FACULTY OF CHEMICAL SCIENCES

SYLLABUS

FOR

B.Sc. in Forensic Sciences

(SEMESTER – I & II)

(Under Choice based Credit System)

Examinations: 2021 Onwards

I K GUJRAL PUNJAB TECHNICAL UNIVERSITY KAPURTHALA

Note:

(i) Subject to change in the syllabi at any time. Please visit the University website time to time.

IK Gujral Punjab Technical University

VISION

To be an institution of excellence in the domain of higher technical education that serves as the fountainhead for nurturing the future leaders of technology and techno- innovation responsible for the techno-economic, social, cultural and environmental prosperity of the people of the State of Punjab, the Nation and the World.

MISSION

To provide seamless education through the pioneering use of technology, in partnership with industry and society with a view to promote research, discovery and entrepreneurship and
To prepare its students to be responsible citizens of the world and the leaders of technology and techno-innovation of the 21st Century by developing in them the desirable knowledge, skill and attitudes base for the world of work and by instilling in them a culture for seamlessness in all facets of life.

OBJECTIVES

To offer globally-relevant, industry-linked, research-focused, technology- enabled seamless education at the graduate, postgraduate and research levels in various areas of engineering & technology and applied sciences keeping in mind that the manpower so spawned is excellent in quality, is relevant to the global technological needs, is motivated to give its best and is committed to the growth of the Nation;

To foster the creation of new and relevant technologies and to transfer them to industry for effective utilization;

To participate in the planning and solving of engineering and managerial problems of relevance to global industry and to society at large by conducting basic and applied research in the areas of technologies. To develop and conduct continuing education programmes for practicing engineers and managers with a view to update their fundamental knowledge base and problem-solving capabilities in the various areas of core competence of the University;

To develop strong collaborative and cooperative links with private and public sector industries and government user departments through various avenues such as undertaking

of consultancy projects, conducting of collaborative applied research projects, manpower development programmes in cutting-edge areas of technology, etc;

To develop comprehensive linkages with premier academic and research institutions within the country and abroad for mutual benefit;

To provide leadership in laboratory planning and in the development of instructional resource material in the conventional as well as in the audio- visual, the video and computer-based modes;

To develop programmes for faculty growth and development both for its own faculty as well as for the faculty of other engineering and technology institutions;

To anticipate the global technological needs and to plan and prepare to cater to them;

To interact and participate with the community/society at large with a view to inculcate in them a feel for scientific and technological thought and endeavour; and

To actively participate in the technological development of the State of Punjab through the undertaking of community development programmes including training and education programmes catering to the needs of the unorganized sector as well as that of the economically and socially weaker sections of society.

ACADEMIC PHILOSOPHY

The philosophy of the education to be imparted at the University is to awaken the **"deepest potential"** of its students as holistic human beings by nurturing qualities of self-confidence, courage, integrity, maturity, versatility of mind as well as a capacity to face the challenges of tomorrow so as to enable them to serve humanity and its highest values in the best possible way.

TITLE OF THE PROGRAM: B.Sc. FORENSIC SCIENCES

YEAR OF IMPLEMENTATION: New Syllabus will be implemented from October 2021 onwards.

DURATION: The course shall be three years, with semester system (6 semesters, with two semesters in a year). The Choice based credit system will be applicable to all the semesters.

ELGIBILITY FOR ADMISSION: Candidates with 50% marks (5% relaxation for SC/ST) in aggregate in 10+2 with Medical (Physics, Chemistry & Biology)

INTAKE CAPACITY: 30 (Thirty)

MEDIUM OF INSTRUCTION: English.

SCHEME OF THE PROGRAM:

Semester-I

Sr. No.	Course Code	Course Type	Course Title	L-T-P*	Credits	Marks Distribution		Marks
						Internal	External	
1.	BFS 101-21	Core Theory	Introduction to Forensic Science	3-1-0	4	40	60	100
2.	BFS 102-21	Core Theory	Crime & Society	3-1-0	4	40	60	100
3.	BFS 103-21	Core Theory	Forensic Chemistry	3-1-0	4	40	60	100
4.	BFS 104-21	Core Practical/Lab	Introduction to Forensic Science Practicals	0-0-4	2	60	40	100
5.	BFS 105-21	Core Practical/Lab	Crime & Society Practicals	0-0-4	2	60	40	100
6.	BFS 106-21	Core Practical/Lab	Forensic Chemistry Practical	0-0-4	2	60	40	100
6.	BTHU 103-18	Ability Enhancement Compulsory Course (AECC)-I	English	1-0-0	1	40	60	100
7.	BTHU 104-18	Ability Enhancement Compulsory Course-(AECC)	English Practical/Laboratory	0-0-2	1	30	20	50
8.	HVPE-101-18	Ability Enhancement Compulsory Course-(AECC)	Human Values, De-addiction & Traffic Rules	3-0-0	3	40	60	100
9.	HVPE-102-18	Ability Enhancement Compulsory Course-(AECC)	Human Values, De-addiction & Traffic Rules (Lab/Seminar)	0-0-1	1	25	--**	25
10.	BMPD 102-18		Mentoring & Professional Development	0-0-1	1	25	--**	25
		Total		13-3-12	23	460	440	900

Second Semester

Course Code	Course Type	**Course Title**	**Load Allocations**			**Marks Distribution**		**Total Marks**	**Credits**
			L*	T*	P	Internal	External		
BFS-201-21	Core Theory	Criminal Law	3	1	0	40	60	100	4
BFS-202-21	Core Theory	Forensic Psychology	3	1	0	40	60	100	4
BFS-203-21	Core Theory	Criminalistics	3	1	0	40	60	100	4
BFS-204-21	Core Practical/Laboratory	Criminal Law Practical	0	0	4	60	40	100	2

BFS-205-21	Core Practical/Laboratory	Criminalistics Practical	0	0	4	60	40	100	2
BFS-206-21	Core Practical/Laboratory	Forensic Psychology	0	0	4	60	40	100	2
BFS-207-21	Ability Enhancement Compulsory Course (AECC) - III	Forensic Science & Society	2	0	0	40	60	100	2
EVS-102-18	Ability Enhancement Compulsory Course (AECC) - IV	Environmental Science	2	0	0	40	60	100	2
	TOTAL		**13**	**03**	**12**	**380**	**420**	**800**	**22**

*A course can either have four Hrs Lecture or Three Hrs Lecture + One Hrs Tutorial as per requirement

**The Human Values, De-addiction and Traffic Rules (Lab/ Seminar) and Mentoring and Professional Development course will have internal evaluation only.

EXAMINATION AND EVALUATION

THEORY					
S.No.			Weightage in Marks		Remarks
1	Internal Evaluation	Mid-Semester Examination	30	10	MSTs, Quizzes, assignments, attendance, etc. Constitute internal evaluation. Best of two mid-semester exams will
2		Attendance	5	5	
3		Assignments	5	5	

					be considered for evaluation
4	External Evaluation	End-Semester Examination	60	30	Conduct and checking of the answer sheets will be at the university level.
	Total		**100**	**50**	
PRACTICAL					
1	Internal Evaluation	Daily evaluation of practical performance/ record/ viva voce	15		
2		Attendance	5		
3		Internal Practical Examination	10		
4	External Evaluation	Final Practical Examination	20		
		Total	**50**		

PATTERN OF END-SEMESTER EXAMINATION

I. **Part A** will be One Compulsory question consisting of short answer type questions [Q No. 1(a-h)] covering whole syllabus. There will be no choice in this question. It will be of 16 marks comprising of **8 questions of 2 marks each**.

II. **Part B** will be comprising of eight questions [2-9]. Student will have to attempt any six questions from this part. It will be of 24 marks with **6 questions of 4 marks each**.

1. **Part C** will be comprising of two compulsory questions with internal choice in both these questions [10-11]. It will be of 20 marks with **2 questions of 10 marks each**.

SYLLABUS OF THE PROGRAM

The syllabus has been upgraded as per provision of the UGC module and demand of the academic environment. The contents of the syllabus have been duly arranged unit wise and included in such a manner so that due importance is given to requisite intellectual and laboratory skills. The application part of the respective contents has been appropriately emphasized.

SEMESTER-I

I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY				
Course Name	**B.Sc. in Forensic Sciences**			
Subject Code:	**BFS 101-21**			
Subject Title:	**Basics of Forensic Sciences**			
Contact Hours:	**L:3**	**T:1**	**P:0**	**Credits:4**
Examination Duration (hours)	**3**			
Objective(s):	To teach the fundamental concepts of Forensic Sciences			

Unit	Contents	Contact Hours
I	**History of Development of Forensic Science in India** Functions of forensic science. Historical aspects of forensic science. Definitions and concepts in forensic science. Scope of forensic science. Need of forensic science. Basic principles of forensic science.	12
II	**Tools and Techniques in Forensic Science** Branches of forensic science. Forensic science in international perspectives, including set up of INTERPOL and FBI. Duties of forensic scientists. Code of conduct for forensic scientists. Qualifications of forensic scientists. Data depiction. Report writing.	12
III	**Organizational set up of Forensic Science Laboratories in India** Hierarchical set up of Central Forensic Science Laboratories, State Forensic Science Laboratories, Government Examiners of Questioned Documents, Fingerprint Bureaus, National Crime Records Bureau, Police & Detective Training Schools, Bureau of Police Research & Development, Directorate of Forensic Science and Mobile Crime Laboratories. Police Academies. Police dogs. Services of crime laboratories. Basic services and optional services.	12
IV	**Domains in Forensic Science**: Branches of Forensic Science, Police officers, Prosecution, Judicial Officers and Medico legal expert etc. Role and Qualifications of forensic scientists. Code of conduct for forensic scientists, Ethical issue in Forensic Science, professional standards for practice of Criminalistics, sanction against expert for unethical conduct.	10

Reference Books

S.No.	Author(s)	Title of the Book	Publisher/Year
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*,	CRC Press, Boca Raton (2005).
4	W.G. Eckert and R.K. Wright	*Introduction to Forensic Sciences*, 2nd Edition, W.G. Eckert (ED.)	CRC Press, Boca Raton (1997).

