MOHAN BABU UNIVERSITY

Sree Sainath Nagar, Tirupati – 517 102

MBU
MOHAN BABU
UNIVERSITY
DREAM. BELIEVE. ACHIEVE

SCHOOL OF LIBERAL ARTS AND SCIENCES

B.Sc. – Forensic Science

CURRICULUM AND SYLLABUS

(From 2023-24 Admitted Students)

FULLY FLEXIBLE CHOICE BASED CREDIT SYSTEM(FFCBCS)

MOHAN BABU UNIVERSITY

Vision

To be a globally respected institution with an innovative and entrepreneurial culture that offers transformative education to advance sustainability and societal good.

Mission

- Develop industry-focused professionals with a global perspective.
- Offer academic programs that provide transformative learning experience founded on the spirit of curiosity, innovation, and integrity.
- Create confluence of research, innovation, and ideation to bring about sustainable and socially relevant enterprises.
- Uphold high standards of professional ethics leading to harmonious relationship with environment and society.

SCHOOL OF LIBERAL ARTS AND SCIENCES

Vision

To be the ideal culmination for the edification of liberal arts and sciences recognized for excellence, innovation, entrepreneurship, environment and social consciousness.

Mission

- Infuse the essential knowledge of liberal arts and sciences, skills and an inquisitive attitude to conceive creative and appropriate solutions to serve industry and community.
- Proffer a know-how par excellence with the state-of-the-art research, innovation, and incubation ecosystem to realise the learners' fullest entrepreneurial potential.
- Endow continued education and research support to working professionals in liberal arts and sciences to augment their domain expertise in the latest technologies
- Entice the true spirit of environment and societal consciousness in citizens of tomorrow in solving challenges in liberal arts and sciences.

DEPARTMENT OF BIOLOGICAL AND CHEMICAL SCIENCES

Vision

To become a leading center of excellence in the Biological and Chemical Sciences through adapting advanced methods in teaching and research.

Mission

- Inspire science students of tomorrow to take on the challenges in the scientific field and build sustaining society that is free from Biological and Chemical science apprehensions.
- Provide students with an education that combines academics with diligent practical training in a dynamic, research-oriented environment to serve Industry and Societal needs.
- Encourage faculty and staff to achieve bigger goals in their respective fields and exhibit the best of their abilities via continuing education and research.

B.Sc. – Forensic Science

PROGRAM EDUCATIONAL OBJECTIVES

After few years of graduation, the graduates of B.Sc. Forensic Science, will:

PEO1. Pursue higher education in their core or allied areas of specialization.

PEO2. Employed as a productive and valued professional in industry/teaching/ research.

PEO3. Engaged in innovation and deployment as a successful entrepreneur.

PEO4. Adapt evolving technologies in the core or allied areas by participating in continuing education programs for lifelong learning

PROGRAM OUTCOMES

On successful completion of the Program, the graduates of B.Sc. Forensic Science, will be able to:

PO1. **Knowledge:** To study as well as apply concepts, theories, and practices across the disciplines to gain the foundational knowledge.

PO2. **Problem Analysis:** To identify, analyze and evaluate various experiences and perspectives using foundational disciplinary knowledge for substantiated conclusions.

PO3. **Design/Development of solutions:** To design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. **Modern tool usage:** To create, select, and apply appropriate techniques, resources and modern tools with an understanding of the limitations.

PO5. **Environment and Sustainability:** Understand the issues of environmental contexts and demonstrate the knowledge for sustainable development.

PO6. **Ethics and Society:** Apply the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities under moral dimensions.

PO7. **Individual and teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, to manage projects and finance in multidisciplinary settings.

PO8. **Effective Communication:** To develop proficiency and efficiency in communicating by connecting people, ideas, books, media, and technology.

PO9. **Life-long learning:** Recognize the need for and acquire the ability to engage in independent and life-long learning in the broadest context of socio-technological changes.

PROGRAM SPECIFIC OUTCOMES

On successful completion of the B.Sc. Forensic Science program, students will be able to:

PSO1. Apply fundamental principles and applications of Forensic Science for handling different types of evidences and their examinations.

PSO2. Become familiar with the other interdisciplinary areas relevant to Forensic Science and also use appropriate analytical techniques for examining differenttypes of evidences found at the crime scene.

PSO3. Have broad knowledge required for pursuing higher education globallyas well as compatible for appearing competitive examinations to get employment or choosing an independent career.

B.Sc. – Forensic Science

Basket Wise - Credit Distribution

S. No.	Basket	Credits (Min.- Max.)
1	SCHOOL CORE	28-34
2	PROGRAM CORE	54-72
3	PROGRAM ELECTIVE	24-36
4	UNIVERSITY ELECTIVE	9-12
TOTAL CREDITS		**Min. 120**

B.Sc. (Hons.) – Forensic Science (4 Years Degree Program)

S. No.	Basket	Credits (Min.- Max.)
1	SCHOOL CORE	28-36
2	PROGRAM CORE	66-81
3	PROGRAM ELECTIVE	39-60
4	UNIVERSITY ELECTIVE	9-12
	TOTAL CREDITS	**Min. 160**

School Core

(28-34 Credits for 3-year course) **(28-36 Credits for 4-year course)**

Course Code	Title of the Course	Lecture	Tutorial	Practical	Project based Learning	Credits	Pre-requisite
		L	T	P	S	C	
School Main Basket (Min. 20 Credits to be earned)							
22BS101401	Environmental Studies	2	-	-	-	2	-
22BS101036	Mind and Behavior	3	-	-	-	3	-
22LG101401	Personality Development	2	-	-	-	2	-
22BS101002	Introduction to Biology	3	-	-	-	3	-
22BS101071	Basic statistics	3	-	-	-	3	-
22BS101080	Introduction to Biometry	3	-	-	-	3	-
22BS101081	Forensic Audio and Video Analysis	3	-	-	-	3	-
22BS101082	Handwriting Identification andRecognition	2	-	-	-	2	-
22BS101083	Psychology	3	-	-	-	3	-
22BS101003	Biodiversity Monitoring and management	3	-	-	-	3	-
22BS111001	Internship	-	-	-	-	2	-
22BS108001	Capstone Project	-	-	-	-	8	-
Language Basket (Min. 5 Credits to be earned)							
22LG101402	Telugu	2	-	-	-	2	-
22LG101404	Sanskrit	2	-	-	-	2	-
22LG102405	General English	2	-	2	-	3	-
22LG102401	English for Professionals	2	-	2	-	3	-

