



Rayat Shikshan Sanstha's

**YASHAVANTRAO CHAVAN INSTITUTE OF SCIENCE,
SATARA**

(Lead college of Karmaveer Bhaurao Patil University Satara)

Reaccredited by NAAC with 'A+' Grade

Subject – Forensic Science

B. Sc. I

Semester - I & II

Syllabus as per NEP 2020

To be implemented w. e. f. June, 2023 onwards

Structure of the course:

1. **TITLE : B. Sc. Forensic Science**
2. **YEAR OF IMPLEMENTATION:- 2023-24**
3. **PREAMBLE :**

This syllabus is framed to give sound knowledge with understanding of Forensic Science to undergraduate students. The goal of the syllabus is to make the study of Forensic Science popular, interesting and encouraging to the students for higher studies including research.

Forensic science, an intricate and indispensable field, stands as the intersection of science, law, and justice. With its roots dating back centuries, forensic science has evolved into a multidisciplinary domain dedicated to uncovering the truth, elucidating mysteries, and ensuring fairness in the judicial system. In the pursuit of truth, forensic scientists employ a wide range of specialized tools and technologies, from microscopes and chromatography instruments to DNA profiling and digital forensics. They delve into the intricate details of crime scenes, scrutinize patterns, reconstruct events, and untangle complex puzzles to piece together an accurate and comprehensive picture of events.

The contributions of forensic science extend beyond the confines of the laboratory and crime scenes. Forensic experts may testify in court, offering their scientific expertise to help the legal system understand the significance of evidence and the implications it holds for the case at hand. They bridge the gap between science and the law, translating technical jargon into accessible language, and shedding light on the intricacies of complex scientific concepts for judges, juries, and legal professionals. The importance of forensic science cannot be overstated. It plays a vital role in promoting justice, safeguarding innocent lives, and ensuring the guilty are held accountable. It seeks to provide answers to the unresolved questions, to bring closure to grieving families, and to uphold the principles of truth, integrity, and fairness within society.

The syllabus is prepared after discussion at length with a number of faculty members of the subject and experts from Government and private sectors and research fields. The units of the syllabus are well defined, taking into consideration the level and capacity of students.

4. **General Objectives:**
 - 1) Apply scientific knowledge and methodologies to investigate and analyse evidence in order to uncover the truth, establish facts, and assist in the administration of justice
 - 2) Provide accurate, reliable, and unbiased scientific information that can be used in legal proceedings
 - 3) To expose the students to various emerging areas of Forensic Science.
 - 4) To prepare students for further studies, helping in their bright career.

Program Outcomes

- 1) The student will graduate with proficiency in forensic Science.
- 2) The students will be eligible to continue higher studies in the subject.
- 3) The students will be eligible to pursue higher education abroad.

- 4) The students will be eligible to appear for the examination for a job in the government sector.
- 5) The students will be eligible to appear for jobs with minimum requirement for B.Sc. program.

Program Specific Objectives

- 1) The students are expected to understand the fundamentals, principles, concepts and recent developments in Forensic Science.
- 2) The practical course is framed in relevance with theory courses to improve understanding of various concepts in Forensic Science.
- 3) It is expected to inspire and boost interest of students in Forensic Science.

Program Specific Outcomes

- 1) Understand basics of Forensic Science.
- 2) Learn, design and perform experiments in the labs to demonstrate the concepts, principles and theories learnt in the classroom
- 3) Develop the ability to apply the knowledge acquired in the classroom and laboratories to specific problems in theoretical and experimental Forensic Science.
- 4) Identify the area of interest in academic research and development.
- 5) Perform jobs in various fields like banking, private investigative agencies, and research labs and in the field of Government sectors, cyber security, Insurance frauds, pharmaceuticals, etc.
- 6) Be an entrepreneur with precision, analytical mind, innovative thinking, and clarity of thought, expression and systematic approach.

DURATION: One year.

EXAM PATTERN: Pattern of examination will be semester wise.

MEDIUM OF INSTRUCTION: English.

STRUCTURE OF COURSE:

1. Semester I :

Theory: 2 Major + 2 Minor + 2 Open elective

Practical's: 2+2+2= 06 Courses

2) Semester II:

Theory: 2 Major + 2 Minor + 2 Open Elective

Practical's: 2+2+2= 06 Courses

Level	Sem	Subject - 1 Major				Subject - 2 Minor		Subject - 3 GE / OE		VSEC		AEC, VEC, IKS			OJT, FP, CEP, CC, RP					Total	Non - CGPA
		DSC		DSE		T	P	T	P	VSC	SEC	AEC	IKS	VEC	CC	FP	CEP	OJT /Int/ App /RT	RM		
		T	P	T	P																
4.5	I	4	2	---	---	4	2	4	2				2		2	---				22	
	II	4	2	---	---	4	2	4	2		2		---	2		---				22	DEGG
Total		8	4			8	4	12		2		2	2	2						44	
		12				12		12		02		04			02						

List of Course titles of Major, Minor and Open Electives

Sr.no	Type	Semester	Course	Course title	Credits
1	Major	I	BFST 111	DSC Course – 1: Basics of Forensic Science I	2
			BFST 112	DSC Course – 2: Basics of Computer and Digital Forensics I	2
			BFSP 113	DSC Practical Course – Lab I : Laboratory exercises in Basics of Forensic Science I and Digital Forensics I.	2
		II	BFST 121	DSC Course – 3: Basics of Forensic Science II	2
			BFST 122	DSC Course – 4: Basics of Computer and Digital Forensics II	2
			BFSP 123	DSC Practical Course –Lab II :Laboratory exercises in Basics of Forensic Science II and Basics of Computer and Digital Forensics II	2
2	Minor	I	BFST 114	Course I- Basics of Forensic Chemistry I and Forensic Physics I	2
			BFST 115	Course II - Basics of Forensic Biology I and Forensic Psychology I	2
			BFSP 116	Lab I : Laboratory exercises Basics of Forensic Biology I and Forensic Psychology- I	2
		II	BFST 124	Course III - Course III: Basics of Forensic Chemistry II and Forensic Physics II	2
			BFST 125	Course IV- Basics of Forensic Biology II and Forensic Psychology II	2

			BFSP 126	Lab II - Laboratory exercises Basics of Forensic Biology II and Forensic Psychology- II	2
3	Open Elective	I	BFST 117	OE-1 : Introduction to Psychology	2
			BFST 118	OE-2: Biopsychology	2
		II	BFST 127	OE-3: Adolescence Psychology	2
			BFST 128	OE-4: Psychology of carrier counselling.	2
4	Indian Knowledge System	I	IKS 101	IKS- Legal Administration in Ancient India	2
5	Skill Enhancement Course	II	SEC 103	SEC- Cell Phone Forensics	2
6	Value Education Course	II	VEC 104	Technological Solutions for Society	

Sr. No.	Subject	Semester	Course no.	Course Title
1	Forensic Science	Sem I	Course I	Basics of Forensic Science I
			Course II	Basics of Computer and Digital Forensics I
			Practical	Lab I : Laboratory exercises in Basics of Forensic Science I and Digital Forensics I.
		Sem II	Course III	Basics of Forensic Science II
			Course IV	Basics of Computer and Digital Forensics II
			Practical	Lab II: Laboratory exercises in Basics of Forensic Science II and Digital Forensics II.

5. **EXAMINATION STRUCTURE: As per college guidelines**

6. **Structure and titles of the course of B.Sc. I for Semester I & II**

Total credits - 2, Total Hours – 30

Sem	Course no. & Course	Course Title	Unit	Unit name	
Sem I	Course I BFST 111	Basics of Forensic Science I	Unit I	Introduction to Forensic Science	
			Unit II	Branches of Forensic Science Laboratories	
			Unit III	Organization of Forensic Science Laboratory	
			Unit IV	Agencies involved in crime detection and investigation	
	Course II BFST 112	Basics of Computer and Digital Forensics I	Unit I	Fundamentals of computers	
			Unit II	Basics of Operating system	
			Unit III	Basics of Networking	
			Unit IV	Basics of Internet	
	Practical BFSP113	Practical	Practical	Lab I : Laboratory exercises in Basics of Forensic Science I and Basics of Computer and Digital Forensics I	
	Sem II	Course III BFST 121	Basics of Forensic Science II	Unit I	Agencies involved in crime detection and investigation I
				Unit II	Agencies involved in crime detection and investigation II
Unit III				Judicial System	
Unit IV				Introduction to Law	
Course IV BFST 122		Basics of Computer and Digital Forensics II	Unit I	Network Security	
			Unit II	Cyber Crimes and digital evidence	
			Unit III	Computing Investigations	
			Unit IV	Crimes and incident scenes	
Practical BFSP 123		Practical	Practical	Lab II: Laboratory exercises in Basics of Forensic Science II and Basics of Computer and Digital Forensics II	

7. **OTHER FEATURES :**

(A) LIBRARY :

Reference Books – Latest Editions, Journals and Periodicals.