I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY				
Course Name	**B.Sc. in Forensic Sciences**			
Subject Code:	**BFS 102-21**			
Subject Title:	**Crime & Society**			
Contact Hours:	**L:3**	**T:1**	**P:0**	**Credits:4**
Examination Duration (hours)	**3**			
Objective(s):	To teach the importance of criminology, causes and consequences of crime in society.			

Details of the Course (Crime & Society)

Unit	Contents	Contact Hours
I	**Basics of Criminology** Definition, aims and scope. Theories of criminal behavior – classical, positivist, sociological. Criminal anthropology.Criminal profiling. Understanding modus operandi. Investigative strategy. Role of media.	8
II	**Crime** Elements, nature, causes and consequences of crime. Deviant behavior. Hate crimes, organized crimes and public disorder, domestic violence and workplace violence. White collar crimes Victimology. Juvenile delinquency. Social change and crime. Psychological Disorders and Criminality. Situational crime prevention.	12
III	**Criminal Justice System** Broad components of criminal justice system. Policing styles and principles. Police's power of investigation. Filing of criminal charges. Community policing. Policing a heterogeneous society. Correctional measures and rehabilitation of offenders. Human rights and criminal justice system in India.	12
IV	**Crime Scene Investigation and Management** Types and classification of Crime Scene, Crime Scene Management, Initial response, Securing the scene of crime, Various crime scene search methods, Various methods of preservation of crime scene: Photography, Sketching, Videography, Voice Recording, Notes taking. Collection methods and labelling, packing and forwarding of evidences, documentation and chain of custody, Role of First Responding Officer and Investigating officer.	12

Reference Books

S.No.	Author(s)	Title of the Book	Publisher/Year
1	S.H. James and J.J. Nordby	*Forensic Science: An Introduction to Scientific and Investigative Techniques*,	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).

I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY				
Course Name	**B.Sc. in Forensic Sciences**			
Subject Code:	**BFS 103-21**			
Subject Title:	**Basics in Forensic Chemistry**			
Contact Hours:	**L:3**	**T:1**	**P:0**	**Credits:4**
Examination Duration (hours)	**3**			
Objective(s):	**To teach the fundamental concepts of cell biology & biochemistry.**			

Unit	**Contents**	**Contact Hours**
I	Organic Chemistry: Structure & Bonding Introduction, hybridization, nature of chemical bonding, polarization, hydrogen bonding, Van-der walls forces, elementary ideas of Inductive effect, Electromeric effect, Resonance effect, Hyperconjugation. Types of Organic reactions: Addition, Substitution, Elimination and Rearrangement Reaction. Reactive Intermediates: Formation, Geometry and stability of carbocations, carbanions, free radicals and carbenes.	12
II	Inorganic Chemistry: Atomic Structure Heisenberg's uncertainty principle, Schrodinger wave equation, Quantum numbers, shapes of s, p & d orbitals. Aufbau principle, Pauli's exclusion principle and Hund's rule of maximum multiplicity. Periodic Table, Periodic properties, atomic & ionic radii, ionization energy, electron affinity and electronegativity and their trends in periodic table. Factors affecting ionization potential.	12
III	Physical Chemistry: Adsorption & catalysis Adsorption, types, applications & factors affecting adsorption. Catalysis, homogeneous & heterogeneous catalysis, enzyme catalysis, autocatalysis. Rate of a reaction, factors affecting rate of a reaction, zero & first order reactions, half life of a reaction, activation energy, transition state theory and collision theory.	12
IV	Analytical Chemistry: Gravimetric & volumetric analysis Principle, theory and types and applications of gravimetric & volumetric analysis	8

Reference Books

S.No.	**Author(s)**	**Title of the Book**	**Publisher/Year**
1	Lee, J.D.	Concise Inorganic Chemistry	ELBS, 1991.
2	Douglas, B.E. and Mc Daniel D.H.	Concepts & Models of Inorganic Chemistry	Oxford, 1970
3	R.T. Morrison & P.S. Boyd	Organic Chemistry	Allyn and Bacon Inc., Boston, 1992
4	D. W. Ball	Physical Chemistry	Thomson Press, India (2007)

I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY				
Course Name	**B.Sc. in Forensic Sciences**			
Subject Code:	**BFS 104-21**			
Subject Title:	**Basics of Forensic Sciences Practical**			
Contact Hours:	**L:0**	**T:0**	**P:4**	**Credits:2**
Examination Duration (hours)	**3**			
Objective(s):	To make the students learn practical aspects of Forensic Sciences			

Sr. No.	**Contents**	**Contact Hours**
I	1. To study the history of crime cases from forensic science perspective. 2. To cite examples of crime cases in which apprehensions arose because of Daubert standards. 3. To review the sections of forensic science at INTERPOL and compare with those in Central Forensic Science Laboratories in India. Include suggestions for improvements if any. 4. To study the annual reports of National Crime Records Bureau and depict the data on different type of crime cases by way of smart art/templates. 5. To write report on different type of crime cases. 6. To review how the Central Fingerprint Bureau, New Delhi, coordinates the working of State Fingerprint Bureaus. 7. To examine the hierarchical set up of different forensic science establishments and suggest improvements. 8. To examine the list of projects undertaken by the Bureau of Police Research and Development and suggest the thrust areas of research in Police Science. 9. To compare and contrast the role of a Police Academy and a Police Training School. 10. To compare the code of conduct prescribed by different establishments for forensic scientists.	

Reference Books

S.No.	**Author(s)**	**Title of the Book**	**Publisher/Year**
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*,	CRC Press, Boca Raton (2005).
4	W.G. Eckert and R.K. Wright	*Introduction to Forensic Sciences*, 2nd Edition, W.G. Eckert (ED.)	CRC Press, Boca Raton (1997).

I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY				
Course Name	**B.Sc. in Forensic Sciences**			
Subject Code:	**BFS 105-21**			
Subject Title:	**Crime & Society Practical**			
Contact Hours:	**L:0**	**T:0**	**P:4**	**Credits:2**
Examination Duration (hours)	**3**			
Objective(s):	To make the students learn practical aspects of subject Crime & Society			

Sr. No.	**Contents**	**Contact Hours**
I	1. To review past criminal cases and elucidate which theory best explains the criminal behavior of the accused. 2. To review crime cases where criminal profiling assisted the police to apprehend the accused. 3. To cite examples of crime cases in which the media acted as a pressure group. 4. To evaluate the post-trauma stress amongst victims of racial discrimination. 5. To correlate deviant behavior of the accused with criminality (take a specific example). 6. To evaluate victimology in a heinous crime. 7. To examine a case of juvenile delinquency and suggest remedial measures. 8. To evaluate how rising standards of living affect crime rate. 9. To review the recommendations on modernization of police stations and evaluate how far these have been carried out in different police stations. 10. To visit a 'Model Police Station' and examine the amenities vis-à-vis conventional police stations. 11. To examine steps being taken for rehabilitation of former convicts and suggest improvements. 12. To prepare a report on interrogation cells and suggest improvements.	

Reference Books

S.No.	**Author(s)**	**Title of the Book**	**Publisher/Year**
1	S.H. James and J.J. Nordby	*Forensic Science: An Introduction to Scientific and Investigative Techniques,*	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).
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I.K. Gujral Punjab Technical University, Kapurthala

I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY				
Course Name	**B.Sc. in Forensic Sciences**			
Subject Code:	**BFS 106-21**			
Subject Title:	**Forensic Chemistry Practical**			
Contact Hours:	**L:0**	**T:0**	**P:4**	**Credits:2**
Examination Duration (hours)	**3**			
Objective(s):	To make the students learn practical aspects of Forensic chemistry			

Sr. No.	**Contents**
I	1. To determine the density of given liquid. 2. To determine relative viscosity of given organic liquids by viscometer. 3. To determine the surface tension of given liquid by Stalgnometer. 4. To study kinetics of acid catalyzed ester hydrolysis. 5. Determination of hardness of water from a given sample of water by EDTA method. 6. Organic qualitative analysis. 7. To determine strength of given acid. 8. To standardize the given NaOH solution & find the strength of given HCl solution. 9. Paper Chromatography of toxic metal ions. 10. Thin Layer Chromatography of Organic poisons. 11. Identification of toxic metal ions in given solution by colour tests. 12. Identification of adulteration in petrol using density method. 13. Iodometric estimation of copper.

Reference Books

S.No.	**Author(s)**	**Title of the Book**	**Publisher/Year**
1	J.B. Yadav	Practical Physical Chemistry	Krishna
2	Vogel, A.I.	Vogel's book on Inorganic Qualitative Analysis	ELBS
3	F.G. Mann and B. C. Saunders	Practical Organic Chemistry	Longman, New York

I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY				
Course Name	**B.Sc. in Forensic Sciences**			
Subject Code:	**BTHU101-18**			
Subject Title:	**English**			
Contact Hours:	**L:1**	**T:0**	**P:0**	**Credits:4**
Examination Duration (hours)	**3**			
Objective(s):	**To learn effective communication both oral & written.**			

Unit	**Contents**	**Contact Hours**
I	Theory of Communication Types and modes of Communication	4
II	Language of Communication Verbal and Non-verbal (Spoken & verbal), Personal, Social and Business Barriers and Strategies, Intra-personal, Inter-personal and Group communication	6
III	**Reading and Understanding** Close Reading, Comprehension, Summary Paraphrasing, Analysis and Interpretation, Translation(from Hindi/Punjabi to English and vice-versa), Literary/Knowledge Texts	10
IV	Documenting, Report Writing, Making Notes, Letter Writing	10

Reference Books

1. *Fluency in English* - Part II, Oxford University Press, 2006.
2. *Business English*, Pearson, 2008.
3. *Language, Literature and Creativity*, Orient Blackswan, 2013.
4. *Language through Literature* (forthcoming) ed. Dr. Gauri Mishra, Dr Ranjana Kaul, Dr Brati Biswas
5. *On Writing Well*. William Zinsser. Harper Resource Book. 2001
6. *Study Writing.* Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.