Course Code	Title of the Course	Lecture	Tutorial	Practical	Project based Learning	Credits	Pre-requisite
		L	T	P	S	C	
22LG101406	German Language	2	-	-	-	2	-
22LG101407	French Language	2	-	-	-	2	-
Mandatory Non-Credit Courses (Min. 6 Credits to be earned) Earned Credits will not be considered for CGPA							
22LG107601	Professional Ethics and Human Values	2	-	-	-	2	-
22CE107602	Disaster Mitigation and Management	2	-	-	-	2	-
22LG107602	Essential Life Skills for Holistic Development	2	-	-	-	2	-
22AB107601	NCC/NSS Activities	-	-	-	-	2	-
22AB107602	Yoga	-	-	-	-	2	-
22MG107401	Innovation, Incubation and Entrepreneurship	2	-	-	-	2	-
22EE107001	Intellectual Property Rights	2	-	-	-	2	-
22EE107002	Fundamentals of Research Methodology	2	-	-	-	2	-

PROGRAM CORE

(54-72 credits for 3-year course) **(66-81 credits for 4-year Course)**

Course Code	Title of the Course	Lecture	Tutorial	Practical	Project-based Learning	Credits	Pre-requisite
		L	T	P	S	C	
22BS101072	Digital Forensics	3	-	-	-	3	-
22BS102070	Fundamentals of Forensic Sciences	3	-	2	-	4	-
22BS101070	Forensic Sciences Physics	3	-	-	-	3	-
22BS102071	Criminalistics	3	-	2	-	4	-
22BS102072	Criminal law	3	-	2	-	4	-
22BS102073	Technological Methods in Forensic Science	3	-	3	-	4.5	-
22BS102074	Dermatoglyphics	3	-	3	-	4.5	-
22BS102075	Forensic Ballistics	3	-	2	-	4	-
22BS102076	Forensic Toxicology	3	-	2	-	4	
22BS102077	Forensic Chemistry	3	-	2	-	4	-
22BS102078	Forensic Biology	3	-	3	-	4.5	-
22BS102079	Questioned Documents	3	-	3	-	4.5	-
22BS102080	Forensic Serology	3	-	2	-	4	Forensic Biology
22BS102081	DNA Forensics	3	-	2	-	4	Forensic Biology
22BS103070	Fundamentals of Crime, Criminology and Police	3	-	-	4	4	-
22BS101011	General Chemistry	3	-	-	-	3	-
22BS102013	Inorganic and Physical Chemistry	3	-	3	-	4.5	-
22BS102014	Basic Organic Chemistry	3	-	3	-	4.5	-
22BS102007	Biophysical Techniques	3	-	3	-	4.5	-
22BS102025	Principles of Microbiology	3	-	3	-	4.5	-

PROGRAM ELECTIVE

(24–36 Credits for 3-Year Course) **(39-60 Credits for 4-Year Course)**

Course code	Title of the Course	Lecture	Tutorial	Practical	Project-based Learning	Credits	Pre-requisite
		L	T	P	S	C	
22BS103071	Crime and Society	3	-	-	4	4	-
22BS101073	Economic offences	3	1	-	-	4	-
22BS101074	Accident Investigations	3	-	-	-	3	-
22BS101075	Forensic Medicine	3	-	-	-	3	Forensic Biology
22BS101076	Forensic Psychology	3	1	-	-	4	-
22BS101077	Cyber Crime and Law	3	-	-	-	3	-
22BS101078	Cyber Forensics	3	1	-	-	4	-
22BS101079	Forensic Ballistics and Explosives	3	1	-	-	4	Forensic Sciences Physics
22BS101084	Forensic Science and Society	3	1	-	-	4	-
22BS101086	Advanced Forensic Science	3	1	-	-	4	-
22BS102024	Fundamentals of Analytical Chemistry	3	-	3	-	4.5	-
22BS102027	Advanced General Chemistry	3	-	-	-	3	-
22BS102082	Forensic Anthropology	3	-	2	-	4	-
22BS102083	Wildlife Forensics	3	-	2	-	4	Forensic Biology
22BS102084	Forensic Entomology	3	-	1	-	3.5	
22BS101087	Various divisions in Forensic Science	3	-	-	-	3	-
22BS101085	Fundamentals of Computers	3	-	-	-	3	-

UNIVERSITY ELECTIVE

(9-12 CREDITS)

Course Code	Title of the Course	Lecture	Tutorial	Practical	Project based Learning	Credits	Pre-requisite
		L	T	P	S	C	
22ME101702	Human Resource Management	3	-	-	-	3	-
22ME101703	Management Science	3	-	-	-	3	-
22ME101704	Managing Innovation and Entrepreneurship	3	-	-	-	3	-
22LG101701	Business Communication and Career Skills	3	-	-	-	3	-
22MG101701	Entrepreneurship for Micro, Small and Medium Enterprises	3	-	-	-	3	-
22SS101704	Indian History	3	-	-	-	3	-
22SS101706	Women Empowerment	3	-	-	-	3	-
22CE101703	Planning for Sustainable Development	3	-	-	-	3	-
22CM101701	Banking and Insurance	3	-	-	-	3	-
22CM101702	Cost Accounting and Financial Management	3	-	-	-	3	-
22SS101702	Gender and Environment	3	-	-	-	3	-
22SS101703	Indian Economy	3	-	-	-	3	-
22SS101705	Indian Tradition and Culture	3	-	-	-	3	-
22SS101701	Constitution of India	3	-	-	-	3	-
22CE201701	Disaster Management	3	-	-	-	3	-
22ME101701	Global Strategy and Technology	3	-	-	-	3	-
22EE101704	Green Technologies	3	-	-	-	3	-

Note:

1. If any student has chosen a course or equivalent course from the above list in their regular curriculum then, he/she is not eligible to opt the same course/s under University Elective.
2. The student can choose courses from other disciplines offered across the schools of MBU satisfying the pre-requisite other than the above list.