(B) SPECIFIC EQUIPMENTS NECESSARY TO RUN THE COURSE: OHP, Computer, L.C.D. Projector.

(C) INTERNET

(D) LIST OF THE LABORATORY EQUIPMENTS:

Instruments	Instruments	Instruments
Colorimeter	Glassware	Soxhlet extraction apparatus.
Spectrophotometer	Chromatographic jar	Micropipettes
pH meter	Chromatography column	LASER
Electrophoresis apparatus	CSI Kit	Sonometer
Computer with printer & internet	CSI Management Kit	Electromagnetic device
Water bath	Fingerprint development kit	Travelling Microscope
Incubator	Fingerprint collection kit	Polarimeter
Oven	Blood detection Kit	Logic gate Kit
Balance	Semen detection Kit	Bridge rectifier
Centrifuge machine	GSR detection Kit	OS forensic

SEMESTER – I

Course – I,

Major Course code: (BFST 111) Basics of Forensic Science I

Credit: - 02

Lectures: 30 Hours

Course Objectives: Students should be able to...

1. understand the basic concepts in Forensic Science.
2. recognize the major contributors to the development of forensic science.
3. study the Organization of a Crime Laboratory.
4. learn about the scope of forensic science.

Credits (Total Credits 2)	SEMESTER– I Major Course I : BFST 111 Basics of Forensic Science	No. of hours per unit
Unit – I	Introduction to Forensic Science	(07)
	1.1 Definition and Scope of Forensic Science 1.2 History and Development of Forensic Science 1.3 Principles of forensic science 1.4 Terminologies in forensic science: First responder 1.5 chain of custody 1.6 Duties of First Responding officers.	
Unit – II	Branches of Forensic Science Laboratories I	(07)
	2.1 Forensic Biology 2.2 Forensic Chemistry 2.3 Forensic Toxicology 2.4 Forensic Physics 2.5 Forensic Ballistics 2.6 Forensic Psychology.	
Unit – III	Branches of Forensic Science Laboratories II	(08)
	3.1 Computer Forensics 3.2 DNA and serology 3.3 Narcotics Unit 3.4 Forensic Anthropology 3.5 Fingerprints analysis 3.6 Questioned Document examination 3.7 Forensic Audio Analysis.	
Unit – IV	Organization of Forensic Science Laboratory	(08)

	4.1 Forensic Science Laboratories in India: history, development and hierarchical set up 4.2 Directorate of Forensic Science Services 4.3 Central Forensic Science Laboratories 4.4 State Forensic Science Laboratories 4.5 Regional Forensic Science Laboratories 4.6 Mobile Crime Laboratories 4.7 Introduction to Various Institutions: IITR, CCMB, CDFD, NCRB, CDTS.	
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Course Outcomes- The students will be able to...

1. differentiate laws of forensic science.
2. utilize the history and development of Forensic science.
3. differentiate the branches of forensic Science.
4. describe about the agencies involved in crime scene investigation.

REFERENCE BOOKS :

1. Saferstein R. *Criminalistics An Introduction to Forensic Science*, 13th edition, Pearson , Pearson Education. (2020)
2. Sharma B.R. *Forensic Science in Criminal Investigation and Trial*, Fifth edition, Universal Law Publishing - An imprint of LexisNexis, (2014)
3. Cyril H. Wecht and John T. Rago, *Forensic Science and Law: Investigative Applications in Criminal, Civil, and Family Justice*, Boca Raton, FL: CRC Press, (2014).
4. Fisher, Barry A. *Techniques of Crime Scene Investigation*. 9th ed. Boca Raton, FL: CRC Press, (2013)
5. James, Stuart H. *Forensic Science: An Introduction to Scientific and Investigative Techniques* 3rd ed. London: CRC Press, 2009.
6. Stuart H.J. Nordby J.J. & Suzanne B. *Forensic Science: An Introduction to Scientific and Investigative Techniques*. USA, Tayler and Francis. (2005).
7. James, S.H. and Nordby, J.J. *Forensic Science: An Introduction to Scientific and Investigative Techniques*. CRC Press: USA; (2003).
8. Nanda, B.B. and Tiwari, R.K. *Forensic Science in India- A Vision for the Twenty First Century*. Select Publisher: New Delhi; (2001).
9. Saferstein, R. *Criminalistics -An Introduction to Forensic Science*. Prentice Hall Inc: USA; (1995)

10. O'Hara, Charles E., and Fred E. Osterberg. *An Introduction to Criminalistics*. USA, The Macmillan Company (1949).

SEMESTER – I
Major Course –II,

Major Course Code: BFST 112, Basics of Computer and Digital Forensics I

Credit: - 02

Lectures: 30 Hours

Course Objectives: Students should be able to...

1. gain knowledge of the overview of Digital & Cyber Forensic and its applications.
2. learn basics of operating system, networking, file system.
3. categorize the types of digital crimes and vulnerability.
4. comprehend the basic tools and Software required for analysis of Cybercrimes.

Credits (Total Credits 2)	SEMESTER – I Major Course – II	No. of hours per unit
Unit - I	Fundamentals of computers	(09)
	1.1 Basics of Computers: Computer organization, 1.2 Input and Output devices, 1.3 Central Processing Unit, 1.4 Types of Memory – RAM, ROM etc. 1.5 Understanding working of internal and external Storage devices. 1.6 Memory units, memory structure and management	
Unit – II	Basics of Operating system	(08)
	2.1 Introduction to Operating System 2.2 Process management 2.3 Concurrency 2.4 Scheduling 2.5 Synchronization, 2.6 Examples of operating Systems – Windows and Dos, Linux. 2.7 Types of Computers, Internal and external parts of computers - connectors, sockets etc.	
Unit – III	Basics of Networking	(07)
	3.1 Basics of Networking-Types of topologies, 3.2 LAN, MAN, WAN, SAN, CAN etc. 3.3 Types of internet connections (Dialup, DSL, Cable, broadband, leased line, satellite, Wi-Fi, 3G-4G) 3.4 ISP, IP grouping.	

Unit - IV	Basics of Internet	(06)
	4.1 Introduction to Internet web and cloud based application 4.2 World Wide Web 4.3 E-mails 4.4 Chat 4.5 Search Engines 4.6 Types of portals 4.7 Networking Protocols.	

Course Outcomes: The students will be able to...

1. define the basic concepts related to Networking.
2. explain the Networking & Its types.
3. describe the types of Internet Connections.
4. discuss technology related Networking.

REFERENCE BOOKS :

1. Singh P.K. *Introduction To Computer Networks*, VK Global Publications Pvt Ltd; 2020th edition (2020)
 2. Miller Michael. *Computer basic Absolute Beginner's* 9th Edition Pearson Publication,(2020)
 3. Singh P K. *Basic of Computer*,V k Global Publication (2015)
 4. Thareja Reema. *Fundamentals of Computer*, Oxford Publication (2014)
 5. Sammons, John. *The Basics of Digital Forensics: The Primer for Getting Started in Digital Forensics*. Waltham, MA: Syngress, (2014)
 6. Morley D. *Understanding Computers today & tomorrow* 14th Edition : Cengage Learning Publication : Feb 2012
 7. Casey, Eoghan. *Digital Evidence and Computer Crime: Forensic Science, Computers, and the Internet*. 3rd ed. Amsterdam: Academic Press, (2011)
 8. Joshi Rajmohan. *Introduction to Computers*, Delhi, Isha Books Publication, Page No (1-22) (2006)
 9. Dr. Joshi R. C. *Basic operating system*, Dream tech Press Publication, (2005)
- Prof. S. Venkatachalam. *Introduction to Computers*, New Delhi, Educational Publisher, (1999)

Practical Course-I

Course code: BFSP 113

Laboratory exercises in Basics of Forensic Science I and Digital Forensics I.

Credit: - 02

Practical's: 60 Hours

<p style="text-align: center;">SEMESTER – I Major Lab Course I: BFSP 113 : (Based on BFST 111 and BFST 112) List of Practical</p>
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Course Objectives: Students should be able to...

1. study the principles of forensic science.
2. understand the development and hierarchical set up of Laboratories.
3. learn about Creation & Sending about email.
4. learn & Understand use of Microsoft Office suite.