I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY				
Course Name	**B.Sc. in Forensic Sciences**			
Subject Code:	**BTHU102-18**			
Subject Title:	**English Practical**			
Contact Hours:	**L:0**	**T:0**	**P:4**	**Credits:2**
Examination Duration (hours)	**3**			
Objective(s):	**To learn effective communication both oral & written.**			

Sr. No.	**Contents**
I	**Interactive practice sessions in Language Lab on Oral Communication** Listening Comprehension Self Introduction, Group Discussion and Role Play Common Everyday Situations: Conversations and Dialogues Communication at Workplace Interviews Formal Presentations, Effective Communication/ Mis-communication Public Speaking

Reference Books

a. *Fluency in English* - Part II, Oxford University Press, 2006.
b. *Business English*, Pearson, 2008.
c. Practical English Usage. Michael Swan. OUP. 1995.
d. *Communication Skills*. Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.
e. *Exercises in Spoken English*. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY				
Course Name	**B.Sc. in Forensic Sciences**			
Subject Code:	**HVPE-101-18**			
Subject Title:	**Human Values, De-addiction & Traffic Rules**			
Contact Hours:	**L:3**	**T:0**	**P:0**	**Credits:3**
Examination Duration (hours)	**3**			
Objective(s):	**To develop a sense of social responsibility, traffic rules and about menace of drugs.**			

Unit	Contents	Contact Hours
I	**Course Introduction – Need, Basic Guidelines, Content and Process for Value Education** Understanding the need, basic guidelines, content and process for Value Education Self Exploration–what is it? – its content and process; 'Natural Acceptance' and Experiential Validation-as the mechanism for self exploration Continuous Happiness and Prosperity- A look at basic Human Aspirations Right understanding, Relationship and Physical Facilities- the basic requirements for 19ulfilment of aspirations of every human being with their correct priority Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario Method to 19ulfil the above human aspirations: understanding and living in harmony at various levels	6
II	**Understanding Harmony in the Human Being – Harmony in Myself!** Understanding human being as a co-existence of the sentient 'I' and the material 'Body' Understanding the needs of Self ('I') and 'Body' – *Sukh* and *Suvidha* Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer) Understanding the characteristics and activities of 'I' and harmony in 'I' Understanding the harmony of I with the Body: *Sanyam* and *Swasthya*; correct appraisal of Physical needs, meaning of Prosperity in detail Programs to ensure *Sanyam* and *Swasthya* Practice Exercises and Case Studies will be taken up in Practice Sessions.	6
III	**Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship** Understanding harmony in the Family- the basic unit of human interaction Understanding values in human-human relationship; meaning of *Nyaya* and program for its 19ulfilment to ensure *Ubhay-tripti*; Trust (*Vishwas)* and Respect (*Samman)* as the foundational values of relationship Understanding the meaning of *Vishwas*; Difference between intention and competence Understanding the meaning of *Samman*, Difference between respect and differentiation; the other salient values in relationship Understanding the harmony in the society (society being an extension of family): *Samadhan, Samridhi, Abhay, Sah-astitva* as comprehensive Human Goals	6

	Visualizing a universal harmonious order in society- Undivided Society (*AkhandSamaj),* Universal Order (*SarvabhaumVyawastha)*- from family to world family! Practice Exercises and Case Studies will be taken up in Practice Sessions	
IV	**Understanding Harmony in the Nature and Existence – Whole existence as Co-existence** Understanding the harmony in the Nature Interconnectedness and mutual 20ulfilment among the four orders of nature-recyclability and self-regulation in nature Understanding Existence as Co-existence (*Sah-astitva*) of mutually interacting units in all-pervasive space Holistic perception of harmony at all levels of existence Practice Exercises and Case Studies will be taken up in Practice Sessions.	4
V	**Implications of the above Holistic Understanding of Harmony on Professional** Natural acceptance of human values Definitiveness of Ethical Human Conduct Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order Competence in professional ethics: Ability to utilize the professional competence for augmenting universal human order, Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, Ability to identify and develop appropriate technologies and management patterns for above production systems. Case studies of typical holistic technologies, management models and production systems Strategy for transition from the present state to Universal Human Order: At the level of individual: as socially and ecologically responsible engineers, technologists and managers b) At the level of society: as mutually enriching institutions and organizations	6

Reference Books

Text Book

R R Gaur, R Sangal, G P Bagaria, 2009, *A Foundation Course in Value Education*.

Reference Books

1. Ivan Illich, 1974, *Energy & Equity*, The Trinity Press, Worcester, and HarperCollins, USA
2. E.F. Schumacher, 1973, *Small is Beautiful: a study of economics as if people mattered*, Blond & Briggs, Britain.
3. A Nagraj, 1998, *Jeevan Vidya ek Parichay*, Divya Path Sansthan, Amarkantak.
4. Sussan George, 1976, *How the Other Half Dies*, Penguin Press. Reprinted 1986, 1991

5. PL Dhar, RR Gaur, 1990, *Science and Humanism*, Commonwealth Purblishers.
6. A.N. Tripathy, 2003, *Human Values*, New Age International Publishers.

7. Subhas Palekar, 2000, *How to practice Natural Farming*, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
8. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, *Limits to Growth*
– *Club of Rome's report*, Universe Books.
9. E G Seebauer & Robert L. Berry, 2000, *Fundamentals of Ethics for Scientists & Engineers* , Oxford University Press
10. M Govindrajran, S Natrajan & V.S. Senthil Kumar, *Engineering Ethics (including Human Values)*, Eastern Economy Edition, Prentice Hall of India Ltd.
11. B P Banerjee, 2005, *Foundations of Ethics and Management*, Excel Books.
12. B L Bajpai, 2004, *Indian Ethos and Modern Management*, New Royal Book Co., Lucknow. Reprinted 2008.

Relevant CDs, Movies, Documentaries & Other Literature:

1. Value Education website, *http://uhv.ac.in*

2. Story of Stuff, *http://www.storyofstuff.com*

3. Al Gore, *An Inconvenient Truth*, Paramount Classics, USA

4. Charlie Chaplin, *Modern Times*, United Artists, USA

5. IIT Delhi, *Modern Technology – the Untold Story*

I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY				
Course Name	**B.Sc. in Forensic Sciences**			
Subject Code:	**HVPE102-18**			
Subject Title:	**Human Values, De-addiction & Traffic Rules Lab/Seminar**			
Contact Hours:	**L:0**	**T:0**	**P:4**	**Credits:2**
Examination Duration (hours)	**3**			
Objective(s):	**To develop a sense of social responsibility, traffic rules and about menace of drugs.**			

Sr. No.	**Contents**
I	One each seminar will be organized on Drug De-addiction and Traffic Rules. Eminent scholar and experts of the subject will be called for the Seminar atleast once during the semester. It will be binding for all the students to attend the seminar

I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY				
Course Name	**B.Sc. in Forensic Sciences**			
Subject Code:	**BMPD 102-18**			
Subject Title:	**Mentoring & Professional Development**			
Contact Hours:	**L:0**	**T:0**	**P:1**	**Credits:1**
Examination Duration (hours)	**3**			
Objective(s):	**To learn the life long learning skills.**			

Sr. No.	**Contents**
I	**Part-A (Class Activities)** 1. Expert and video lectures 2. Aptitude Test 3. Group Discussion 4. Quiz (General/Technical) 5. Presentations by the students 6. Team building Exercises 7* A part of above six points practicals on Fundamentals of Computers are also added as per Annexure-I
II	**Part-B (Outdoor Activities)** 1. Sports/NSS/NCC 2. Society Activities of various students chapter i.e. ISTE, SCIE, SAE, CSI, Cultural Club, etc.

Evaluation shall be based on rubrics for Part – A & B

Mentors/Faculty incharges shall maintain proper record student wise of each activity conducted and the same shall be submitted to the department.

I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY				
Course Name	**B.Sc. in Forensic Sciences**			
Subject Code:	**BFS 201-21**			
Subject Title:	**Criminal Law**			
Contact Hours:	**L:3**	**T:1**	**P:4**	**Credits:6**
Examination Duration (hours)	**3**			
Objective(s):	To Learn & Understand: *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*			

Details of Syllabus

Unit	Contents	Contact Hours
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. Summary trials – Section 260(2). Judgements in abridged forms – Section 355.	12
II	Indian Penal Code pertaining to offences against persons – Sections 121A, 299, 300, 302, 304A, 304B, 307, 309, 319, 320, 324, 326, 351, 354, 359, 362. Sections 375 & 377 and their amendments. Indian Penal Code pertaining to offences against property Sections – 378, 383, 390, 391, 405, 415, 420, 441, 463, 489A, 497, 499, 503, 511. Indian Evidence Act – Evidence and rules of relevancy in brief. Expert witness. Cross examination and re-examination of witnesses. Sections 32, 45, 46, 47, 57, 58, 60, 73, 135, 136, 137, 138, 141.Section 293 in the code of criminal procedure.	14
III	**Constitution of India** Preamble, Fundamental Rights, Directive Principles of State Policy. – Articles 14, 15, 20, 21, 22, 51A.	10
IV	**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	16

Reference Books

III D.A. Bronstein, *Law for the Expert Witness*, CRC Press, Boca Raton (1999).

JJJ Vipa P. Sarthi, *Law of Evidence*, 6th Edition, Eastern Book Co., Lucknow (2006).

KKK A.S. Pillia, *Criminal Law*, 6th Edition, N.M. Tripathi Pvt Ltd., Mumbai (1983).

LLL R.C. Nigam, *Law of Crimes in India*, Volume I, Asia Publishing House, New Delhi (1965).

MMM (Chief Justice) M. Monir, *Law of Evidence*, 6th Edition, Universal Law Publishing Co. Pvt. Ltd., New Delhi (2002).