SCHOOL CORE

Course Code	Course Title	L	T	P	S	C
22BS101401	**ENVIRONMENTAL STUDIES**	**2**	**-**	**-**	**-**	**2**

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on multidisciplinary nature of environmental studies, scope and importance of environmental education, ecosystems, ecology, renewable and non-renewable energy resources. Biodiversity and its conservation. Environmental pollution and its control measures, global environmental issues and Acts. Green Chemistry and its tools.

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

CO1	Understand the natural environment, and to realize the importance of the renewable energy sources.
CO2	Acquire knowledge of various sources of water pollution and the management of municipal and Industrial wastewater.
CO3	Summarize the various environmental pollution and its control measures.
CO4	Get familiarized on climate and social issues arising due to environmental disorders.
CO5	Gain awareness on Green technology and its tools.

CO-PO Mapping Table:

Course Outcomes	Program Outcomes								
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	**3**	**-**	**-**	**-**	**3**	**2**	**-**	**-**	**-**
CO2	**3**	**-**	**-**	**-**	**3**	**2**	**-**	**-**	**-**
CO3	**3**	**-**	**-**	**-**	**3**	**3**	**-**	**-**	**-**
CO4	**2**	**-**	**-**	**-**	**3**	**3**	**-**	**-**	**2**
CO5	**3**	**-**	**-**	**2**	**3**	**-**	**-**	**-**	**2**
Course Correlation Mapping	**3**	**-**	**-**	**2**	**3**	**3**	**-**	**-**	**2**

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: ENERGY SOURCES **(06 Periods)**

Renewable energy Resources: Solar energy - solar cells, wind energy, tidal energy.
Non-renewable energy resources: Natural gas, coal gas, biogas.

Module 2: WATER POLLUTION **(06 Periods)**

Potable water, Sources of water, impurities in water and their consequences, Eutrophication, Effect of Hardness of water, Municipal and Industrial wastewater management.

Module 3: ENVIRONMENTAL POLLUTION AND ITS CONTROL MEASURES (06 Periods)

Definition, causes, effects and control measures of: Air, Water (thermal and marine pollution), Land pollution, Radiation pollution and Nuclear hazard, Noise pollution, Overgrazing, effects of modern agriculture – fertilizer and pesticides.

Module 4: ENVIRONMENTAL AND SOCIAL ISSUES (06 Periods)

Climate changes: global warming, acid rain, ozone layer depletion, nuclear accidents. **Social Issues:** Population growth, variation among nations and population explosion. Urban problems related to Water conservation, rain water harvesting and watershed management.

Module 5: GREEN TECHNOLOGY (06 Periods)

Introduction, principles of green chemistry, tools of green chemistry, Green Computing, green construction, Green manufacturing Systems.

Total Periods: 30

EXPERIENTIAL LEARNING

1. Submit a document on your plan of action in maintaining the sustainable environment.
2. Visit the Tirupathi Municipal corporation water treatment plant and submit a report on your observations
3. List any two major environmental issues in Tirupathi and make a report with solutions using your expertise.
4. Submit your ideas on the importance of Environmental Education for technical students.
5. How do unequal urban planning and green space distribution affect temperatures in a city?
6. How are water sources affected by urbanization?

RESOURCES

TEXT BOOKS:

1 Anubha Kaushik and C. P. Kaushik, Perspectives in Environmental Studies, New Age International (P) Ltd. Publications, 6 th Edition, 2018.

2 Erach Barucha, Environmental Studies, Orient Blackswan, 2nd Edition, 2013.

REFERENCE BOOKS:

1 Benny Joseph, Environmental Studies, Tata McGraw-Hill, 2nd Edition, 2009.

2 Cunningham W.P. and Cunningham M.A., Principles of Environmental Science, Tata McGraw-Hill Publishing Company, New Delhi, 8th Edition,2016.

VIDEO LECTURES:

1 https://study.com/academy/lesson/what-is-environmental-science-definition-and-scope-of-the-field.html

2 https://www.youtube.com/watch?v=Y5B1nWYle40

3 https://www.digimat.in/nptel/courses/video/127105018/L26.html

Web Resources:

1 https://www.ugc.ac.in/oldpdf/modelcurriculum/env.pdf

2 https://www.hzu.edu.in/bed/E%20V%20S.pdf

3 https://cpcb.nic.in/7thEditionPollutionControlLawSeries2021.pdf

4 https://www.clearias.com/environmental-laws-india/

SCHOOL CORE

Course Code	Course Title	L	T	P	S	C
22BS101036	**MIND AND BEHAVIOR**	**3**	**-**	**-**	**-**	**3**

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on Introduction to Mind and Body, Molecules of Life, Story of Heredity and Mind, Neural signaling and Mind behavior, and Functions and Behavior of Brain.

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

CO1 Understand Mind and body, and coordination of Mind and Body

CO2 Identify Molecules of life such as water, lipids, proteins etc.,

CO3 Gain knowledge on aspects of Heredity and Mind.

CO4 Understand Neural signaling, role of neurotransmitters in neurotransmission.

CO5 Identify the tests for diagnosis of functions of the brain.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	3	-
CO2	3	2	-	-	-	-	-	-	-	-	3	-
CO3	3	3	-	-	-	-	-	-	-	-	3	-
CO4	3	3	-	-	-	-	-	-	-	-	3	-
CO5	3	3	-	-	-	-	-	-	-	-	3	-
Course Correlation Mapping	3	3	-	-	-	-	-	-	-	-	3	-

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: INTRODUCTION TO MIND AND BODY **(09 Periods)**

human evolution, mind-body problem, nervous systems, brains, neurons, coordination of mind and body.