Credits (Total Credits 2)	SEMESTER – I Major Lab Course I: BFSP 113 : (Based on BFST 111 and BFST 112) List of Practical	No. of hours per Practical (60 hrs)
1	To study the principles of Forensic Science.	
2	To gain and understand the First responding officer duties.	
3	To demonstrate on chain of custody.	
4	To learn the different branches of Forensic Science. (any four branches)	
5	To study the different branches of Forensic Science. (any four branches)	
6	Enhance knowledge of forensic techniques used in specialized fields such as DNA analysis, ballistics, and arson investigation.	
7	To learn the different branches of Forensic Science. (any four branches)	
8	To demonstrate the development and hierarchical set up of Laboratories.	
9	To study the Directorate, Regional and central forensic Science Laboratories.	
10	To learn about the Windows file (creation, modification, deletion, attributes) folder (Creation, nesting, attributes).	
11	To understand LAN-client/server, user creation, password protection.	
12	To use the internet- visiting websites with a given URL, Searching information using Search engines.	
13	To use E-mail, creating e-mail, Sending and Receiving emails with Attachments.	

14	To understand Networking commands-like ping, IP-config, etc, with various switches.
15	To tracing E-mail, finding sender's IP address, of received email, tracing route of email Received using tools available on internet, e.g. Visual Trace Route etc.
16	To Work with Ms-office (word, excel, power-point).

Course Outcomes: The Students will be able to...

1. analyze principles of forensic science.
2. describe the development and hierarchical set up of Laboratories.
3. operate the Creation & Sending about email.
4. perform the networking Commands.
5. discuss the Microsoft Office suite.

REFERENCE BOOKS :

1. Singh P.K. *Introduction To Computer Networks*, VK Global Publications Pvt Ltd; 2020th edition (1 January 2020); VK Global Publications Pvt Ltd : 1 Jan 2020
2. Miller Michael. *Computer basic Absolute Beginner's* Pearson Publication, 9th Edition: 2020
3. Singh P K. *Basic of Computer*, V k Global Publication 2015
4. Thareja Reema. *Fundamentals of Computer*, Oxford Publication : 4 June 2014
5. Lyman M.D. *Criminal Investigation- The Art and the Science*. Pearson Education: India; (2013)
6. Morley D. *Understanding Computers today & tomorrow* 14th Edition : Cengage Learning Publication : Feb 2012
7. Joshi Rajmohan. *Introduction to Computers*, Delhi, Isha Books Publication, 2006 : Page No (1-22)
8. Dr.JoshiR. C. *Basic operating system*, Dream tech PressPublication,2005
9. James, S.H. and Nordby, J.J. *Forensic Science: An Introduction to Scientific and Investigative Techniques*. CRC Press: USA; (2003).
10. Barry, A.J. *Fisher- Techniques of Crime Scene Investigation*, 7th ed. R.C. Press, New York (2003)
11. Sharma, B.R. *Forensic Science in Criminal Investigation and Trails*. Universal Law Publishing: (2003).
12. Meguire, M., Morgan, R. and Reiner, R. *The Oxford Handbook of Criminology* 2nded. Oxford University Press: New York; (2002)
13. Bell, W.R. *Practical Criminal Investigation in Correctional Facilities*. CRC Press: London; (2001).

14. Nanda, B.B. and Tiwari, R.K. *Forensic Science in India- A Vision for the Twenty First Century*. Select Publisher: New Delhi; (2001)
15. Prof. S. Venkatachalam. *Introduction to Computers*, New Delhi, Educational Publisher, 1999
16. Saferstein, R. *Criminalistics -An Introduction to Forensic Science*. Prentice Hall: USA; (1995).
17. Lee Henry. *Crime Scene Handbook*: Henry C Lee.

Rayat Shikshan Sanstha's
Yashavantrao Chavan Institute of Science, Satara (Autonomous)
Department of Forensic Science
Minor Course Name: Integrated Forensic Sciences

SEMESTER– I Minor Course I : BFST 114 Basics of Forensic Chemistry I and Forensic Physics I
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Course Objectives: Students should be able to...

1. study the Reactive Intermediate and related reactions.
2. study hybridization and its types.
3. learn the concept of fluid mechanics and related terms.
4. understand the concept and applications of radioactivity.

Credits (Total Credits 2)	SEMESTER– I Minor Course I : BFST 114 Basics of Forensic Chemistry I and Forensic Physics I	No. of hours per unit
Unit – I	Reactive Intermediate and related reaction	(07)
	1.1 Basics of chemistry 1.2 Reactive Intermediate and related reaction Carbocation Carbanion 1.3 Free radical 1.4 Carbene, Nitrene and Benzene 1.5 Normality and Morality	
Unit – II	Hybridization	(07)

	2.1 Concept of hybridization–Definition 2.2 different types of hybridization 2.3 Geometry of molecules 2.4 Valence Shell Electron Pair Repulsion (VSEPR) Theory.	
Unit – III	Fluid mechanics	(09)
	3.1 Introduction to fluids 3.2 Pressure in a fluid 3.3 Pascal’s law and Archimedes’ Principle 3.4 Atmospheric Pressure and Barometer 3.5 Buoyant Force , Steady and Turbulent Flow 3.6 Equation of continuity 3.7 Bernoulli’s Principle and Application of Bernoulli’s equation 3.8 Applications of fluid mechanics in Forensic Science	
Unit – IV	Radioactivity	(07)
	4.1 Review of nuclear composition 4.2 Nuclear properties and half-life 4.3 Radioactive decay Schemes 4.4 Applications of Radioisotope 4.5 Carbon dating and Radiometric dating.	

Course Outcomes: The students will be able to...

1. explain the Reactive Intermediate and related reactions.
2. describe the concept of hybridization, different types of hybridization and their geometry of molecules.
3. discuss the concept of fluid mechanics and related terms.
4. elaborate the concept and applications of radioactivity.

REFERENCE BOOKS:

1. Puri, S. Kalia, *Principles of inorganic chemistry*, Milestone publisher, Delhi India., (137-200 , 201 – 233 , 313 – 327) 2020
2. J. E. Huheey, *Inorganic Chemistry*, 4th edition, HarperCollins college publishers, (92-134, 300, 538-557, 655, 662) (2020)
3. H.C. Verma, *Concepts of Physics*, Bharati Bhavan Publishers ,2017, 255-280
4. M. Boyed, *Organic Chemistry*. Pearson, London, England.(1-39). (2010)
5. G. D. Christian. *Analytical Chemistry* 6th edition, Publisher : Wiley, Hoboken, New Jersey, United States. (555-558) (2007)
6. Shriver and Atkins, *Inorganic Chemistry*,3rd edition, Great Britain by Oxford University press, W. H. Freeman and Company 41 Madison Avenue, New York, NY 10010. (1-147) (2006)

7. S. Keith, *Mechanics* (Third ed.). (Addison-Wesley, 1971),144-49
8. Puri, S. Pathania, *Principles of Physical Chemistry*, Vishal Publishing House, 44th Edition Jaladhar July 1962, (525-557)
9. Sears and Zeemansky, *University Physics*, XI th edition, Pearson education. 312-320
10. Viscosity of liquids and gases (<http://hyperphysics.phy-astr.gsu.edu/Hbase/tables/viscosity.html>)

SEMESTER – I
BFST 115
Minor Course – II Forensic Biology I and Forensic Psychology I

<p>SEMESTER – I Minor Course II : BFST 115 Basics of Forensic Biology I and Forensic Psychology I</p>
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Course Objectives: Students should be able to...

1. learn the basics and concepts related to Cell biology.
2. classify amino acids, proteins, carbohydrates.
3. study the science and history of Psychology.
4. understand the structure and function of neurons in accordance of Behaviour.

Credits (Total Credits 2)	SEMESTER – I Minor Course II : BFST 115 Basics of Forensic Biology I and Forensic Psychology I	No. of hours per unit
Unit I	Cell biology:	(07)
	1.1 Origin of life and theories of evolution 1.2 geological time scale 1.3 Discovery of cell and the cell theory 1.4 Ultra structure of prokaryotic & eukaryotic cell 1.5 Structural organization and functions of plasma membrane and cell wall of prokaryotes & eukaryotes 1.6 Cellular Organelles and Cytoskeleton structures.	
Unit II	Biochemistry	(08)
	2.1 Properties and Classification of Amino acids 2.2 Properties and Classification of proteins 2.3 Properties and Classification of enzymes 2.4 Properties and Classification of nucleic acid 2.5 Properties and Classification of carbohydrates 2.6 Properties and Classification of lipids 2.7 Properties and Classification of vitamins.	
Unit III	The Science of Psychology	(08)

	3.1 What is Psychology –Nature 3.2 Definition and its Goals 3.3 History of Psychology 3.4 Psychology: The Science 3.5 Early Schools of Psychology and Modern Perspectives 3.6 Scientific Study Methods in Psychology- Naturalistic Observation, Experimental 3.7 Case Studies and Survey.	
Unit IV	Biological Perspectives of Behaviour	(07)
	4.1 Neurons-structure and function 4.2 synapse and neurotransmitters 4.3 Neuron and Nerves; Building the Network 4.4 Central Nervous System and Peripheral Nervous System 4.5 The Brain-structure and function 4.6 Glandular system.	