I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY				
Course Name	**B.Sc. in Forensic Sciences**			
Subject Code:	**BFS 202-21**			
Subject Title:	**Forensic Psychology**			
Contact Hours:	**L:3**	**T:1**	**P:4**	**Credits:6**
Examination Duration (hours)	**3**			
Objective(s):	To Learn & Understand: 1. *The overview of forensic psychology and its applications.* 2. *The legal aspects of forensic psychology.* 3. *The significance of criminal profiling.* 4. *The importance of psychological assessment in gauging criminal behavior.* 5. *The tools and techniques required for detection of deception.* 6. *The critical assessment of advanced forensic techniques like polygraphy, narco analysis and brain electrical oscillation signatures.*			

Details of Syllabus

Unit	Contents	Contact Hours
I	**Basics of Forensic Psychology** Definition and fundamental concepts of forensic psychology and forensic psychiatry. Psychology and law. Ethical issues in forensic psychology. 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.	10
II	**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. Juvenile delinquency – theories of offending (social cognition, moral reasoning), Child abuse (physical, sexual, emotional), juvenile sex offenders, legal controversies.	12
III	**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.	08

Reference Books

4. 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).
5. R. Saferstein, *Criminalistics*, 8th Edition, Prentice Hall, New Jersey (2004).
6. J.C. DeLadurantey and D.R. Sullivan, *Criminal Investigation Standards*, Harper & Row, New York (1980).

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

I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY				
Course Name	**B.Sc. in Forensic Sciences**			
Subject Code:	**BFS 203-21**			
Subject Title:	**Criminalistics**			
Contact Hours:	**L:3**	**T:1**	**P:4**	**Credits:6**
Examination Duration (hours)	**3**			
Objective(s):	To Learn & Understand: 1. *The methods of securing, searching and documenting crime scenes.* 2. *The art of collecting, packaging and preserving different types of physical and trace evidence at crime scenes.* 3. *The legal importance of chain of custody.* 4. *The tools and techniques for analysis of different types of crime scene evidence.*			

Details of Syllabus

Unit	Contents	Contact Hours
I	**Crime Scene Management** Types of crime scenes – indoor and outdoor. Securing and isolating the crime scene. Crime scene search methods. Safety measures at crime scenes. Legal considerations at crime scenes. Documentation of crime scenes – photography, videography, sketching and recording notes. Duties of first responders at crime scenes. Coordination between police personnel and forensic scientists at crime scenes. The evaluation of 5Ws (who?, what?, when?, where?, why?) and 1H (how?). Crime scene logs.	10
II	**Crime Scene Evidence** Classification of crime scene evidence – physical and trace evidence. Locard principle. Collection, labeling, sealing of evidence. Hazardous evidence. Preservation of evidence. Chain of custody. Reconstruction of crime scene.	8
III	**Forensic Physics-I** Glass evidence – collection, packaging, analysis. Matching of glass samples by mechanical fit and refractive index measurements. Analysis by spectroscopic methods. Fracture analysis and direction of impact. Paint evidence – collection, packaging and preservation. Analysis by destructive and non-destructive methods. Importance of paint evidence in hit and run cases. Fibre evidence – artificial and man-made fibres. Collection of fibre evidence. Identification and comparison of fibres. Semen and Blood based evidence, their collection, analysis and preservation.	10
IV	**Forensic Physics-II** Soil evidence – importance, location, collection and comparison of soil samples. Cloth evidence – importance, collection, analysis of adhering material. Matching of pieces. Toolmark evidence. Classification of toolmarks. Forensic importance of toolmarks. Collection, preservation and matching of toolmarks. Restoration of erased serial numbers and engraved marks. Forensic gemmology.	10

Reference Books

6. M. Byrd, *Crime Scene Evidence: A Guide to the Recovery and Collection of Physical Evidence*, CRC Press, Boca Raton (2001).
7. T.J. Gardener and T.M. Anderson, *Criminal Evidence*, 4th Ed., Wadsworth, Belmont (2001).
8. S.H. James and J.J. Nordby, *Forensic Science: An Introduction to Scientific and Investigative Techniques*, 2nd Edition, CRC Press, Boca Raton (2005).
9. W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's, *Techniques of Crime Scene Investigation*, CRC Press, Boca Raton (2013).

I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY				
Course Name	**B.Sc. in Forensic Sciences**			
Subject Code:	**BFS 204-21**			
Subject Title:	**Criminal Law Practical**			
Contact Hours:	**L:0**	**T:0**	**P:4**	**Credits:2**
Examination Duration (hours)	**3**			
Objective(s):	To make the students learn practical aspects of Criminal Law			

Sr. No.	Contents	
	1. To prepare a schedule of five cognizable and five non-cognizable offences 2. To study the powers and limitations of the Court of Judicial Magistrate of First Class. 3. To prepare a schedule of the offences which may be tried under Section 260(2) of Criminal Procedure Code. 4. To study a crime case in which an accused was punished on charge of murder under Section 302. 5. To study a crime case in which an accused was punished on charge of rape under Section 375. 6. To cite example of a case in which the opinion of an expert was called for under Section 45 of the Indian Evidence Act. 7. To cite a case wherein a person was detained under Article 22(5) of the Indian Constitution. Express your views whether the rights of the person as enlisted in this Article were taken care of. 8. To cite a case under Article 14 of the Constitution of India wherein the Right to Equality before Law was allegedly violated. 9. To list the restrictions imposed on Right to Freedom of Worship under the Constitution of India. 10. To prepare a schedule of persons convicted under Narcotics, Drugs and Psychotropic Act statistically analyze the age group to which they belonged. 11. To study a case in which Drugs and Cosmetic Act was invoked. 12. To study a case in which Explosive Substances Act was invoked. 13. To study a case in which Arms Act was invoked. 14. In light of Section 304B of the Indian Penal Code, cite a case involving dowry death. 15. To study a case wherein the Untouchability Offences Act was invoked on the basis of Article 15 of the Constitution of India.	

Reference Books:

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

I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY				
Course Name	**B.Sc. in Forensic Sciences**			
Subject Code:	**BFS 205-21**			
Subject Title:	**Forensic Psychology Practical**			
Contact Hours:	**L:0**	**T:0**	**P:4**	**Credits:2**
Examination Duration (hours)	**3**			
Objective(s):	To Learn & Understand practical aspects of Forensic Psychology			

Sr. No.	**Contents**	**Contact Hours**
I	6. To cite a crime case where legal procedures pertaining to psychic behavior had to be invoked. 7. To prepare a report on relationship between mental disorders and forensic psychology. 8. To review a crime case involving serial murders. Comment on the psychological traits of the accused. 9. To cite a crime case involving a juvenile and argue for and against lowering the age for categorizing an individual as juvenile. 10. To study a criminal case in which hypnosis was used as a means to detect deception. 11. To prepare a case report on thematic appreciation test. 12. To prepare a case report on Minnesota multiphasic personality inventory test. 13. To prepare a case report on thematic appreciation test. 14. To prepare a case report on word association test. 15. To prepare a case report on Bhatia's battery of performance test of intelligence. 16. To cite a criminal case in which narco analysis was used as a means to detect deception.	

Reference Books

1. A.A. Moenssens, J. Starrs, C.E. Henderson and F.E. Inbau, *Scientific Evidence in Civil and Criminal Cases*, 4th Edition, The Foundation Press, Inc., New York (1995).
2. R. Saferstein, *Criminalistics*, 8th Edition, Prentice Hall, New Jersey (2004).
3. J.C. DeLadurantey and D.R. Sullivan, *Criminal Investigation Standards*, Harper & Row, New York (1980).
4. J. Niehaus, *Investigative Forensic Hypnosis*, CRC Press, Boca Raton (1999).

5. E. Elaad in *Encyclopedia of Forensic Science, Volume 2*, J.A. Siegel, P.J. Saukko and G.C. Knupfer (Eds.), Academic Press, London (2000).

I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY				
Course Name	**B.Sc. in Forensic Sciences**			
Subject Code:	**BFS 206-21**			
Subject Title:	**Criminalistics Practical**			
Contact Hours:	**L:0**	**T:0**	**P:4**	**Credits:2**
Examination Duration (hours)	**3**			
Objective(s):	To Learn & Understand practical aspects of Criminalistics			

Sr. No.	Contents	Contact Hours
I	13. To prepare a report on evaluation of crime scene. 14. To reconstruct a crime scene (outdoor and indoor). 15. To compare soil samples by density gradient method. 16. To compare paint samples by physical matching method. 17. To compare paint samples by thin layer chromatography method. 18. To compare glass samples by refractive index method. 19. To identify and compare tool marks. 20. To compare cloth samples by physical matching.	

Reference Books

1. M. Byrd, *Crime Scene Evidence: A Guide to the Recovery and Collection of Physical Evidence*, CRC Press, Boca Raton (2001).
2. T.J. Gardener and T.M. Anderson, *Criminal Evidence*, 4th Ed., Wadsworth, Belmont (2001).
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.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's, *Techniques of Crime Scene Investigation*, CRC Press, Boca Raton (2013).

I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY				
Course Name	**B.Sc. in Forensic Sciences**			
Subject Code:	**BFS 207-21**			
Subject Title:	**Forensic Science & Society**			
Contact Hours:	**L:2**	**T:0**	**P:0**	**Credits:2**
Examination Duration (hours)	**3**			
Objective(s):	To Learn & Understand: *1.Importance of forensic engineering.* *2.Importance of forensic archeology.* 3.*Importance of forensic intelligence.*			

Details of Syllabus

Unit	Contents	Contact Hours
I	**Forensic Engineering** Role of mechanical, electronics and computer engineers in forensic science. Accident investigations. Failure of signaling and control systems. Ergonomics. Applications of animations, simulations and digital imaging in solving crime cases. Episodes involving fire engineering.	8
II	**Forensic Archeology** Role of forensic archeology. Searching the archeological site. Methods of digging the burial site. Recovery of remains. Documenting the recovered material. Preservation of remains.	6
III	**Forensic Intelligence** Role of forensic intelligence in crime analysis. Methods of crime analysis. Databases in forensic intelligence. Management of serial crimes by application of forensic intelligence.	8

Reference Books

1. J.F. Brown and K.S. Obenski, *Forensic Engineering – Reconstruction of Accidents*, C.C. Thomas, Springfield (1990).
2. E.W. Killam, *The Detection of Human Remains*, C.C. Thomas, Springfield (1990).
3. R.K. Noon, *Introduction to Forensic Engineering*, CRC Press, Boca Raton (1992).
4. O. Ribaux and P. Margot in *Encyclopedia of Forensic Sciences*, Volume 1, J.A. Siegel, P.J. Saukko and G.C. Knupfer (Ed.), Academic Press, London (2000).