Module 2: MOLECULES OF LIFE **(09 Periods)**

Water, polarity, hydrophilic, hydrophobic, phospholipids, membranes, proteins, chemistry

and life

Module 3: STORY OF HEREDITY AND MIND **(09 Periods)**

DNA back story, Darwin, Bohr, Delbrück, gene, genetic code, ion channels and pumps, membrane potential, neural signaling

Module 4: NEURAL SIGNALING AND MIND BEHAVIOR **(09 Periods)**

synapses, neurotransmitters, ionotropic and GPCR receptors, autonomic nervous system, seizures, pharmacology, psychoactive drugs, neural wiring and guidance, neuroplasticity.

Module 5: FUNCTIONS AND BEHAVIOR OF BRAIN **(09 Periods)**

sensory peception, chemotaxis, olfaction, taste, flavor, vision, retina, photoreceptors, receptive fields, cortical visual areas, hearing, Fourier analysis, hair cell, vestibular, somatosensation, motor circuitry, mirror neurons, lesions, brain imaging, x-ray, CT, MRI, EEG, ECoG, MEG, PET, fMRI

Total Periods: 45

EXPERIENTIAL LEARNING

1. Submit a document on activities of Brain
2. Discuss about sleep and dreams
3. Assignment on different diagnostic tools used for brain function
4. Seminar on Neural function and Brain
5. Case study of different behaviors
6. Group discussion on Logical thinking

RESOURCES

TEXT BOOKS:

1 S. M. Breedlove, N. V. Watson & M. R. Rosenzweig,: Biological Psychology: An Introduction to Behavioral, cognitive and Clinical Neuroscience, 6th Edition, Sinauer Associates Inc., 2010.

2 V.S. Ramachandran, The Tell-Tale Brain, Ist Edition, RHI publisher, 2012.

REFERENCE BOOKS:

1 R.M. Sapolsky, Behave, The best selling exploration of why humans behave as they do, 1st edition, Vintage publishers, 2018.

2 J. Mitterer, D. Coon, T. Martini, Introduction to psychology: Gateways to Mind and Behavio, 16th Edition, Wadsworth publishing Co Inc, 2021.

VIDEO LECTURES:

1 www.biopsychology.com

WEB RESOURCES:

1 www.sinauer.com/ebooks

2 www.ncbi.nlm.nih.gov/sites/entrez

SCHOOL CORE

Course Code	Course Title	L	T	P	S	C
22LG101401	**PERSONALITY DEVELOPMENT**	**2**	**-**	**-**	**-**	**2**

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course gives awareness to students about the various dynamics of personality developments.

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

CO1 Demonstrate knowledge of leadership qualities by examining and applying personality traits through Positive self esteem, Open Communication and Self-Righteousness.

CO2 Analyze the limitations of Attitudes by applying and demonstrating communication traits through decision Making, Ethics and Self Actualization.

CO3 Apply appropriate Analyzing techniques for comprehending different personalities by examining Positive and Negative Characteristic Traits and demonstrating through Leadership Styles, Mentoring and Behaviour Modification.

CO4 Apply appropriate techniques in Solving Problems by examining and demonstrating Time Management, Stress Management and Anger Management.

CO-PO Mapping Table:

Course Outcomes	Program Outcomes								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	2	1	-	3		-	-	1	-
CO2	2	3	-	3		-	-	1	-
CO3	2	2	-	3		-	-	2	-
CO4	3	1	-	2		-	-	3	-
Course Correlation Mapping	2	2	-	3		-	-	2	-

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: **PERSONALITIES AND LEADERSHIP QUALITIES** **(06 Periods)**

Introduction: Different Personalities **-** Personality Analysis **-** Freudian Analysis **–** Vedantic Concept: Swamy Vivekananda **-** Personality Begets - Types- Leadership Qualities – Decision Making **-** Case Studies: Personalities, - Exercises.

Module 2: SELF ESTEEM AND SELF DEVELOPMENT (06 Periods)

Know Yourself: Self Image - Positive Self Esteem -Turn Failure into Success - Be Sensitive to Feedback - Build Self Confidence – Self Actualization - Set Goals - Action Plans - Accountability – Behavior Modification – Mentoring - Learning- Counseling – Challenge yourself with Aptitude Tests and Internships, - Exercises.

Module 3: ATTITUDE (06 Periods)

Importance – Difference between Behavior and Attitude - Changing Negative Attitude- Impact of Attitudes on others - Unproductive Attitudes –Assess your Behaviour - Exercises.

Module 4: COMMUNICATION RELATIONSHIP (06 Periods)

Introduction – Positive and Negative Characteristic Traits - Grapevine Communication – Open Communication; Team Player - Leadership styles – Performance Expectations - Electronic Communication; Text Messaging – Voicemail – e-Mail, - Exercises.

Module 5: CRITICAL WORK SKILLS AND ETHICS (06 Periods)

Time Management - Balancing Life and Work - Stress Management - Anger Management - Making Decisions and Solving Problems - Developing Creativity - Ethics and Self-Righteousness – Being Judgemental in the Real World - Striving for Integrity, - Exercises.

Total Periods: 30

EXPERIENTIAL LEARNING

1. List out the positive traits in you on the charts and explain in detail.
2. Discuss different famous personalities and their leadership styles.
3. What do you know about values and beliefs discuss elaborately.
4. Illustrate the morals that you follow in your that you practice in your life.
5. Interpret the role of different personalities in Bhagavad Gita.

RESOURCES

TEXTBOOKS:

1 Harold R. Wallace and L. Ann Masters, Personal Development for Life and Work, Cengage Learning, Delhi, 10th edition Indian Reprint, 2011. (6th Indian Reprint 2015)

2 Barun K. Mitra, Personality Development and Soft Skills, Oxford University Press, 2011.

REFERENCE BOOKS:

1. K. Alex, Soft Skills, S. Chand & Company Ltd, New Delhi, 2nd Revised Edition, 2011.

2. Stephen P. Robbins and Timothy A. Judge, Organizational Behaviour, Prentice Hall, Delhi, 16th edition, 2014

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=6Y5VWBLi1es
2. https://www.youtube.com/watch?v=H9qA3inVMrA

WEB RESOURCES:

1. https://www.universalclass.com/.../the-process-of-perso...
2. https://www.ncbi.nlm.nih.gov/pubmed/25545842
3. https://www.youtube.com/watch?v=Tuw8hxrFBH8

SCHOOL CORE

Course Code	Course Title	L	T	P	S	C
22BS101002	INTRODUCTION TO BIOLOGY	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on Introduction to living organisms, plant and animal biology, basics of molecular biology, human biology and photosynthesis.