Course Outcomes: The students will be able to...

1. explain theories of evolution.
2. classify carbohydrates, enzymes , proteins, amino acids.
3. define Psychology and explain its modern perspectives.
4. describe the nervous system and its types.

REFERENCE BOOKS:

1. P. B. Godkar, *Clinical Biochemistry*, third edition (Unit IV), 2018
2. Ciccarelli, S. K. & Meyer G. E., *Psychology* (New Delhi, Pearson Education, 2006), 1-304.
3. Edward E. S., Stephen M. K., *Cognitive Psychology Mind and Brain*, (New Delhi, Pearson Education, 17 Aug 2006.)1-30.
4. Nelson and Cox, W.H Freeman, *Lehninger Principles of Biochemistry* 5th ed.(2005).(Unit IV -239-255,273-279,343-355)
5. P.K Gupta, *Rastogi publications Cell and molecular biology* 3rd ed.(Unit I), 1Dec. 2005.
6. S Chand, *Cell biology, genetics, Molecular biology, evolution and ecology* (1 sep.2004) (Unit 1)
7. Baran R.A. *Psychology*, (New Delhi; Pearson Education Pvt. Ltd. 2001),5-205
8. T. Palmer, Prentice Hall/Ellis Horwood, *Understanding enzymes*, 4th ed. (1995). (Unit IV)
9. Morgan C.T., King R.A., Weisz J.R., Schopler., *Introduction to Psychology* (McGrawHill Book Co.,1986)
10. Kimble G.A., Garnezy, *Principles of General Psychology*, 3rd ed., New York,1-90, 1Jan 1965.

Semester- I
Minor Lab Course – I
Lab I: Laboratory exercises in Basics of Forensic Chemistry I and Forensic Physics I &
Basics of Forensic Biology I and Forensic Psychology I

<p>SEMESTER – I Minor Lab Course I : BFSP 116 : (Based on BFST 114 and BFST 115)</p>

Course Objectives: Students should be able to...

1. summarize preparation & standardization of chemical Solutions
2. determine the Young's modulus.
3. study plant and animal cell structure.
4. understand Mitosis.
5. conduct psychological tests.

Credits (Total Credits 2)	SEMESTER – I Minor Practical Course - I List of Practical	No. of hours per Practicals (60 hrs)
1	Preparation & standardization of H ₂ SO ₄ solution.	
2	Preparation & standardization of HCl Solution	
3	Estimation of Acetamide	
4	To determine the surface tension of given liquid	
5	Water analysis	
6	Organic Qualitative Analysis (3 Compounds)	
7	To study five basic shapes of hybridization.	
8	Volumetric estimation Of Potassium Permanganate	
9	To determine the Poisson's Ratio of a hollow rubber tube.	

10	To determine Young's modulus(Y) of the wooden bar.	
11	To determine the coefficient of viscosity of water by Poiseuille's methods	
12	To Calibrate a Spectrometer using a mercury source.	
13	To determine the Frequency of A.C. mains by sonometer using a wire of magnetic/non-magnetic material.	
14	To determine refractive index by using liquid lens.	
15	To determine the wavelength of given Laser Source by using plane diffraction grating.	
16	Study of plant and animal cell type's basic structure using micrographs or model	
17	Study of bacterial cell structure, shape and arrangement using micrographs or models.	
18	Blood as liquid tissue – demonstrating the different types of blood cells	
19	Mitosis demonstrated using onion root tip method.	
20	Studying the different cellular organelles of the eukaryotic and prokaryotic cells with animation and micrographs.	
21	To study the historical perspective of psychology.	
22	How to conduct psychological tests.	
23	Type A/B behaviour patterns- Upinder Dhar & Jain M	
24	Illusion (Muller-Lyre)	

Course Outcomes: The students will be able to...

1. prepare & standardize chemical solutions.
2. determine the Young's modulus.
3. draw plant and animal cells structure.
4. demonstrate mitosis using onion root tip method.
5. conduct psychological tests.

REFERENCE BOOKS:

1. *Handbook of Media for clinical and public health microbiology* by Ronald Atlas and James W.S. , Taylor & Francis Publication, 2013
2. H. Singh and P. S. Hemne *B.Sc. Practical Physics* , S. Chand Publication, (4th edition, 2011) 20-60
3. White and Manning, *Experimental College Physics*, McGraw-Hill Book Company.(3rd edition 2011) 333-340

4. S. L. Gupta and V. Kumar, *Practical Physics*, Pragati Prakashan, (27th edition, 2010) 210-213
5. Morisand Boyed, *Organic Chemistry* Pearson, London, England. (1-39) (2010)
6. G. D. Christian *Analytical Chemistry* 6th edition, Publisher: Wiley, Hoboken, New Jersey, United States. (742, 750, 753, 780) (2004)
7. Gupta Kumar. *Heterocyclic chemistry Vol I and Vol II Springer*, Salmon Tower Building New York City, United States. (58,66) (1999)
8. S.B. Karch, *The Pathology of Drug Abuse*, CRC Press, Boca Raton (1996).
9. *Cell biology, genetics, Molecular biology, evolution and ecology*-by P.S.Verma and V.K. Agarwal, S. Chand Publication, 1974.
10. C. L. Arora, *B.Sc. Practical Physics*, (S. Chand Publication, 1957) 69-79
11. Upinder Dhar & Jain M. -*Type A/B behavior patterns*-
12. A.K.P. Sinha & L.N.K. Sinha- *Sinha's Comprehensive Anxiety Test – Illusion (Muller-Lyre) Manual*

Rayat Shikshan Sanstha's

Yashavantrao Chavan Institute of Science, Satara (Autonomous)

A Lead College of Karmaveer Bhaurao Patil University, Satara.

Department of Psychology

IDS

Open Elective: Human Psychology

Semester – I

SEMESTER– I

OE – I

Introduction to Psychology

Course Objectives- Students should be able to...

1. learn about the contributions of some of the early pioneers in psychology.

2. study the memory in terms of information processing and distinguish between sensory, short-term, and long term memory.
3. gain knowledge of the role of emotions, motivation, and personality in human behaviour.
4. understand the physiological changes that occur during emotional arousal and the relationship between arousal and performance.

Credits (Total Credits 2)	SEMESTER– I Major Paper – I Introduction to Psychology	No. of hours per unit
Unit – I	Introduction to Forensic Science	(08)
	1.1.Definition of Psychology, 1.2.History of psychology, 1.3.Field of Psychology, 1.4.Scientific research	
Unit – II	Learning	(08)
	2.1. Definition of Learning, 2.2. Classical Conditioning, 2.3. Operant Conditioning, 2.4. Observational Learning.	
Unit – III	Memory	(08)
	3.1. What Is Memory, Memory process. 3.2. Information-Processing Model, 3.3. Types of memory, 3.4. Forgetting	
Unit – IV	Motivation and Emotion	(08)
	1.1.Defining Motivation, 1.2.Theories of motivation, 1.3.The Three Elements of Emotion, 1.4.Early Theories of Emotion,	

Course Outcomes- After completion of the units students should be able to:

1. demonstrate understanding of the terminology used in psychology
2. demonstrate an understanding of the general history of the field of psychology
3. acquire knowledge of branches of psychology.
4. identify research models and relate the findings of research to life situations.

Reading Book

1. Ciccarelli Sandra K., White J. Noland. *Psychology*, Pearson Education, 2018.

REFERENCE BOOKS:

1. Myers, D. G. *Psychology*. 10th edition; International edition. New York: Worth Palgrave Macmillan, Indian reprint 2013.
2. Lahey, B. B. *Psychology: An Introduction*, 11th edit. New York: McGraw-Hill Publications, (2012).
3. Feldman Robert S. *Understanding Psychology*, McGraw-Hill, 2011.
4. Baron, R. A., & Kalsher, M. J. *Psychology: From Science to Practice*. (2nd ed.). Pearson Education inc., Allyn and Bacon (2008).
5. Morgan Clifford T., King Richard A., Weisz John R., Schopler John. *Introduction to Psychology*, New Delhi, McGraw Hill EducaUon (India) Private Limited, 1986.

SEMESTER – I Paper – II Biopsychology
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Course Objectives: Students will be able to...

1. study the division of biopsychology known as physiological psychology.
2. know about basic anatomy of the nervous system.
3. gain knowledge about CNS and PNS.
4. study the Neuron and function of brain.