I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY				
Course Name	**B.Sc. in Forensic Sciences**			
Subject Code:	**EVS102-18**			
Subject Title:	**Environmental Studies**			
Contact Hours:	**L:2**	**T:0**	**P:0**	**Credits:2**
Examination Duration (hours)	**3**			
Objective(s):	**To learn the basics of Environmental issues.**			

Details of Syllabus

Unit	Contents	Contact Hours
I	Introduction to Environmental Studies Multidisciplinary nature of Environmental Studies: Scope & Importance Need for Public Awareness Ecosystems Concept of an Ecosystem: Structure & functions of an ecosystem (Producers, Consumers & Decomposers) Energy Flow in an ecosystem: Food Chain, Food web and Ecological Pyramids Characteristic features, structure & functions of following Ecosystems: • Forest Ecosystem • Aquatic Ecosystem (Ponds, Lakes, River & Ocean)	4
II	Natural Resources Renewable & Non-renewable resources Forest Resources: Their uses, functions & values (Biodiversity conservation, role in climate change, medicines) & threats (Overexploitation, Deforestation, Timber extraction, Agriculture Pressure), Forest Conservation Act Water Resources: Their uses (Agriculture, Domestic & Industrial), functions & values, Overexploitation and Pollution of Ground & Surface water resources (Case study of Punjab), Water Conservation, Rainwater Harvesting, Land Resources: Land as a resource; Land degradation, soil erosion and desertification. Energy Resources: Renewable & non-renewable energy resources, use of alternate energy resources (Solar, Wind, Biomass, Thermal), Urban problems related to Energy	8
III	Biodiversity & its conservation Types of Biodiversity: Species, Genetic & Ecosystem India as a mega biodiversity nation, Biodiversity hot spots and biogeographic regions of India Examples of Endangered & Endemic species of India, Red data book Environmental Pollution & Social Issues Types, Causes, Effects & Control of Air, Water, Soil & Noise Pollution Nuclear hazards and accidents & Health risks Global Climate Change: Global warming, Ozone depletion, Acid rain, Melting of Glaciers & Ice caps, Rising sea levels Environmental disasters: Earthquakes, Floods, Cyclones, Landslides	8
IV	Field Work Visit to a National Park, Biosphere Reserve, Wildlife Sanctuary Documentation & preparation of a Biodiversity (flora & fauna) register of campus/river/forest Visit to a local polluted site : Urban/Rural/Industrial/Agricultural Identification & Photography of resident or migratory birds, insects (butterflies) Public hearing on environmental issues in a village	16

Reference Books

1. Carson, R. 2002. *Silent Spring*. Houghton Mifflin Harcourt.

2. Gadgil, M., & Guha, R.1993. *This Fissured Land: An Ecological History of India*. Univ. of California Press.
3. Gleeson, B. and Low, N. (eds.) 1999.*Global Ethics and Environment*, London, Routledge.
4. Gleick, P. H. 1993. *Water in Crisis*. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.
5. Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll.*Principles of Conservation Biology*. Sunderland: Sinauer Associates, 2006.
6. Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from India's Himalaya dams. *Science*, 339: 36--- 37.
7. McCully, P. 1996. *Rivers no more: the environmental effects of dams*(pp. 29---64). Zed Books.
8. McNeill, John R. 2000. Something New Under the Sun: An Environmental History of the Twentieth Century.
9. Odum, E.P., Odum, H.T. & Andrews, J. 1971.*Fundamentals of Ecology*. Philadelphia: Saunders.
10. Pepper, I.L., Gerba, C.P. & Brusseau, M.L. 2011. Environmental and Pollution Science. Academic Press.
11. Rao, M.N. & Datta, A.K. 1987. *Waste Water Treatment*. Oxford and IBH Publishing Co. Pvt. Ltd.
12. Raven, P.H., Hassenzahl, D.M. & Berg, L.R. 2012.*Environment*. 8th edition. John Wiley & Sons.
13. Rosencranz, A., Divan, S., & Noble, M. L. 2001. *Environmental law and policy in India*. *Tripathi 1992*.
14. Sengupta, R. 2003. *Ecology and economics*: An approach to sustainable development. OUP.
15. Singh, J.S., Singh, S.P. and Gupta, S.R. 2014. *Ecology, Environmental Science and Conservation*. S. Chand Publishing, New Delhi.
16. Sodhi, N.S., Gibson, L. & Raven, P.H. (eds). 2013. *Conservation Biology*: *Voices from the Tropics*. John Wiley & Sons.
17. Thapar, V. 1998. *Land of the Tiger*: *A Natural History of the Indian Subcontinent*.
18. Warren, C. E. 1971. *Biology and Water Pollution Control*. WB Saunders.
19. Wilson, E. O. 2006.*The Creation: An appeal to save life on earth*. New York: Norton.
20. World Commission on Environment and Development. 1987.*Our Common Future*. Oxford University Press.

Semester	**Third (3rd)**

Course Code	**Course Type**	**Course Name / Title**	**Lord Allocation**				**Marks Distribution**		**Total Marks**	**Credit**
			Lecture	**Tutorial**	**Practical**	**Studio (If Applicable)**	**Internal**	**External**		
BFS-301-21	Theory	Forensic Dermatoglyphics	3	1	-	NA	40	60	100	4
BFS-302-21	Theory	Technological Methods in Forensic Science	3	1	-	NA	40	60	100	4
BFS-303-21	Theory	Forensic Biology and Serology	3	1	-	NA	40	60	100	4
BFS-304-21	Lab	Forensic Dermatoglyphics Lab	-	-	4	NA	60	40	100	2
BFS-305-21	Lab	Technological Methods in Forensic Science Lab	-	-	4	NA	60	40	100	2
BFS-306-21	Lab	Forensic Biology and Serology Lab	-	-	4	NA	60	40	100	2
BFS-307-21	Ability Enhancement Course	Handwriting Identification and Recognition	2	-	-	NA	40	60	100	2
BFS-308-21	Ability Enhancement Course	English and Communication Skills –I	2	-	-	NA	40	60	100	2

Semester	Fourth (4th)									
Course Code	Course Type	Course Name / Title	Load Allocation				Marks Distribution		Total Marks	Credit
			Lecture	Tutorial	Practical	Studio /If	Internal	External		
BFS-401-21	Theory	Forensic Ballistics	3	1	-	NA	40	60	100	4
BFS-402-21	Theory	Forensic Toxicology	3	1	-	NA	40	60	100	4
BFS-403-21	Theory	Forensic Anthropology	3	1	-	NA	40	60	100	4
BFS-404-21	Lab	Forensic Ballistics Practical	-	-	4	NA	60	40	100	2
BFS-405-21	Lab	Forensic Toxicology Practical	-	-	4	NA	60	40	100	2
BFS-406-21	Lab	Forensic Anthropology Practical	-	-	4	NA	60	40	100	2
BFS-407-21	Ability Enhancement Course	Introduction to Biometry	2	-	-	NA	40	60	100	2
BFS-408-21	Ability Enhancement Course	English and Communication Skills - II	2	-	-	NA	40	60	100	2

Detailed Syllabus:

Course Name	**B.Sc. in Forensic Sciences**			
Subject Code:	**BFS-301-21**			
Subject Title:	**Forensic Dermatoglyphics**			
Contact Hours:	**L:3**	**T:1**	**P:0**	**Credits:6**
Examination Duration (hours)	**3**			
Objective(s):	*Learning Objectives: After studying this paper the students will know–* *a. The fundamental principles on which the science of fingerprinting is based.* *b. Fingerprints are the most infallible means of identification.* *c. The world's first fingerprint bureau was established in India.* *d. The method of classifying criminal record by fingerprints was worked out in India, and by Indians.* *e. The physical and chemical techniques of developing fingerprints on crime scene evidence.* *f. The significance of foot, palm, ear and lip prints.*			

Details of Syllabus

Unit	Contents	Contact Hours
I	**Unit1: Introduction to Fingerprinting** Introduction and history, with special reference to India. Biological basis of fingerprints. Formation of ridges.	4
II	**Unit2: Basics of Fingerprinting** Fundamental principles of fingerprinting. Types of fingerprints. Fingerprint patterns. Fingerprint characters/minutiae. Plain and rolled fingerprints. Classification and cataloguing of fingerprint record. Automated Fingerprint Identification System. Significance of poroscopy and edgeoscopy.	12
III	**Unit3: Development of Fingerprints** Latent prints. Constituents of sweat residue. Latent fingerprints' detection by physical and chemical techniques. Mechanism of detection of	16

	fingerprints by different developing reagents. Application of light sources in fingerprint detection. Preservation of developed fingerprints. Digital imaging for fingerprint enhancement. Fingerprinting the deceased. Developing fingerprints on gloves.	
IV	**Unit4: Other Impressions** Importance of footprints. Casting of footprints, Electrostatic lifting of latent footprints. Palm prints. Lip prints Nature, location, collection and examination of lip prints. Ear prints and their significance. Palm prints and their historical importance.	10

Reference Books

1. J.E. Cowger, *Friction Ridge Skin*, CRC Press, Boca Raton(1983).
2. D.A. Ashbaugh, *Quantitative Qualitative Friction Ridge Analysis*, CRC Press, Boca Raton(2000).
3. C. Champod, C. Lennard, P. Margot an M. Stoilovic, *Fingerprints and other Ridge Skin Impressions*, CRC Press, Boca Raton (2004).
4. Lee and Gaensleen's, *Advances in Fingerprint Technology*,3rd Edition, R.S. Ramotowski(Ed.), CRC Press, Boca Raton (2013).