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

- **CO1** Identify difference between cells, Cellular components and their functions.
- **CO2** Understand taxonomy, nomenclature and diseases resulting from parasites.
- **CO3** Identify Central dogma of Molecular biology and process of Recombinant DNA technology.
- **CO4** Understand different organ systems and their functions.
- **CO5** Understand basics and Mechanism of Photosynthesis.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	3	-
CO2	3	2	-	-	-	-	-	-	-	-	3	-
CO3	3	3	-	-	-	-	-	-	-	-	3	-
CO4	3	2	-	-	-	-	-	-	-	3	3	-
CO5	3	2	-	-	-	-	-	-	-	3	3	-
Course Correlation Mapping	3	2	-	-	-	-	-	-	-	3	3	-

Correlation Levels: 3: High; 2: Medium;1: Low

COURSE CONTENT

Module 1: INTRODUCTION TO LIVING ORGANISMS (09 Periods)

Differences between Living and Non Living systems. Cell biology and cell structure, Sub cellular Structures, Difference between Prokaryotes and Eukaryotes, Comparison between Plant and Animal Cells.

Module 2: PLANT AND ANIMAL BIOLOGY (10 periods)

Classification of Plant Kingdom. Concepts of Growth, Economic Importance of Plants, Classification of Animal Kingdom, Functions, morphology, growth and Reproduction, Protozoan Parasites – two important forms in man (Plasmodium, Entamoebahistolytica), Helminthes (Fasciotopsisbuski, Taenia solium, Ascaris, Wuchariabancrafti)

Module 3: BASIC MOLECULAR BIOLOGY (11 Periods)

DNA as genetic material, Structure of DNA, Cental dogma of Molecular Biology, DNA replication, Transcription, Translation, Gene expression and regulation, Recombinant DNA technology.

Module 4: HUMAN BIOLOGY (08 Periods)

Introduction of body as a whole, Physiology of Blood. Digestive system, Respiratory system and Endocrine system.Biological axons and neurons, Neuromuscular and synaptic junctions.

Module 5: PHOTOSYNTHESIS (07 Periods)

Bacterial & Plant photosynthesis; oxygenic and anoxygenic photosynthesis; chlorophyll as trapper of solarenergy, photosynthetic reaction centres, Hill reaction, PS I & PS II, Photophosphorylation - cyclic & noncyclic;Dark reaction & CO2 fixation.

Total Periods: 45

EXPERIENTIAL LEARNING

LIST OF EXERCISES:

1. Student will be asked to identify the Cell and Cellular organelle spotters and should write the functions of spotters identified
2. Students will be asked to prepare a table of disease causing Protozoans.
3. Students will be asked to prepare assignments for Central dogma of Molecular biology
4. Students have to identify different organs in the organ system diagrams.
5. Students will be given assignments on the topic of photosynthesis.

RESOURCES

TEXT BOOKS:

1. Sylvia S Mader, Biology, 14th Edition
2. A. Waugh, Ross and Wilson's Anatomy and Physiology in Health and Illness, 13th edition, Elsevier, 2018.

REFERENCE BOOKS:

1. F. B. Salisbury and C.W. Ross, Plant Physiology, 3rd Edition, CBS publisher, 2006.
2. C. C Chatterjee, Human Physiology, Vol 1 & 2, ,13th Edition, CBS publisher, 2020

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=N0Y386SVGN8
2. https://www.youtube.com/watch?v=nqG9zsvd1Rk
3. https://www.youtube.com/watch?v=zBkN-rRleho

WEB RESOURCES:

1. https://www.biologydiscussion.com/plant-taxonomy/quick-notes-on-plant-taxonomy/47582
2. https://www.toppr.com/guides/biology/diversity-in-living-organisms/animal-kingdom/
3. https://www.youtube.com/watch?v=X3TAROotFfM
4. https://www.youtube.com/watch?v=ZW9zPdb_Bs0

SCHOOL CORE

Course Code	Course Title	L	T	P	S	C
22BS101071	**BASIC STATISTICS**	**3**	**-**	**-**	**-**	**3**

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on Introduction to probability, Introduction to statistics, Measures of central tendencies, Measures of dispersion, Correlation and regression

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

CO1 Apply the fundamental concepts of probability.

CO2 Demonstrate the concepts of statistics.

CO3 Apply the concepts of statistical measures of central tendency on dataset.

CO4 Apply the concepts of statistical measures of dispersion on dataset.

CO5 Apply the concepts of correlation and regression on dataset.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	1
CO2	3		-	-	-	-	-	-	-	-	-	1
CO3	3	3	-	-	-	-	-	-	-	-	-	1
CO4	3	3	-	-	-	-	-	-	-	-	-	1
CO5	3	3	-	-	-	-	-	-	-	-	-	1
Course Correlation Mapping	3	3	-	-	-	-	-	-	-	-	-	1

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: INTRODUCTION TO PROBABILITY (09 Periods)

Definitions of Probability – Axioms on probability – Conditional probability (Simple problems on the above topics)

Module 2: INTRODUCTION TO STATISTICS (09 Periods)

Definition of Statistics – Scope and Limitations of Statistics – Statistical investigation – Stages in conducting survey – Primary data vs Secondary data – Classification, Tabulation and presentation of data diagram (Simple problems on the above topics)

Module 3: MEASURES OF CENTRAL TENDENCIES (09 Periods)

Measures of Central tendency definition; Types of averages, median, mode, Arithmetic mean, Geometric mean, Harmonic mean, Quadratic mean, Relation between mean, median and mode (Simple problems on the above topics)

Module 4: MEASURES OF DISPERSION (09 Periods)

Definition and properties of dispersion – Absolute vs relative measure of dispersion – Skewness, Kurtosis, Range, Quartile deviation, Mean deviation and Standard deviation (Simple problems on the above topics)

Module 5: CORRELATION AND REGRESSION (09 Periods)

Introduction – Types of correlation – Coefficient of Correlation – Rank Correlation – Regression – Principles of least square techniques – Fitting a straight line – Fitting a second- degree parabola (Simple problems on the above topics)

Total Periods: 45

EXPERIENTIAL LEARNING

1. Case on various statistical parameters on real time Forensic dataset.

RESOURCES

TEXT BOOKS:

1. Arumugam and Issac, Statistics, New Gamma Publishers, July 2013.
2. S.C Gupta- Fundamental of statistics- Himalaya publishing house- 2014.