Credits (Total Credits 2)	SEMESTER – I Paper – II Biopsychology	No. of hours per unit
Unit – I	Introduction to Biopsychology as a Neuroscience	(08)
	1.1. Definition of Biopsychology, 1.2. origin of biopsychology, 1.3. Neuroscience, relation between biopsychology and Neuroscience, 1.4. Types of Research Characterize the Bio psychological Approach,	

	1.5.Divisions of biopsychology	
Unit – II	Anatomy of the Nervous System-I	(08)
	2.1. Introduction to Nervous system, 2.2.Division of the Nervous system, 2.3. Central Nervous System (CNS), 2.4. Cells of the Nervous and Anatomy of Neurons, 2.5. Neuroanatomical Techniques and Directions	
Unit – III	Anatomy of the Nervous System-II	(07)
	3.1. Introduction to Peripheral Nervous system (PNS), 3.2. Spinal Cord, 3.3. Five Major Divisions of the Brain, 3.4. Limbic System and the Basal Ganglia, 3.5. How Neurons Send and Receive Signals.	
Unit – IV	Neural Conduction and Synaptic Transmission	(07)
	4.1. Resting Membrane Potential, 4.2. Generation, Conduction, and Integration of Postsynaptic Potentials, 4.3. Generation, Conduction and Integration of Postsynaptic Potentials, 4.4. Synaptic Transmissions, Neurotransmitters, 4.5. Pharmacology of Synaptic Transmission and Behaviour.	

Course Outcomes: the students should be able to...

1. explain different division of biopsychology known as physiological psychology
2. explain the basic anatomy of the nervous system.
3. discuss about the CNS and PNS.
4. explain neuron and function of brain.

Reading Book

1. Pinel John P.J., Barnes S.J., *Biopsychology*, Tenth Edition, Global Edition, Pearson Education Limited 2022.

REFERENCE BOOKS:

1. Sullivan Ezra, *Habits and Holiness- Ethics, Theology, and Biopsychology*, The Catholic University of America Press 2021.
2. Pinel John P.J., Barnes S.J., *Biopsychology*, Tenth Edition, Global Edition, Pearson Education Limited 2018.
3. Myers, D. G. *Psychology*.10th edition; International edition. New York: Worth Palgrave Macmillan, Indian reprint 2013.
4. Lahey, B. B. *Psychology: An Introduction*, 11th edit. New York: McGraw-Hill Publications3, (2012).
5. Feldman Robert S. *Understanding Psychology*, McGraw-Hill, 2011.
6. Baron, R. A., & Kalsher, M. J. *Psychology: From Science to Practice*. (2nd ed.).Pearson Education inc., Allyn and Bacon (2008).
7. Morgan Clifford T., King Richard A., Weisz John R., Schopler John. *Introduction to Psychology*, New Delhi, McGmw Hill EducaUon (India) Private Limited, 1986.

Rayat Shikshan Sanstha's
Yashavantrao Chavan Institute of Science, Satara (Autonomous)
Lead College of Karmaveer Bhaurao Patil University, Satara.
Department of Forensic Science
Indian Knowledge System: Legal Administration in Ancient India

SEMESTER– I Indian Knowledge System Legal Administration in Ancient India
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Course Objectives- Students should be able to:

1. understand the development of the legal system of the country.
2. know Establishment and organization of the East India Company.
3. know Administration of Justice before British Rule, during British Rule and after Independence.
4. study Establishment and organization of various courts.

Credits (Total Credits 2)	SEMESTER– I Indian Knowledge System Legal Administration in Ancient India	No. of hours per unit
Unit – I	History of Courts And Legislature (1600 - 1832)	(09)
	1.1 Administration of justice in the Presidency Towns 1.2 Development of courts and Judicial Institution under East India Company.	

	1.3 Mayor's Courts, The Charter of 1726 & 1753. 1.4 Judicial Reforms of Warren Hastings Judicial Plan of 1772, 1774, 1780, 1781. 1.5 Regulating Act 1773. 1.6 Charter of 1774. 1.7 Supreme Court at Bombay and Madras 1823.	
Unit – II	Process of Codification And Constitutional Changes (1833-56)	(06)
	2.1 The Charter Act of 1833. 2.2 Establishment Legislature of an All India Charter in 1834. 2.3 Establishment of Law Commissions & Law Reforms.	
Unit – III	History of Courts (1857-1915):	(06)
	3.1 The First War of Indian Independence 1857. 3.2 Establishment & Development of Indian High-Courts (Act of 1861, 1911, 1915)	
Unit – IV	Legislatures In India (1892-1947):	(09)
	4.1 Indian Council Act 1892. 4.2 Indian Council Act 1909. 4.3 The Government of India Act – 1919. 4.4 The Government of India Act – 1935. 4.5 Cripps Mission – 1942. 4.6 Cabinet Mission – 1946. 4.7 Indian Independence Act – 1947.	

Course Outcomes- After completion of the units students should be able to:

1. Explain the development of the legal system of the country.
2. Describe Constitutional changes during and after Independence.
3. Distinguish between the Legal system before British Rule, during British Rule and *after* Independence.
4. Describe the Establishment and organization of various courts.

REFERENCE BOOKS:

1. Arvind S. Avhad- *The Indian Legal History*- ed-2008 – Hind Law Publications
2. M.P.Jain –*Outlines of Indian Legal History* -5th ed. 2004 Pub.-Wadhwa and Company
3. J.K. Mittal- *Indian Legal & Constitutional History*- 1st ed-2003,pub-Allahabad Agency Herbert Cowell.
4. B. Keith – *A Constitutional History of India, 1600-1935* 2nd Ed Allahabad, Central Book Depot. 1961.
5. G. and Appadorai – *Speeches and Documents on the Indian Constitution*. 1945
6. *The History and Constitution of the Courts and Legislative Authorities in India* – 6th Ed, Rev. S. C. Bagchi, Calcutta, Maker, Spink, 1936.
7. Sir, Couteay Ilbert, *the Government of India*, 2nd Ed. London OUP 1907.
8. M. D. *Indian Legal History*, Dhanwantri Mechanical and Law Book House, Delhi.

SEMESTER II

Course - III,

Course code: BFST 121 Basics of Forensic Science II

Credit: - 02

Lectures: 30 Hours

SEMESTER – II Major Course III : BFST 121 Basics of Forensic Science II
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Course Objectives: Students should be able to...

1. study the crime scene investigative agencies.
2. understand the investigative agencies working process.
3. learn the types and powers of court.
4. acquire the basic concepts of laws related to forensic science.

Credits (Total Credits 2)	SEMESTER – II Major Course III : BFST 121 Basics of Forensic Science II	No. of hours per unit/credits
Unit – I	Agencies involved in crime detection and investigation I	(08)
	1.1 Functions and hierarchical set up of Law enforcement agencies 1.2 civil police 1.3 reserve police 1.4 Government Examiners of Questioned Documents 1.5 Fingerprint Bureaus 1.6 National Crime Records Bureau 1.7 Police & Detective Training Schools 1.8 NICFS.	
Unit – II	Agencies involved in crime detection and investigation II	(08)
	2.1 Bureau of Police Research & Development 2.2 National and State Police Academies 2.3 Police Training Schools/Colleges 2.4 Dog Squad 2.5 Bomb Detection and Defusal Squad 2.6 RAW, CBI, INTERPOL and FBI.	
Unit – III	Judicial system	(08)
	3.1 Courts: Types, powers and jurisdiction 3.2 Admissibility of evidence in Courts 3.3 Definition of Experts 3.4 Provisions in Cr.P.C.,1973 & Indian Evidence Act relating to experts & their report 3.5 Court Procedures pertaining to Expert Testimony & Witness	
Unit – IV	Introduction to Law	(08)
	4.1 Meaning, Nature and Importance of Law 4.2 Classification of Law 4.3 Basics of Indian Constitution 4.4 Basics of Criminal Law 4.5 Elements of Criminal Law	

Course Outcomes: The students will be able to...

1. describe about the agencies involved in crime scene investigation .
2. analyse the investigative agencies and their process.
3. explain the setup of the judicial system.
4. discuss the basic concepts of law related to forensic science.

REFERENCE BOOKS:

1. Gandhi B M. *Penal Law*, Eastern Book Company, (2023)
2. Jain M.P. *Indian Constitutional Law*, LexisNexis (2018)
3. Lyman M.D. *Criminal Investigation- The Art and the Science*. Pearson Education: India; (2013)
4. Sarthi V. P., *Law of Evidence*, 6thEdition, Eastern Book Co., Lucknow (2006).
5. James, S.H. and Nordby, J.J. *Forensic Science: An Introduction to Scientific and Investigative Techniques*. CRC Press: USA; (2003).
6. Sharma, B.R. *Forensic Science in Criminal Investigation and Trails*. Universal Law Publishing: (2003).
7. Barry, A.J. *Fisher- Techniques of Crime Scene Investigation*, 7th ed. R.C. Press, New York (2003)
8. Meguire, M., Morgan, R. and Reiner, R. *The Oxford Handbook of Criminology* 2nded. Oxford University Press: New York; (2002)
9. Monir M., *Law of Evidence*, 6 th Edition, Universal Law Publishing Co. Pvt. Ltd., New Delhi (2002).
10. Nanda, B.B. and Tiwari, R.K. *Forensic Science in India- A Vision for the Twenty First Century*. Select Publisher: New Delhi; (2001)
11. Bell, W.R. *Practical Criminal Investigation in Correctional Facilities*. CRC Pres: London; (2001).
12. Bronstein D.A. *Law for the Expert Witness*, C R C Press, Boca Raton (1999).
13. Saferstein, R. *Criminalistics -An Introduction to Forensic Science*. Prentice Hall: USA; (1995).
14. Mahajan V.D. *Jurisprudence*, Eastern Book Company, (1993)
15. Pillai A.S. *Criminal Law*, 6thEdition, N.M. Tripathi Pvt. Ltd., Mumbai (1983).
16. Nigam R.C. *Law of Crimes in India*, Volume I, Asia Publishing House, New Delhi (1965).