Course Name	**B.Sc. in Forensic Sciences**			
Subject Code:	**BFS-302-21**			
Subject Title:	**Technological Methods in Forensic Science**			
Contact Hours:	**L:3**	**T:1**	**P:0**	**Credits:6**
Examination Duration (hours)	**3**			
Objective(s):	*Learning Objectives: After studying this paper the students will know–* *a. Theimportanceofchromatographicandspectroscopictechniquesinprocessingcrimesceneevidence.* *b. The utility of colorimetry, electrophoresisandneutronactivationanalysisinidentifyingchemicalandbiologicalmaterials.* *c. Thesignificanceofmicroscopyinvisualizingtraceevidenceandcomparingitwithcontrolsamples.* *d. The usefulness of photography and videography for recording the crime scenes.*			

Details of Syllabus

Unit	Contents
I	**Unit1: Instrumentation** Sample preparation for chromatographic and spectroscopic evidence. Chromatographic methods. Fundamental principles and forensic applications of t chromatography, gas chromatography and liquid chromatography.
II	**Unit2: Spectroscopic methods.** Spectroscopic methods. Fundamental principles and forensic applications of Ultravi spectroscopy, infrared spectroscopy, atomic absorption spectroscopy, atomic emission spe and mass spectroscopy. X-ray spectrometry. Colorimetric analysis and Lambert-Beer law. Electrophoresis–fundamental principles and forensic applications.

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	Neutron activation analysis–fundamental principles and forensic applications.
III	**Unit3: Microscopy** Fundamental principles. Different types of microscopes. Electron microscope. C Microscope. Forensic applications of microscopy.
IV	**Unit4:Forensic photography** Basic principles and applications of photography in forensic science. 3Dphotography.Photographicevidence.Infraredandultravioletphotography.Digitalphotograp Crime scene and laboratory photography.

Reference Books

1. D.A.Skoog, D.M.West and F.J.Holler, *Fundamentals of Analytical Chemistry,*6thEdition,Saunders College Publishing, Fort Worth(1992).
2. W.Kemp, *Organic Spectroscopy*, 3rd Edition, Macmillan, Hampshire(1991).
3. J.W. Robinson, *Undergraduate Instrumental Analysis*, 5thEdition, Marcel Dekker,Inc.,NewYork(1995).
4. D.R.Redsicker,*The Practical Methodology of Forensic Photography*, 2ndEdition,CRCPress, Boca Raton (2000).

Course Name	**B.Sc. in Forensic Sciences**			
Subject Code:	**BFS-303-21**			
Subject Title:	**Forensic Biology and Serology**			
Contact Hours:	**L:3**	**T:1**	**P:0**	**Credits:6**
Examination Duration (hours)	**3**			
Objective(s):	*Learning Objectives: After studying this paper the students will know–* *a. The significance of biological and serological evidence.* *b. The forensic importance of hair evidence.* *c. The importance of biological fluids–blood,urine, semen,saliva,sweat and milk–in crime investigations.*			

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	The importance of blood stain patterns in reconstructing the crime scene

Details of Syllabus

Unit	Contents	Contact Hours
I	**Unit1: Biological Evidence** Nature and importance of biological evidence. Types and identification of microbial organisms of forensic significance. Identification of wood, leaves, pollens and juices as botanical evidence. Diatoms and their forensic significance.	8
II	**Unit2: Hair Evidence** Significance of hair evidence. Transfer, persistence and recovery of hair evidence. Structure of human hair. Comparison of hair samples. Morphology and biochemistry of human hair. Comparison of human and animal hair.	8
III	**Unit3: Forensic Importance of Body fluids** Identification of body fluids. Composition and functions of blood. Collection and preservation of blood evidence. Distinction between human and non-human blood. Determination of blood groups. Antigens and antibodies. Semen. Forensic significance of semen. Composition, functions and morphology of spermatozoa. Collection, evaluation and tests for identification of semen. Individualization on the basis of semen examination. Composition, functions and forensic significance of saliva, sweat, milk and urine. Tests for their identifications.	16
IV	**Unit4: Bloodstain Pattern Analysis** Blood stain characteristics. Impact blood-stain patterns. Cast-off blood-stain patterns. Projected blood stain patterns. Contact blood stain patterns. Blood trails. Bloodstain drying times. Documentation of blood-stain pattern evidence. Crime scene reconstruction with the aid of blood stains pattern analysis.	14

Reference Books

1. L.Stryer,*Biochemistry*, 3rd Edition,W.H.FreemanandCompany,NewYork(1988).
2. W.G.EckertandS.H.James,*Interpretation of Bloodstain Evidence at Crime Scenes*, CRCPress, Boca Raton (1989).
3. R.Saferstein, *Criminalistics*,8th Edition,PrenticeHall,NewJersey(2004).
4. G.T.DuncanandM.I.Tracey,Serology and DNA typingin, *Introduction to Forensic Sciences*,2ndEdition,W.G. Eckert (Ed.),CRC Press, BocaRaton(1997).
5. T.BevelandR.M.Gardner,*Blood stain Pattern Analysis*, 3rdEdition, CRC Press, Boca Raton(2008)

Course Name	**B.Sc. in Forensic Sciences**			
Subject Code:	**BFS-304-21**			
Subject Title:	**Forensic Dermatoglyphics Lab**			
Contact Hours:	**L:0**	**T:0**	**P:4**	**Credits:2**
Examination Duration (hours)	**3**			
Objective(s):	To make the students learn practical aspects of dermatoglyphics			

Sr. No.	**Contents**	
	1. To record plain and rolled fingerprints. 2. To carry out ten digit classification of fingerprints. 3. To identify different fingerprint patterns. 4. To identify core and delta. 5. To carry out ridge tracing and ridge counting. 6. To investigate physical methods of fingerprint detection. 7. To investigate chemical methods of fingerprint detection. 8. To use different light sources for enhancing developed fingerprints. 9. To prepare cast of foot prints.	

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Reference Books:

1. J.E.Cowger,*Friction RidgeSkin*, CRC Press,BocaRaton(1983).
2. D.A.Ashbaugh,*Quantitative-Qualitative Friction Ridge Analysis*, CRC Press,Boca Raton(2000).
3. C. Champod, C. Lennard, P. Margot an M. Stoilovic, *Fingerprints and other Ridge Skin Impressions*,CRC Press, BocaRaton (2004).
4. Lee and Gaensleen's, *Advances in Fingerprint Technology*, 3rdEdition, R.S.Ramotowski(Ed.), CRC Press, Boca Raton (2013).

Course Name	**B.Sc. in Forensic Sciences**			
Subject Title:	**Technological Methods in Forensic Science**			
Subject Code:	**BFS-305-21**			
Contact Hours:	**L:0**	**T:0**	**P:4**	**Credits:2**
Examination Duration (hours)	**3**			
Objective(s):	To Learn & Understand practical aspects of instrumentation			

Sr. No.	**Contents**	**Contact Hours**
I	1. To determine the concentration of a colored compound by colorimetry analysis. 2. To carry out thin layer chromatography of ink samples. 3. To carry out separation of organic compounds by paper chromatography. 4. To identify drug samples using UV-Visible spectroscopy.	

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	5. To take photographs using different filters. 6. To take photographs of crime scene exhibits at different angles. 7. To record videography of a crime scene.	

Reference Books

1. D.A.Skoog,D.M.WestandF.J.Holler,*FundamentalsofAnalyticalChemistry,*6thEdition,Saunders CollegePublishing, Fort Worth(1992).
2. W.Kemp,*OrganicSpectroscopy*, 3rd Edition,Macmillan,Hampshire(1991).
3. J.W.Robinson,*UndergraduateInstrumentalAnalysis*,5thEdition,MarcelDekker,Inc.,NewYork(1995).
4. D.R.Redsicker,*ThePracticalMethodologyofForensicPhotography*,2ndEdition,CRC Press, BocaRaton (2000).

Course Name	**B.Sc. in Forensic Sciences**			
Subject Code:	**BFS-306-21**			
Subject Title:	**Forensic Biology and Serology Lab**			
Contact Hours:	**L:0**	**T:0**	**P:4**	**Credits:2**
Examination Duration (hours)	**3**			
Objective(s):	To Learn & Understand practical aspects of biology and serology.			

Sr. No.	**Contents**	**Contact Hours**
I	1. To examine hair morphology and determine the species to which the hair belongs. 2. To prepare slides of scale pattern of human hair. 3. To examine human hair for cortex and medulla. 4. To carry out microscopic examination of pollen grains. 5. To carryout microscopic examination of diatoms.	

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	6. To determine blood group from fresh blood samples. 7. To carry out chemical identification of human blood. 8. To carry out crystal test of human blood. 9. To carry out cross-over electrophoresis. 10. To carry out identification of saliva. 11. To carry out identification of urine. 12. To study the correlation between impact angle and shape of bloodstain. 13. To identify the point of convergence from the bloodstain patterns.	

Reference Books

1. L.Stryer,*Biochemistry*, 3rd Edition,W.H.FreemanandCompany,NewYork(1988).
2. W.G.EckertandS.H.James,*InterpretationofBloodstainEvidenceatCrimeScenes*,CRCPress, BocaRaton (1989).
3. R.Saferstein, *Criminalistics*,8th Edition,PrenticeHall,NewJersey(2004).
4. G.T.DuncanandM.I.Tracey,SerologyandDNAtypingin,*IntroductiontoForensicSciences*,2ndEdition,W.G. Eckert (Ed.),CRC Press, BocaRaton(1997).
5. T.BevelandR.M.Gardner,*BloodstainPatternAnalysis*,3rdEdition,CRCPress,BocaRaton(2008).