REFERENCE BOOKS:

1. A.M. Goon. M.K. Gupta and B. Dasgupta – Fundamentals of Statistics. CRC Press, Boca Raton, 2013
2. S.C Gupta- Fundamental of statistics- Himalaya publishing house- 2014.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=ARq7fX41KPA
2. https://www.youtube.com/watch?v=70hHTFfjqmY
3. https://www.youtube.com/watch?v=Cv-znNgaJ_8
4. https://www.youtube.com/watch?v=OHncwX8cxik
5. https://www.youtube.com/watch?v=ro1BjtI9r6o

WEB RESOURCES:

1. https://download.e-bookshelf.de/download/0000/5677/10/L-G-0000567710-0015227082.pdf
2. https://iase-web.org/documents/papers/isi53/1034.pdf?1402524976
3. https://testbook.com/ugc-net-commerce/measures-of-central-tendency
4. https://www.saspublishers.com/media/articles/SJEBM_411773-786.pdf

SCHOOL CORE

Course Code	Course Title	L	T	P	S	C
22BS101080	**INTRODUCTION TO BIOMETRY**	**3**	**-**	**-**	**-**	**3**

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on fundamental aspects, features of biometric processes, measurement of performance in biometric systems, biometrics in forensic identification, applications of biometrics in forensic investigation

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

CO1 Understand the fundamental aspects of biometrics

CO2 Understand the features of biometrics

CO3 Gain knowledge of measuring performance of biometrics

CO4 Apply the biometrics in forensic identification and investigation

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	2	-	1
CO2	3	-	-	-	-	-	-	-	-	2	-	1
CO3	3	-	-	-	-	-	-	-	-	2	-	1
CO4	3	-	-	-	-	-	-	-	-	2	-	1
Course Correlation Mapping	3	-	-	-	-	-	-	-	-	2	-	1

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: FUNDAMENTAL ASPECTS (09 Periods)

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

Module 2: FEATURES OF BIOMETRIC PROCESSES

Multimodal biometrics. Key biometric processes – enrolment, identification and verification. Positive and negative identification,

(09 Periods)

Module 3: MEASUREMENT OF PERFORMANCE IN BIOMETRIC SYSTEMS (09 Periods)

Development of Biometric technology, Performance measures used in biometric systems – FAR, FRR, GAR, FTA, FTE and ATV. Biometric versus traditional technologies, Data Acquisition in Biometric System

Module 4: BIOMETRICS IN FORENSIC IDENTIFICATION (09 Periods)

Crime and Forensic Science, Limitations of Forensic Science in Criminal identification, Biometrics: A Strong Alternative for Crime Detection, Characteristics of Biometrics, Identification and Verification, Multimodal Biometrics in Crime Detection, Limitations of Biometric Systems

Module 5: BIOMETRICS IN FORENSIC INVESTIGATION (09 Periods)

Physiological Biometrics -Fingerprints, palm prints, iris, retina, geometry of hand and face
Behavioural Biometrics - Handwriting, signatures, keystrokes, gait and voice. Limitations of Biometric Systems

Total Periods: 45

EXPERIENTIAL LEARNING

1. Case study on crime investigation using Behavioural biometrics

RESOURCES

TEXT BOOKS:

1. S. Nanavati, M. Thieme, R. Nanavati, Biometrics, Wiley India Pvt. Ltd, 2012.

REFERENCE BOOKS:

1. P. Reid, Biometrics for Network Security, New Delhi, 2014.
2. J.R. Vacca, Biometric Technologies and Verification Systems, Butterworth-Heinemann, Oxford, 2017.
3. Jain AK, Patrick Flynn, Arun AR, Handbook of biometrics, Springer publications, London, 2007.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=kjbDHOAM8cw
2. https://www.youtube.com/watch?v=0USrCEw_1_E
3. https://www.youtube.com/watch?v=w7fsFBcDK4c
4. https://www.youtube.com/watch?v=JsDY4x7aJO8
5. https://www.youtube.com/watch?v=kmxVemEyaYc

WEB RESOURCES:

1. https://www.hilarispublisher.com/open-access/biometrics-in-forensic-identification-applications-and-challenges-2472-1026-1000108.pdf
2. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4580999/
3. https://egyankosh.ac.in/bitstream/123456789/89053/1/Unit-4.pdf

4. http://csjournals.com/IJCSC/PDF9-2/6.%20Garima.pdf
5. https://www.researchgate.net/publication/269037172_On_Forensic_Use_of_Biometrics

SCHOOL CORE

Course Code	Course Title	L	T	P	S	C
22BS101081	FORENSIC AUDIO AND VIDEO ANALYSIS	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on Introduction of Sound, Audio Evidence – Introduction, Audio Evidence – Analysis, Video evidence – Introduction, Video evidence – Analysis

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

CO1 Comprehend the concept sound and its properties
CO2 Gain knowledge of collection of audio evidence
CO3 Gain knowledge of analysis of audio evidence
CO4 Gain knowledge of collection of video evidence
CO5 Gain knowledge of analysis of video evidence

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	2	-	1
CO2	3	-	-	-	-	-	-	-	-	2	-	1
CO3	3	-	-	-	-	-	-	-	-	2	-	1
CO4	3	-	-	-	-	-	-	-	-	2	-	1
CO5	3	-	-	-	-	-	-	-	-	2	-	1
Course Correlation Mapping	3	-	-	-	-	-	-	-	-	2	-	1

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: INTRODUCTION OF SOUND (09 Periods)

The generation of sound**,** Speech anatomy and mechanism, Physical properties of vibrating systems**,** Phonemes. Articulation. Phonetic aspects of speech, principles of speaker recognition

Module 2: AUDIO EVIDENCE – INTRODUCTION (09 Periods)

Collection and specimen sample collection. Speaker recognition – manual, semi – automaticand automatic methods and familiarization of some software

Module 3: AUDIO EVIDENCE – ANALYSIS (09 Periods)

Fourier analysis, Fourier transforms, acoustic speech production, error in speakeridentification, application in automatic speaker identification and verification system

Module 4: VIDEO EVIDENCE – INTRODUCTION (09 Periods)

The generation of video, the concepts of editing, Image clarification in a video – methods and familiarization of software. Forensic audio video analysis, voltage, decibels, audio line levels, frequency measurements, spectrum analysis, noise characteristics, digital filters and audio enhancement, authentication off-recorded audio, speech spectrographic analysis, magnetic developing and optical methods.