17. Lee Henry. *Crime Scene Handbook*: Henry C Lee.

SEMESTER – II

Course - IV,

Course code: BFST 122

Basics of Computer and Digital Forensics II

Credit: - 02

Lectures: 30 Hours

Course Objectives: Students should be able to...

1. study the basics of network security.
2. learn the overview of Digital & Cyber Forensic and its applications.
3. understand the basic digital forensics and techniques for conducting the forensic examination on different digital devices.
4. examine the digital evidence such as data acquisition, identification analysis.

Credits (Total Credits 2)	SEMESTER – II Major Course – IV Basics of Computer and Digital Forensics II	No. of hours per unit/credits
Unit – I	Network Security	(08)
	1.1 Network Security Threats 1.2 Vulnerabilities 1.3 Access control 1.4 Virus 1.5 Trojans 1.6 Security plan and policies.	
Unit – II	Cyber Crimes and digital evidence	(08)
	2.1 What is cyber crime 2.2 Types of cyber crimes 2.3 Digital evidence 2.4 Digital vs Physical Evidence 2.5 Nature of Digital Evidence 2.6 Precautions while dealing with Digital Evidence.	
Unit – III	Computing Investigations	(07)
	3.1 Understanding Computing Investigations 3.2 Procedure for corporate High-Tech investigations 3.3 Understanding data recovery 3.4 workstation 3.5 software conducting 3.6 investigations.	

Unit – IV	Crimes and incident scenes	(07)
	4.1 Processing crimes and incident scenes 4.2 Securing a computer incident or crime 4.3 Seizing digital evidence at scene 4.4 Storing digital evidence 4.5 Obtaining digital hash 4.6 Reviewing case.	

Course Outcomes: The students will be able to...

1. explain the basics of network security.
2. analyse the overview of Digital & Cyber Forensic and its applications.
3. perform the basic digital forensics and techniques for conducting the forensic examination on different digital devices.
4. discuss the digital evidences such as the data acquisition, identification analysis.

REFERENCE BOOKS:

1. Singh P.K. *Introduction To Computer Networks*, VK Global Publications Pvt Ltd; 2020th edition (1 January 2020); VK Global Publications Pvt Ltd : 1 Jan 2020
2. Miller Michael. *Computer basic Absolute Beginner's* Pearson Publication, 9th Edition: 2020
3. Singh P K. *Basic of Computer*, V k Global Publication 2015
4. TharejaReema. *Fundamentals of Computer*, Oxford Publication : 4 June 2014
5. Morley D. *Understanding Computers today & tomorrow* 14th Edition : Cengage Learning Publication : Feb 2012
6. Nelson, B, Phillips, A, Enfinger, F, Stuart, C., *Guide to Computer Forensics and Investigations*, 2nd ed., Thomson Course Technology, 2006, ISBN: 0-619-21706-5.
7. Joshi Rajmohan. *Introduction to Computers*, Delhi, Isha Books Publication, 2006 : Page No (1-22)
8. Dr. Joshi R. C. *Basic operating system*, Dream tech PressPublication,2005
9. Vacca, J, *Computer Forensics, Computer Crime Scene Investigation*, 2nd Ed, Charles River Media, 2005, ISBN: 1-58450-389.
10. Warren G. Kruse II and Jay G. Heiser, *Computer Forensics: Incident Response Essentials*, Addison Wesley, 2002.
11. Prof. S. Venkatachalam. *Introduction to Computers*, New Delhi, Educational Publisher, 1999

Lab II: Laboratory exercises in Basics of Forensic Science II and Basics of Computer and Digital Forensics II

Credit: - 02

Practical: 60 Hours

<p>SEMESTER – II Major Lab Course II: BFSP 123 : (Based on BFST 121 and BFST 122) List of Practical (15)</p>

Course Objectives- Students should be able to...

1. study the hierarchical set up of Law enforcement agencies.
2. study the annual reports of the National Crime Records Bureau.
3. learn to write reports on different types of crime cases.
4. learn about Creating & Sending email.

Credits (Total Credits 2)	SEMESTER – I Major Lab Course II: BFSP 123 : (Based on BFST 121 and BFST 122) List of Practical	No. of hours per Practical (60 hrs)
1	To study the hierarchical set up of Law enforcement agencies.	
2	To analyze statistical data of the National Crime Records Bureau regarding various crimes.	
3	To study the history of crime cases from a forensic science perspective.	
4	To Review The sections of forensic science at INTERPOL and compare with those in Central Forensic Science Laboratories in India.	
5	To study the annual reports of the National Crime Records Bureau and depict the data on different types of crime cases by way of smart art/templates.	
6	To write reports on different types of crime cases.	
7	To prepare a schedule of five cognizable and five non-cognizable offences	
8	To study the powers and limitations of the Court of Judicial Magistrate of First Class.	
9	To study a crime case in which an accused was punished on charge of murder under Section 302.	
10	Use of E-mail, creating e-mail, Sending and Receiving emails with Attachments	
11	Networking commands-like ping, IP-configuration, etc, with various switches.	
12	Tracing E-mail, finding sender's IP address, of received email, tracing route of email Received using tools available on internet, e.g. Visual Trace Route etc.	
13	Working with Ms-office (word, excel, power-point).	
14	Understanding the working of Firewall	
15	To understand the Cyber Crime Investigation Process: Forensics Readiness, Warrants and Secure the crime scene, Collect the evidence, secure the Evidence.	
16	To understand the Searching and Seizing of Evidences.	

Course Outcomes: The students should be able to...

1. discuss the hierarchical set up of Law enforcement agencies.
2. write reports on different types of crime cases.
3. explain the working process of the National Crime Records Bureau and INTERPOL.
4. perform a cybercrime investigation process.

REFERENCE BOOKS

1. Gandhi B M. *Penal Law*, Eastern Book Company, (2023)
2. Jain M.P. *Indian Constitutional Law*, LexisNexis (2018)
3. W.J.Tilstone, M.L.Hastrup and C. Hald, Fisher's. *Techniques of Crime Scene Investigation*, CRC Press, Boca Raton (2013).
4. Sarthi V. P., *Law of Evidence*, 6th Edition, Eastern Book Co., Lucknow (2006).
5. S.H.James and J.J.Nordby, *Forensic Science: An Introduction to Scientific and Investigative*, 2nd Edition, CRC Press, Boca Raton (2005).
6. R.Saferstein, *Criminalistics*, 8th Edition, Prentice Hall, New Jersey (2004).
7. M.K. Bhasin and S.Nath, *Role of Forensic Science in the New Millennium*, University of Delhi, Delhi (2002).
8. Monir M., *Law of Evidence*, 6th Edition, Universal Law Publishing Co. Pvt. Ltd., New Delhi (2002).
9. B.B. Nanda and R.K.Tiwari, *Forensic Science in India: A Vision for the Twenty First Century*, Select Publishers, New Delhi (2001).
10. Bronstein D.A. *Law for the Expert Witness*, C R C Press, Boca Raton (1999).
11. W.G. Eckert and R.K. Wright. *Introduction to Forensic Sciences*, 2nd Edition, W.G. Eckert (ED.), CRC Press, Boca Raton (1997).
12. Mahajan V.D. *Jurisprudence*, Eastern Book Company, (1993)
13. Pillai A.S. *Criminal Law*, 6th Edition, N.M. Tripathi Pvt. Ltd., Mumbai (1983).
14. Nigam R.C. *Law of Crimes in India*, Volume I, Asia Publishing House, New Delhi (1965).

<p style="text-align: center;">SEMESTER – II Minor Course III : BFST 124 Basics of Forensic Chemistry II and Forensic Physics II</p>

Course Objectives: Students should be able to...

1. learn the importance of chemical kinetics.

- learn the laws of Thermodynamics.
- understand basics and applications of LASER in forensic science.
- study the basic concept of Optics.