Course Name	**B.Sc. in Forensic Sciences**			
Subject Code:	**BFS-307-21**			
Subject Title:	**Handwriting Identification and Recognition**			
Contact Hours:	**L:2**	**T:0**	**P:0**	**Credits:2**
Examination Duration (hours)	**3**			
Objective(s):	*Learning Objectives: After studying this paper the students will know–* *a. Important features in handwriting identification.* *b. Basis of handwriting characteristics.* *c. Significance of forensic documentation*			

Details of Syllabus

Unit	Contents	Contact Hours
I	**Unit1: Introduction to Handwriting**	4

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	Basis of handwriting identification. Characteristics of handwriting – scope and application. Class and individual characteristics.	
II	**Unit2: Handwriting Identification** Arrangement, alignment, margin, slant, speed, pressure, spacing, line quality, embellishments, movement and pen lifts. Factors influencing handwriting– physical, mechanical, genetic and physiological.	6
III	**Unit3: Handwriting Examination** Basis of handwriting comparison. Collection of handwriting samples. Forgery detection. Counterfeiting. Examination of altered and erased documents. Tools used in handwriting examination.	6
IV	**Unit4: Handwriting Recognition** Basisofhandwritingrecognition.Off-lineandon-linehandwritingrecognition.Stepsinvolved in handwriting recognition – pre-processing, feature extraction and classification. Applications of handwriting recognition.	8

Reference Books

1. O.Hilton,*ScientificExaminationofQuestionedDocuments*,CRCPress,BocaRaton(1982).
2. A.A.Moenssens,J.Starrs,C.E.HendersonandF.E.Inbau,*ScientificEvidenceinCivilandCriminal Cases*, 4thEdition,Foundation Press, New York(1995).
3. R.N.Morris,*Forensic Handwriting Identification:Fundamental Concepts and Principles*,Academic Press,London(2000).
4. E.David,*The Scientific Examination of Documents–Methods and Techniques*, 2nd Edition,Taylor&Francis, Hants (1997).
5. Z.Liu,J.H.Cai and R.Buse,Handwriting Recognition:*Soft Computing and Probabilistic Approach* (Volume133),Springer Science andBusinessMedia (2003).

Course Name	**B.Sc. in Forensic Sciences**			
Subject Code:	**BFS-308-21**			
Subject Title:	**English and Communication Skills –I**			
Contact Hours:	**L:2**	**T:0**	**P:0**	**Credits:2**
Examination Duration (hours)	**3**			

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Objective(s):	**To learn the basics of English Language**

Details of Syllabus

Unit	Contents	Contact Hours
I	**Unit-1:**Introduction to English language a) Role and significance of English language in the present scenario b) English Language: Its relevance for the Indian industry c) Introduction to Listening, Speaking, Reading, Writing (LSRW) and benchmarking of the class.	4
II	**Unit-2:**Phonetics& Functional Grammar a) Pronunciation and daily usage correction (speak with differences between p/b, s/sh, f/ph, t/d, v/w sounds) b) Parts of speech, articles, tenses, verbs and modals c) Practice of daily use words, numerals and tongue twisters d) Vocabulary building, Construction of simple sentences: Basic sentence pattern, subject and Predicate.	8
III	**Unit-3:**English Communication- About Myself a) Let's talk, making conversation, meeting and greeting b) Introducing myself, my family and my friends c) My opinions, my likes and dislikes d) Life at college, hostel and workplace.	8
IV	**Unit-4:**Personality Development- a) First impression: Dressing sense, good manners, speaking well and respectably. b) Positive Attitude: Being happy and alert, a good listener and a good friend. c) Consultation among peers: Soliciting advice and giving advice. d) Goal setting, confidence building& handling rejection.	10

Reference Books

1. ILFS Bi-lingual Course in Basic English, ILFS Skill Development Corporation.

2. English Grammar Composition & Usage by J.C. Nesfield, Macmillan Publishers

3. The Business letters by Madan Sood, Goodwill Publishing House, New Delhi.

4.Communication Skills by Sanjay Kumar &PushpLata, Oxford University Press.

FOURTH SEMESTER

Course Name	**B.Sc. in Forensic Sciences**			
Subject Title:	**Forensic Ballistics**			
Subject Code:	**BFS-401-21**			
Contact Hours:	**L:3**	**T:1**	**P: 0**	**Credits:4**
Examination Duration (hours)	**3**			
Objective(s):	*Learning Objectives: After studying this paper the students will know –* *a. The classification of firearms and their firing mechanisms.* *b. The methods of identifying firearms.* *c. The characteristics of ammunition.*			

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	d. *The importance of firearm evidence.* e. *The nature of firearm injuries.* f. *The methods for characterization of gunshot residue.*

Details of Syllabus:

Unit	Contents	Contact Hours
I	**Unit 1: Firearms** History and development of firearms. Classification of firearms. Weapon types and their operation. Firing mechanisms of different firearms. Internal ballistics – Definition, ignition of propellants, shape and size of propellants, manner of burning, and various factors affecting the internal ballistics: lock time, ignition time, barreltime, erosion, corrosion and gas cutting.	8
II	**Unit 2: External and Terminal Ballistics** External Ballistics – Vacuum trajectory, effect of air resistance on trajectory, base drag, drop,drift, yaw, shape of projectile and stability, trajectory computation, ballistics coefficient and limiting velocity, Measurements of trajectory parameters, introduction to automated system of trajectory computation and automated management of ballistic data. Terminal Ballistics – Effect of projectile on hitting the target: function of bullet shape,striking velocity, striking angle and nature of target, tumbling of bullets, effect of instability of bullet, effect of intermediate targets, influence of range. Ricochet and its effects, stopping power.	10
III	**Unit 3: Ammunition** Types of ammunition. Constructional features and characteristics of different types of cartridges and bullets. Primers and priming compounds. Projectiles. Head stamp markings on ammunitions. Different types of marks produced during firing process on cartridge – firing pin marks, breech face marks, chamber marks, extractor and ejector marks.	14

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IV	**Unit 4: Firearm Evidence** Matching of bullets and cartridge cases in regular firearms. Identification of bullets, pellets and wads fired from improvised, country made firearms. Automated method of bullet and cartridge case comparison. Determination of range of fire and time of fire. Mechanisms of formation of gunshot residues. Methods of analysis of gunshot residues from shooting hands and targets, with special reference to clothings. Identification and nature of firearms injuries. Reconstruction with respect to accident, suicide, murder and self defence.	14

Reference Books

1. B.J. Heard, *Handbook of Firearms and Ballistics*, Wiley and Sons, Chichester (1997).
2. W.F. Rowe, Firearms identification, *Forensic Science Handbook*, Vol. 2, R. Saferstein(Ed.), Prentice Hall, New Jersey (1988).
3. A.J. Schwoeble and D.L. Exline, *Current Methods in Forensic Gunshot ResidueAnalysis*, CRC Press, Boca Raton (2000).
4. E. Elaad in *Encyclopedia of Forensic Science, Volume 2*, J.A. Siegel, P.J. Saukko and G.C. Knupfer (Eds.), Academic Press, London (2000).

Course Name	**B.Sc. in Forensic Sciences**			
Subject Title:	**Forensic Toxicology**			
Subject Code:	**BFS-402-21**			
Contact Hours:	**L:3**	**T:1**	**P:0**	**Credits:4**
Examination Duration (hours)	**3**			
Objective(s):	*Learning Objectives: After studying this paper the students will know –* *a. The significance of toxicological studies in forensic science.* *b. The classification of poisons and their modes of actions.* *c. The absorption of poisons in body fluids.* *d. The forensic identification of illicit liquors.* *e. The classification and characteristics of the narcotics, drugs and psychotropicsubstances.* *f. The menace of designer drugs.* *g. The methods of identifying and purifying narcotics, drugs and psychotropic substances.*			

Details of Syllabus

Unit	Contents	Contact Hours
I	**Unit 1: Basics of Toxicology** Significance of toxicological findings. Techniques used in toxicology. Toxicological analysisand chemical intoxication tests. Postmortem Toxicology. Human performance toxicology. Dose-response relationship. Lethal dose 50 and effective dose 50.	8
II	**Unit 2: Poisons** Classification of poisons. Physico-chemical characteristics and mode of action of poisons.Accidental, suicidal and homicidal poisonings. Signs and symptoms of common poisoning and their antidotes. Collection and preservationof viscera, blood and urine for various poison cases. Identification of biocides and metal salts in body fluids. Metabolism	14

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	and excretion ofpoisons. Application of immunoassays in forensic work. Animal poisons. Snake venom. Mode of action. Carbon monoxide poisoning.Vegetable poisons. Poisonous seeds, fruits, roots and mushrooms. Beverages. Alcoholic and non-alcoholic illicit liquors. Analysis and identification of ethylalcohol. Estimation of ethyl alcohol in blood and urine. Proof spirit. Crime scene management in illicit liquor cases.	
III	**Unit 3: Narcotics, Drugs and Psychotropic Substances** Definition of narcotics, drugs and psychotropic substances. Broad classification – Narcotics, stimulants, depressants and hallucinogens. General characteristics and common example of each classification. Natural, synthetic and semi-synthetic narcotics, drugs and psychotropic substances. Designer drugs. Tolerance, addiction and withdrawal symptoms of narcotics, drugs andpsychotropic substances Crime scene search for narcotics, drugs and psychotropic substances – searching a suspect, searching a dwelling, searching a vehicle. Clandestine drug laboratories. Collection and preservation of drug evidence. Testing ofnarcotics, drugs and psychotropic substances.	7
IV	**Unit 4: Isolation and Analysis of Narcotics, Drugs and Psychotropic Substances** Isolation techniques for purifying narcotics, drugs and psychotropic substances – thin layer chromatography, gas-liquid chromatography and high performance liquid chromatography. Presumptive and screening tests for narcotics, drugs and psychotropic substances. Microcrystalline testing of drugs of abuse. Analysis of narcotics, drugs and psychotropic substances in breast milk, saliva, urine, hair and antemortem blood. Drugs and driving. Dope tests. Analysis of narcotics, drugs and psychotropic substances in postmortem blood. Postmortem changes affecting the analysis of narcotics, drugs and psychotropic substances.	7

Reference Books

1. R. Saferstein, *Criminalistics*, 8th Edition, Prentice Hall, New Jersey (2004).
2. F.G. Hofmann, *A Handbook on Drug and Alcohol Abuse*, 2nd Edition,Oxford University Press, New York (1983).
3. S.B. Karch, *The Pathology of Drug Abuse*, CRC Press, Boca Raton (1996).
4. A. Poklis, Forensic toxicology in, *Introduction to Forensic Sciences*, 2nd Edition, W.G. Eckert (Ed.), CRC Press, Boca Raton (1997).
5. A.W. Jones, Enforcement of drink-driving laws by use of per se legal alcohol

limits: Blood and/or breath concentration as evidence of impairment, *Alcohol, Drug and Driving*, 4, 99 (1988).