Module 5: VIDEO EVIDENCE – ANALYSIS (09 Periods)

Falsification in video recording, video frame sequence, method – waveform – vectroscope, videogrametry and photogrametry techniques, video image analysis, facial image recognitionfrom video frame image.

Total Periods: 45

EXPERIENTIAL LEARNING

1. Prepare a PPT on the role of technology in Forensic studies

RESOURCES

TEXT BOOKS:

1. Gloria J. Borden et al. Speech Science Primer (Physiology, Acoustics and perception of Speech), 6th Edition, A Wolters Kluwer Company, USA. 2011.
2. Harry Hollien; Forensic Voice Identification, Academic Press, London. 2001.

REFERENCE BOOKS:

1. Vijay K. Madisetti. The Digital Signal Processing Handbook- Video, Speech, andAudio Signal Processing and Associated Standards. CRC Press. 2010.
2. Forensic Audio/Video Unit Standard Operating Procedures - Forensic AnalysisDivision. Houston. 2016.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=3Vp_u3Z_8T4

2. https://www.youtube.com/watch?v=P-orHv7QdK8

WEB RESOURCES:

1. https://forensicexpertinvestigation.com/audio-and-video-authentication-and-analysis-services/
2. https://www.ecsbiztech.com/audio-video-forensics/

SCHOOL CORE

Course Code	Course Title	L	T	P	S	C
22BS101082	HANDWRITING IDENTIFICATION AND RECOGNITION	2	-	-	-	2

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on Handwriting Identification, Qualitative Aspects of Handwriting, Factors Controlling Handwriting Pattern, Handwriting Examination, Handwriting Recognition.

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

CO1 Identify the characters of handwriting

CO2 Gain knowledge on handwriting characteristics

CO3 Gain knowledge of influences on handwriting

CO4 Gain knowledge of analyzing handwriting

CO5 Gain knowledge of recognizing the handwriting

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	2	-	1
CO2	3	-	-	-	-	-	-	-	-	2	-	1
CO3	3	-	-	-	-	-	-	-	-	2	-	1
CO4	3	-	-	-	-	-	-	-	-	2	-	1
CO5	3	-	-	-	-	-	-	-	-	2	-	1
Course Correlation Mapping	3	-	-	-	-	-	-	-	-	2	-	1

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: HANDWRITING IDENTIFICATION (06 Periods)

Basis of handwriting identification. Characteristics of handwriting – scope and application. Class and individual characteristics.

Module 2: QUALITATIVE ASPECTS OF HANDWRITING (06 Periods)

Arrangement, alignment, margin, slant, speed, pressure, spacing, line quality, embellishments, movement and pen lifts

Module 3: FACTORS CONTROLLING HANDWRITING PATTERN (06 Periods)

Factors influencing handwriting – physical, mechanical, genetic and physiological.

Module 4: HANDWRITING EXAMINATION (06 Periods)

Basis of handwriting comparison. Collection of handwriting samples. Forgery detection. Counterfeiting. Examination of altered and erased documents. Tools used in handwriting examination

Module 5: HANDWRITING RECOGNITION (06 Periods)

Basis of handwriting recognition. Off-line and on-line handwriting recognition. Steps involved in handwriting recognition – pre-processing, feature extraction and classification. Applications of handwriting recognition

Total Periods: 30

EXPERIENTIAL LEARNING

1. Prepare a PPT on the role of handwriting in Forensic studies

RESOURCES

TEXT BOOKS:

1. R.N. Morris, Forensic Handwriting Identification: Fundamental Concepts and Principles, Academic Press, London, 2010.

REFERENCE BOOKS:

1. Z. Liu, J.H. Cai and R. Buse, Handwriting Recognition: Soft Computing and Probabilistic Approach (Volume 133), Springer Science and Business Media, 2013.
2. A.A. Moenssens, J. Starrs, C.E. Henderson and F.E. Inbau, Scientific Evidence in Civil and Criminal Cases, 6th Edition, Foundation Press, New York, 2015.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=5K7PO3RQpeI
2. https://www.youtube.com/watch?v=WhRC31SlXzA
3. https://www.youtube.com/watch?v=XleUHn5P4vM

WEB RESOURCES:

1. https://www.v7labs.com/blog/handwriting-recognition-guide
2. https://cs.stanford.edu/people/adityaj/HandwritingRecognition.pdf
3. https://www.researchgate.net/publication/2286971_An_Overview_of_Handwriting_Recognition

SCHOOL CORE

Course Code	Course Title	L	T	P	S	C
22BS101083	**PSYCHOLOGY**	**3**	**-**	**-**	**-**	**3**

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on Introduction of psychology,
Sensation and Perception, Motivation and Motives, Learning and Personality, Forensic Psychology

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

CO1 Understand the basics of Psychology

CO2 Acquire knowledge on the basics of Sensation & Perception.

