PSYCHOLOGY- LAB

Subject Code- FS208

1. To review a crime case involving serial murders. Comment on the psychological traits of the accused.
2. To study a criminal case in which hypnosis was used as a means to detect deception.
3. To prepare a case report on thematic appreciation test.
4. To prepare a case report on Minnesota multiphase personality inventory test.
5. To prepare a case report on thematic appreciation test.
6. To prepare a case report on word association test.
7. To prepare a case report on Bhatia's battery of performance test of intelligence.
8. To cite a criminal case in which Narco analysis was used as a means to detect deception.

SUGGESTED READINGS:

1. Criminal Profiling-An Introduction to Behavioural Evidence analysis', Brent Turvey, Academic Press; 4th edition (13 May 2011)
2. Handbook of Forensic Psychology', Prof Dr. Vimala Veeraraghwan, Edition 1st, Elsevier
3. Handbook of Forensic Psychology', Irving B. Weiner, Allen K. Hiss, Edition 3rd , 2006, Wiley Publication.
4. Theoretical Psychology', Moazziz Ali Beg, Sangeeta Gupta Beg, Vol[04], Edition 2nd, 2013, Global Vision Publishing House, New Delhi.
5. 'Abnormal Psychology-The Problem of Maladaptive Behaviour', Irwin G. Sarson, Barbara R. Sarson, Edition 11th, 2012, PHI Publication, New Delhi.