Credits (Total Credits 2)	SEMESTER – II Minor Course III : BFST 124 Basics of Forensic Chemistry II and Forensic Physics II	No. of hours per unit/credits
Unit – I	Chemical Kinetics	(07)
	1.1 Introduction and Rate of reaction 1.2 Definition and units of rate constant 1.3 Factors affecting rate of reaction 1.4 Order and Molecularity of reaction 1.5 First order reaction and Characteristics of first order reaction 1.6 Pseudo- unimolecular reactions.	
Unit – II	Thermodynamics	(08)
	2.1 Introduction (Basic terms involved in thermodynamics) 2.2 Statement of Zeroth law, First law and Third law 2.3 Spontaneous & non-spontaneous processes 2.4 definitions, distinguishing points and examples 2.5 Second law of thermodynamics and its different Statements.	
Unit – III	LASER	(07)
	3.1 A brief history of lasers 3.2 Einstein's prediction: The Three Processes 3.3 Pumping schemes 3.4 Characteristics of lasers 3.5 Types of lasers: Ruby laser, He-Ne laser 3.6 Applications of lasers in Forensic Science.	
Unit – IV	Optics	(08)
	4.1 Introduction to development of optics 4.2 Types of Lens, Lens maker's formula 4.3 Cardinal points of an optical system 4.4 Aberration and its types : Monochromatic, chromatic 4.5 Interference in thin film- Thin films 4.6 Interference due to transmitted light 4.7 Newton's rings.	

Course outcomes: The students will be able to...

- explain the introduction of chemical kinetics and their rate of reaction.
- describe basic terms in thermodynamics and their all laws and statements.
- apply different LASER techniques and phenomenon in forensic science.
- describe different types of lens, Lens Equation, types of aberration.

REFERENCE BOOKS:

1. Bahl, Tuli and Bahl, *Essentials of Physical Chemistry*, S. Chand Publication, New Delhi, India (1-450), 28th edition, 2019.
2. Skoog, *Holler and Crouch Instrumental Analysis*, Cengage Learning 20 Channel Center Street Boston, MA 02210, USA. (696- 793) (2018)
3. S. Glasstone, *Thermodynamics for chemists*. (2017)
4. H.C. Verma, *Concepts of Physics*, (Bharati Bhavan Publishers 2017) 255-280
5. Soni and Dharmarha, *Textbook of Physical Chemistry*, Sultan Chand & Sons, 2016 (unit VI)
6. M. N. Avadhanulu and Dr.P.S.Hemne, *An introduction to Lasers – Theory and Applications*, S. Chand Publication, (Ref. 2, 11.7.1 – 11.7.4), 2010.
7. Sears and Zemansky, *University Physics with Modern Physics*, 11th edition, Pearson education. (312-320), 2004.
8. Gupta Kumar *Heterocyclic chemistry Vol I and Vol II Springer*, Salmon Tower Building New York City, United States. (58, 66) (1998)
9. Day and Selbin, *Theoretical Inorganic Chemistry*, 2nd edition, DARYAGANJ NEW DELHI 181 DL (1969)
10. G. R. Goel, *Advanced Physical Chemistry*, Publishing House, 36th Edition

<p>SEMESTER – II Minor Course IV : BFST 125 Basics of Forensic Biology II and Forensic Psychology II</p>

Course Objectives: Students should be able to...

1. learn the basic concepts of microbiology.
2. study the basic principle of Immunology.
3. understand the concepts of sensation and perception.
4. understand the concept of Learning and its theories.

Credits (Total Credits 2)	SEMESTER – II Minor Course IV : BFST 125 Basics of Forensic Biology II and Forensic Psychology II	No. of hours per unit/credits
Unit – I	Basics of microbiology	(07)
	1.1 Concept of pure culture technique	
	1.2 Stains and staining techniques	

	1.3 Control of Microorganisms: Physical & Chemical methods of control 1.4 Microscopy principle and types of Microscopy 1.5 Broad classification of microorganisms	
Unit – II	Immunity	(08)
	2.1 Definition 2.2 Types-natural, acquired, active, passive 2.3 Antigens-Definition and types of antigens 2.4 Factors influencing antigenicity 2.5 Antibody-Definition, structure and types 2.6 Properties and functions of Immunoglobulin 2.7 Agglutination and Precipitation.	
Unit – III	Sensation and Perception	(07)
	3.1 Sensation and Perception-Definition 3.2 Perceptual constancies 3.3 Gestalt Principle of Perception-perceptual organization and Grouping of Stimuli in Perceptual Organization 3.4 Depth Perception 3.5 Errors in Perception-Illusion, Hallucination 3.6 Individual Factors in Perception.	
Unit - IV	Learning	(08)
	4.1 Definition of Learning 4.2 Types of Learning 4.3 Theories of Learning - Classical Conditioning, Operant Conditioning, Trial-Error Learning, Insight Learning, Cognitive Learning Theory Tolman's Latent Learning, Bandura's Observational Learning Theory.	

Course Outcomes: The students will be able to...

1. explain concepts of microbiology.
2. describe basic principles of Immunology.
3. elaborate concepts related to sensation and perception.

4. discuss theories of Learning.

REFERENCE BOOKS

1. Surinder Kumar , *Essentials of Microbiology*, JP Medical Ltd, 2015
2. Roitt :*Essential Immunology* , Wiley - Blackwell , 2011(Unit IV Page no. 1 to 21)
3. Upadhyay & Nath, *Biophysical Chemistry*, Himalaya Publishing house (2010)
4. Ciccarelli, S. K. & Meyer G. E., *Psychology* (New Delhi, Pearson Education, 2006), 1-304.
5. Edward E. S., Stephen M. K., *Cognitive Psychology Mind and Brain*, (New Delhi, Pearson Education, 17 Aug 2006)1-30.
6. *Kuby's Immunology*, Goldsby, Kindt, Osborne, W.H Freeman and company, NewYork 6th ed.(unit IV Page no.4 to 21), 21 July 2006
7. Dubey and Maheshwari, *Practical Microbiology*, S.Chand and company, New Delhi, 2002.
8. Baran R.A.*Psychology*, (New Delhi; Pearson Education Pvt. Ltd. 2001),5-205
9. Morgan C.T., King R.A., Weisz J.R., Schopler., *Introduction to Psychology* (McGrawHill Book Co.,1986)
10. Kimble G.A., Garnezy *Principles of General Psychology*, 3rd ed., New York, 1 Jan 1965(1-90).

SEMESTER – II

Minor Lab Course - II: BFSP 126

Lab II: Laboratory exercises in Basics of Forensic Chemistry II and Forensic Physics II & Basics of Forensic Biology II and Forensic Psychology II

SEMESTER – II

Minor Lab Course II : BFSP 126 : (Based on BFST 124 and BFST 125) List of Practical

Course Objectives: Students should be able to...

1. study Reaction between $K_2S_2O_8$ & KI, Semi micro qualitative analysis.
2. learn to determine the wavelength of a given LASER source by using plane diffraction grating.
3. learn blood groupings techniques.
4. learn staining techniques.
5. examine span of attention.

Credits (Total Credits 2)	SEMESTER – II Minor Lab Course - II List of Practical	No. of hours per Practical (60)
1	Chemical Kinetics I : Hydrolysis of Methyl Acetate 3	
2	Chemical Kinetics II: Study of Reaction Between K ₂ S ₂ O ₈ & KI	
3	To study laws of Thermodynamics.	
4	To study the order and Molecularity of reaction.	
5	To determine the wavelength of a given (He-Ne LASER) LASER source by using plane diffraction grating.	
6	Measurement of divergence of laser.	
7	To find the refractive index of a liquid using convex lens and plane mirror	
8	To find the refractive index of a liquid using a concave mirror and a plane mirror.	
9	Study of morphological types of red blood cells	
10	Antigen-antibody reaction (blood groupings)	
11	Staining Techniques, Simple, Negative staining, Gram Staining	
12	Mitochondria – Stained preparation of mitochondria from i) Onion peeling ii) Hydrilla leaf iii) Oral mucosa by using Janus Green B	
13	Serial Learning	
14	Recall-Recognition	
15	Span of Attention	
16	Retroactive Inhibition and Proactive Inhibition	

Course Outcomes: The students will be able to...

1. perform Reaction between K₂S₂O₈ & KI, Semi micro qualitative analysis.
2. determine the wavelength of a given (He-Ne LASER) LASER source by using plane diffraction grating.
3. determine blood groups using Antigen-antibody reaction.
4. perform staining techniques.
5. find out span of Attention.