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

Course Name	**B.Sc. in Forensic Sciences**			
Subject Title:	**Forensic Anthropology**			
Subject Code:	**BFS-403-21**			
Contact Hours:	**L:3**	**T:1**	**P:0**	**Credits:4**
Examination Duration (hours)	**3**			
Objective(s):	*Learning Objectives: After studying this paper the students will know –* *a. Importance of forensic anthropology in identification of persons.* *b. Different techniques of facial reconstruction and their forensic importance.* *c. Significance of somatoscopy and somatometry.*			

Details of Syllabus

Unit	Contents	Contact Hours
I	**Unit 1: Significance of Forensic Anthropology** Scope of forensic anthropology. Study of human skeleton. Nature, formation, and identificationof human bones. Determination of age, sex, stature from skeletal material.	10
II	**Unit 2: Personal Identification – Somatoscopy** Somatoscopy – observation of hair on head, forehead, eyes, root of nose, nasal bridge, nasal tip, chin, Darwin's tubercle, ear lobes, supra-orbital ridges, physiognomic ear breadth, circumference of head. Scar marks and occupational marks.	8
III	**Unit 3: Personal Identification – Somatometry** Somatometry – measurements of head, face, nose, cheek, ear, hand and foot, body weight, height. Indices - cephalic index, nasal index, cranial index, upper facial index. Genetic and congenital anomalies – causes, types, identification and their forensic significance.	6

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IV	**Unit 4: Facial Reconstruction** Portrait Parle/ Bertillon system. Photofit/identi kit. Facial superimposition techniques. Cranio facial super imposition techniques photographic super imposition, video superimposition, Roentgenographic superimposition. Use of somatoscopic and craniometric methods in reconstruction. Importance of tissue depth in facial reconstruction.	12

Reference Books

1. M.Y. Iscan and S.R. Loth, The scope of forensic anthropology in, *Introduction toForensic 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 MexicoPress, Mexico (1998).

Course Name	**B.Sc. in Forensic Sciences**			
Subject Title:	**Forensic Ballistics Practical**			
Subject Code:	**BFS-404-21**			
Contact Hours:	**L:0**	**T:0**	**P:4**	**Credits:2**
Examination Duration (hours)	**3**			
Objective(s):	To Learn & Understand practical aspects of Ballistics.			

Sr. No.	Contents	Contact Hours
	1. To describe, with the aid of diagrams, the firing mechanisms of different types of firearms. 2. To correlate the velocity of bullet with the impact it produces on the target. 3. To correlate the striking angle of the bullet with the impact on the target. 4. To estimate the range of fired bullets. 5. To carry out the comparison of fired bullets. 6. To carry out the comparison of fired cartridge cases. 7. To identify gunshot residue. 8. To correlate the nature of injuries with distance from which the bullet was fired. 9. To differentiate, with the aid of diagram, contact wounds, close range wounds anddistant wounds.	

Reference Books

1. B.J. Heard, *Handbook of Firearms and Ballistics*, Wiley and Sons, Chichester (1997).
2. W.F. Rowe, Firearms identification, *Forensic Science Handbook*, Vol. 2, R. Saferstein (Ed.), Prentice Hall, New Jersey (1988).
3. A.J. Schwoeble and D.L. Exline, *Current Methods in Forensic Gunshot Residue Analysis*, CRC Press, Boca Raton (2000).
4. E. Elaad in *Encyclopedia of Forensic Science, Volume 2*, J.A. Siegel, P.J. Saukko and G.C. Knupfer (Eds.), Academic Press, London (2000).

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Course Name	**B.Sc. in Forensic Sciences**			
Subject Title:	**Forensic Toxicology Practical**			
Subject Code:	**BFS-405-21**			
Contact Hours:	**L:0**	**T:0**	**P:4**	**Credits:2**
Examination Duration (hours)	**3**			
Objective(s):	To Learn & Understand practical aspects of Toxicology.			

Sr. No.	Contents	Contact Hours
	1. To identify biocides. 2. To identify metallic poisons. 3. To identify organic poisons. 4. To identify ethyl alcohol. 5. To identify methyl alcohol. 6. To carry out quantitative estimation of ethyl alcohol. 7. To prepare iodoform. 8. To identify drugs of abuse by spot tests. 9. To perform color tests for barbiturates. 10. To separate drugs of abuse by thin layer chromatography.	

Reference Books

1. R. Saferstein, *Criminalistics*, 8th Edition, Prentice Hall, New Jersey (2004).
2. F.G. Hofmann, *A Handbook on Drug and Alcohol Abuse*, 2nd Edition,Oxford University Press, New York (1983).
3. S.B. Karch, *The Pathology of Drug Abuse*, CRC Press, Boca Raton (1996).
4. A. Poklis, Forensic toxicology in, *Introduction to Forensic Sciences*, 2nd Edition, W.G. Eckert (Ed.), CRC Press, Boca Raton (1997).
5. A.W. Jones, Enforcement of drink-driving laws by use of per se legal alcohol limits: Blood and/or breath concentration as evidence of impairment, *Alcohol, Drug and Driving*, **4**, 99 (1988).
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 Name	**B.Sc. in Forensic Sciences**			
Subject Title:	**Forensic Anthropology Practical**			
Subject Code:	**BFS-406-21**			
Contact Hours:	**L:0**	**T:0**	**P:4**	**Credits:2**
Examination Duration (hours)	**3**			
Objective(s):	To Learn & Understand practical aspects of Anthropology.			

Sr. No.	Contents	Contact Hours
	1. To *determine of age from skull and teeth.* 2. To determine of sex from skull. 3. To determine sex from pelvis. 4. To study identification and description of bones and their measurements. 5. To investigate the differences between animal and human bones. 6. To perform somatometric measurements on living subjects. 7. To carry out craniometric measurements of human skull. 8. To estimate stature from long bone length. 9. To conduct portrait parley using photofit identification kit.	

Reference Books

1. M.Y. Iscan and S.R. Loth, The scope of forensic anthropology in, *Introduction toForensic 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 MexicoPress, Mexico (1998).

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Course Name	**B.Sc. in Forensic Sciences**			
Subject Title:	**Introduction to Biometry**			
Sunject Code:	**BFS-407-21**			
Contact Hours:	**L:2**	**T:0**	**P:0**	**Credits:2**
Examination Duration (hours)	**3**			
Objective(s):	*Learning Objectives: After studying this paper the students will know –* a. *The basis of biometry.* b. *The classification of biometric processes.* c. *The importance of behavioral biometry.*			

Details of Syllabus

Unit	Contents	Contact Hours
I	**Unit 1: Fundamental Aspects** Definition, characteristics and operation of biometric system. Classification of biometric systems – physiological and behavioral. Strength and weakness of physiological and behavioral biometrics. Multimodal biometrics.	10
II	**Unit 2: Biometric Processes** Key biometric processes – enrolment, identification and verification. Positive and negative identification. Performance measuresused in biometric systems – FAR, FRR, GAR, FTA, FTE and ATV. Biometric versus traditional technologies.	6
III	**Unit 3: Physiological Biometrics** Fingerprints, palm prints, iris, retina, geometry of hand and face.	5
IV	**Unit 4: Behavioral Biometrics** Handwriting, signatures, keystrokes, gait and voice.	6

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Reference Books

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. J.R. Vacca, *Biometric Technologies and Verification Systems*, Butterworth-Heinemann,Oxford (2007).

Course Name	**B.Sc. in Forensic Sciences**			
Subject Title:	**English and Communication Skills -II**			
Subject Code:	**BFS-408-21**			
Contact Hours:	**L:2**	**T:0**	**P:0**	**Credits:2**
Examination Duration (hours)	**3**			
Objective(s):	To learn the basics of English Language			

Details of Syllabus

Unit	Contents	Contact Hours
I	**Unit-1:** Basic Communication & Soft Skills a) Review and Recap of the last Semester b) Reading comprehension c) Building conversational skills d)Verbal & Non-verbal communication	4
II	**Unit-2:** Vocabulary: Building Blocks a) Word Formation: Prefix, suffix, conversion and compounding b) Homophones and one-word substitution c) Words often confused and misused d) Idiomatic phrase, Antonyms and Synonyms	8
III	**Unit-3:** English Communication: World around Me a) Market place, Bus stop, Bank, Post Office b) Village, Town and City c) Eating out: Stall, Dhaba and Restaurant	8
IV	**Unit-4:** Personality Development	10

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	a) Etiquettes: Telephone, e-mail and at a wedding or social gathering b) Public dealing: Making enquiries and requesting for help, handling difference of opinion, giving directions, instructions and getting assistance c) Expressions: Giving compliments, making complaints, Feeling sorry and saying thank you d) Entertainment: Radio, music, television, and computers	

Reference Books

1. ILFS Bi-lingual Course in Basic English, ILFS Skill Development Corporation.
2. English Grammar Composition & Usage by J.C. Nesfield, Macmillan Publishers
3. The Business letters by Madan Sood, Goodwill Publishing House, New Delhi.
4. Communication Skills by Sanjay Kumar & PushpLata, Oxford University Press.
5. Newspapers.