REFERENCE BOOKS:

1. Puri, Sharma and Kalia, *Principles of inorganic chemistry*, Milestone publisher, Delhi, India. 7 Dec 2020, (137-200 , 201 – 233 , 313 – 327)
2. Bahl, Tuli and Bahl, *Essentials of Physical Chemistry*, New Delhi, India, 28th edition ,2019 (1-450)
3. *Stain and staining procedure* by Desai and Desai, 2017.
4. Soni and Dharmaraj, *Textbook of Physical Chemistry*, Sultan Chand & Sons, 2016 (unit VI)
5. *Forensic Biology* by Richard Li, Taylor & Francis Group, 2015.
6. *Handbook of Media for clinical and public health microbiology* by Ronald Atlas, Taylor & Francis Group, 2014.
7. H. Singh and P. S. Hemne *B.Sc. Practical Physics*, , S. Chand Publication, (4th edition, 2011) 20-60
8. White and Manning, *Experimental College Physics*, McGraw-Hill Book Company. (3rd edition 2011) 333-340
9. Gurdeep Raj, *Advanced Physical Chemistry*, Publishing House, 36th Edition, 2011.
10. S. L. Gupta and V. Kumar, *Practical Physics*, Pragati Prakashan, (27th edition, 2010)
11. Puri, Sharma and Pathania, *Principles of Physical Chemistry*, Vishal Publishing House, 44th Edition Jaladhar July 1962, (525-557)
12. C. L. Arora, *B.Sc. Practical Physics*, (S. Chand Publication, 1957) 69-79
13. J. E. Huheey, *Inorganic Chemistry*, 4th edition, HarperCollins college publishers, (92-134, 300, 538-557, 655, 662)
14. DFSL manual.
15. Serial Learning Manual
16. Recall-Recognition Manual
17. Maze learning Manual
18. Span of Attention Manual

Semester – II
OE: Human Psychology
OE Course - III: BFST 127 Adolescence Psychology

SEMESTER – II Paper – III Adolescence Psychology

Course Objectives- Students will be able to:

1. study the physical development of adolescences.
2. know about the cognitive development of adolescences.
3. understand the social development factors.
4. identify the personality development factors.

Credits (Total Credits 2)	SEMESTER – II Paper – III Adolescence Psychology	No. of hours per unit/credits
Unit – I	Physical Development in Adolescence	(08)
	1.1. Introduction to Adolescence, 1.2. Puberty, 1.3. Physical development, 1.4. Growth during Adolescence: The Rapid Pace of Physical and Sexual Maturation, 1.5. Brain Development and Thought: Paving the Way for Cognitive Growth	
Unit – II	Cognitive Development in Adolescence	(08)
	2.1. Piagetian Approaches to Cognitive Development: Using Formal Operations, 2.2. Information Processing Perspectives: Gradual Transformations in Abilities 2.3. Egocentrism in Thinking: Adolescents’ Self-Absorption School Performance 2.4 Cyberspace: Adolescents Online, 2.5. Threats to Adolescents’ Well-Being.	
Unit – III	Social Development in Adolescence	(08)
	3.1. Relationships: Family and Friends, 3.2. Family Ties: Changing Relations with Relations, Relationships with Peers. 3.3. Dating, Sexual Behaviour, and Teenage Pregnancy 3.4. Dating and Sexual Relationships in the Twenty-First Century 3.5. Sexual Orientation: Heterosexuality, Homosexuality,	

	Bisexuality, and Transexualism.	
Unit – IV	Personality Development in Adolescence	(06)
	4.1. Identity: Asking “Who Am I?” 4.2. Self-Concept and Self-Esteem 4.3. Marcia’s Approach to Identity Development: Updating Erikson 1.5. Depression and Suicide: Psychological Difficulties in Adolescence.	

Course Outcomes- After completion of the units students will be able to:

1. Define physical development of adolescences.
2. Describe the cognitive development of adolescences.
3. Explain the social development factors.
4. Know the personality development factors.

Reading Book

1. Feldman R.S., *Development across the Life Span*, Eight Edition England, Pearson Education Limited 2018.

REFERENCE BOOKS:

1. Feldman R.S., *Development across the Life Span*, Eight Edition England, Pearson Education Limited 2018.
2. Shaffer D.R., Kipp K., Wood E., Wiloughby T., *Developmental Psychology- Childhood and Adolescence*, Fourth Edition, Nelson Education Ltd.2013.
3. Zgourides G., *Developmental Psychology*, Foster City, IDG Books Worldwide 2000.

SEMESTER – II

Human Psychology

Open Elective – IV

BFST: 128 Psychology of carrier counselling.

Course Objectives- Students will be able to:

1. study the theories of career counselling.
2. learn about the theories of career decision making.
3. know about personal development for career.
4. understand the counselling process and outcomes.

Credits (Total Credits 2)	SEMESTER – II Paper IV – Psychology of carrier counselling.	No. of hours per unit/credits
Unit - I	Theories of Career Decision Making	(08)
	1.1.Introduction, Person–Environment Fit Theories, 1.2.Rodger’s Seven-Point Plan, Holland’s six types, Present status models, Interests and personality, 1.3.Developmental Career Theories, Structural Theories, Social Influence in Career 1.4.Decision Making, Lent, Brown and Hackett’s Social Cognitive Career Theory, 1.5.Levels of Analysis, Reductionism.	
Unit – II	Theories of Adult Career Development	(08)
	2.1. Introduction to Theories of Personal Development, 2.2. Theories of Career Development, 2.3.Career transitions and cycles, Career management as a social process, 2.4. Career development skills, 2.5. Cultural Differences.	
Unit – III	Counselling Theories	(08)
	3.1. Introduction to counselling theories, 3.2. Person-centred Theories, 3.3.Psychodynamic Theories, 3.4.Cognitive-Behavioural Theories, 3.5 Narrative Approaches, Comparing and Integrating Theories.	
Unit - IV	Evaluating the Effectiveness of Career Counselling	(06)
	4.1. Introduction, 4.2.Process and Outcome research: therapeutic counselling, 4.3. career counselling,	

	4.4.Epistemological and Methodological Issues,	
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Course Outcomes: After completion of the units students will be able to...

1. describe different methods of carrier counselling.
2. utilize the different theories of career decision making.
3. utilize the personal development for career
4. discuss the counselling process and outcomes

Reading Book:

1. Kidd Jennifer M. *Understanding Career Counselling; Theory, Research and Practice*, London: SAGE Publications Ltd, 2006.

REFERENCE BOOKS:

1. Gladding Samuel T. *Counseling: A Comprehensive Profession*, United States of America, Pearson Education, Inc., 2018.
2. Nathan Robert & Hill Linda. *Career Counselling*, second edition, London: SAGE Publications Ltd, 2006.
3. Ritchie Graeme. *The Linguistic Analysis of Jokes*, USA and Canada, Routledge, 2004.

Rayat Shikshan Sanstha's

Yashavantrao Chavan Institute of Science, Satara (Autonomous)

Department of Forensic Science

Skill Enhancement Courses

Course Name: - SEC 103 Tools and Techniques in Forensic Science

<p style="text-align: center;">SEMESTER – II</p> <p style="text-align: center;">Cell Phone Forensics</p>
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Course Objectives- Students will be able to:

1. Understand the basics of cell phone forensics.
2. Learn about the mobile phone forensic process.

3. Understand the Fundamental concept of investigative tools and techniques.

Credits (Total Credits 2)	SEMESTER – II Introduction to Biometry	No. of hours per unit/credits
Unit - I	Introduction to Cell Phone Forensics	(09)
	1.1 Introduction and Basics of Cell Phone Forensics 1.2 A brief history of the development of mobile phone technology 1.3 The history of mobile phone forensics 1.4 The mobile phone forensics process 1.5 PDA Forensics 1.6 Digital Evidence Handling for Cell Phones and SIM Cards 1.7 SIM Card Cloning 1.8 Call History Recovery 1.9 Deleted SMS Recovery 1.10 Evidence in Mobile Phone Systems	
Unit – II	Mobile Storage Media	(06)
	2.1 Forensic analysis of mobile phone internal memory 2.2 Digital Camera Forensics 2.3 Advanced Cell (Mobile) Phone Forensics 2.4 Mobile phone forensics case studies 2.5 Tools used in Mobile and SIM Card Forensics 2.6 Expert Opinion Report Writing 2.7 Ethics for the Expert Witness	

Course Outcomes- After completion of the units students will be able to:

1. Analyse the basis of cell phone forensics.
2. Discuss the investigative techniques and tools.
3. Explain the importance of a forensic expert.

REFERENCE BOOKS:

1. Hummert, Christian, Pawlaszczyk, Dirk. *Mobile Forensics – The File Format Handbook*, Springer International Publishing, Cham, 2022.
2. Casey, Eoghan. *Digital Evidence and Computer Crime: Forensic Science, Computers, and the Internet*. Amsterdam: Academic Press, 2018.
3. Michael R, and Craig M. *Cellular Telephone System in Forensics*. New York: Springer, 2016.
4. Balding, D J. *Handbook of Mobile Forensics and Investigation*. Amsterdam: Academic Press, 2015.