CO3 Gain knowledge about the role of motivation & motives in human behaviour

CO4 Understand the basic concepts, nature and theories of learning and personality

CO5 Analyze the importance of psychological assessment in gauging criminal behavior.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	2	-	1
CO2	3	-	-	-	-	-	-	-	-	2	-	1
CO3	3	-	-	-	-	-	-	-	-	2	-	1
CO4	3	-	-	-	-	-	1	-	-	2	-	1
CO5	3	-	-	-	-	-	-	-	-	2	-	1
Course Correlation Mapping	3	-	-	-	-	-	1	-	-	2	-	1

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: INTRODUCTION OF PSYCHOLOGY (09 Periods)

Introduction and Definition of Psychology. A brief history of Psychology: Structuralism, Functionalism, Behaviourism, Gestalt psychology, Psychoanalytic Psychology, Humanistic Psychology. Contemporary Perspectives of Psychology: Biological, Psychodynamic, Behaviouristic, Humanistic, Cognitive, Evolutionary, Socio-cultural. Areas of Specialization in Psychology

Module 2: SENSATION AND PERCEPTION (09 Periods)

Sensation: Definition, Basic concepts and Processes in sensation. Types of senses and Sensory adaptation: Vision, Hearing, Touch, Smell, Taste, Kinaesthetic and vestibular senses.
Attention: Determinants of attention, factors affecting attention, span of attention.
Perception: Definition, Perceptual constancy, Perceptual organization - Gestalt principles. Depth Perception: monocular and binocular cues. Perceptual defence, Perceptual constancies, Colour perception: colour theories (in brief). Illusions of different types. Extra sensory perception

Module 3: MOTIVATION AND MOTIVES (09 Periods)

Motivation – Definition, Theories of Motivation: Instinct approach, Drive- reduction approaches, Arousal approaches, Incentive approaches, Humanistic Approaches, Self- determination theory.
Motives – Types of motives, Hunger: Biological factors and other factors in hunger, Thirst, Pain, The Sex drive, Learned motives- Social motives, Achievement motivation.

Module 4: LEARNING AND PERSONALITY (09 Periods)

Learning: The nature of learning, Classical Conditioning- Principles and Applications, Operant Conditioning - Principles and Applications, Social and cognitive learning: Observational Learning. Trial and Error learning.
Personality: Definition - Approaches – Psychodynamic – Humanistic – Cognitive approach - Assessment of Personality – Questionnaire - Rating Scales and Projective tests – Characteristics - Advantages and disadvantages.

Module 5: FORENSIC PSYCHOLOGY (09 Periods)

Definition, Fundamental concepts, Psychological Assessment and its importance, Psychology of Lying, Psychology of Serial Murderers and Terrorists. Detection of Deception Brain Fingerprinting & Narco Analysis: History, Method of Investigation, Significance, Limitations, Legal Aspects and Future perspectives. Polygraphy: History, Procedure of Investigation, Limitations and Legal Aspects

Total Periods: 45

EXPERIENTIAL LEARNING

1. Prepare a PPT on the importance of psychology study for a Forensic student

RESOURCES

TEXT BOOKS:

1. Cicarelli, S. K. & White, J. N. (2017). Psychology. Pearson India Education Services,Pvt Ltd.
2. Arrigo, B.A. Introduction to Forensic Psychology. Academic Press, London, 2000

REFERENCE BOOKS:

1. Kalat, J. W. Introduction to Psychology, Cengage Learning 2016

2. Feldman, R. S. Understanding Psychology. 12th Edition. New Delhi, Tata McGraw Hill. 2015

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=E4mWEaxUpP4
2. https://www.youtube.com/watch?v=x2tFLBnX8Ik
3. https://www.youtube.com/watch?v=bOmsg3rUB7M
4. https://www.youtube.com/watch?v=FSrlIP3yVjs

WEB RESOURCES:

1. https://ocw.mit.edu/ans7870/9/9.00SC/MIT9_00SCF11_text.pdf
2. https://www.youtube.com/watch?v=E4mWEaxUpP4
3. https://www.verywellmind.com/what-is-motivation-2795378
4. https://opentext.wsu.edu/psych105/chapter/10-5-learning-approaches-to-personality/
5. https://www.frontiersin.org/articles/10.3389/fpsyg.2023.1071985/full

SCHOOL CORE

Course Code	Course Title	L	T	P	S	C
22BS101003	BIODIVERSITY MONITORING AND MANAGEMENT	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on Introduction to Biodiversity, Value of Biodiversity, Threats to Biodiversity, Monitoring and Management of Biodiversity and Ecosystem Management.

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

CO1	Understand the natural environment, and to realize the importance of the renewable energy sources.
CO2	Acquire knowledge of various sources of water pollution and the management of municipal and Industrial wastewater.
CO3	Summarize the various environmental pollution and its control measures.
CO4	Get familiarized on climate and social issues arising due to environmental disorders.
CO5	Gain awareness on Green technology and its tools.

CO-PO Mapping Table:

Course Outcomes	Program Outcomes								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	-	-	-	3	2	-	-	-
CO2	3	-	-	-	3	2	-	-	-
CO3	3	-	-	-	3	3	-	-	-
CO4	2	-	-	-	3	3	-	-	2
CO5	3	-	-	2	3	-	-	-	2
Course Correlation Mapping	3	-	-	2	3	3	-	-	2

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: INTRODUCTION TO BIODIVERSITY (09 Periods)

Introduction- Definition of Biodiversity, Types of Biodiversity, Genetic diversity, Species diversity, Ecosystem diversity: Structural and functional aspects. the value of biodiversity and conservation, Conservation of Biology, current practice in conservation, conservation of genetic diversity, conservation of species diversity, conservation of ecosystem diversity, relevance of ecosystem diversity as well as services in conservation

Module 2: VALUE OF BIODIVERSITY (09 Periods)

Value of Biodiversity- Intrinsic, consumptive, productive use, social, ethical, aesthetic and option values. Utilitarian values of biodiversity- goods, services and information. Biodiversity

and ecosystem functioning. Biodiversity and stability of ecosystem functioning. Biodiversity at global, national and local levels India as a Mega Diversity Nation. Hotspots of Biodiversity: Criteria for determining hot spots. Indo-Burma (Eastern Himalaya), Western Ghats and Sri Lanka

Module 3: THREATS TO BIODIVERSITY (09 Periods)

Habitat loss, pollution, species introduction, global climate change, overexploitation, poaching of wildlife. Rare species, genetic diversity of rare species, habitat loss and fragmentation. Extinction: mass extinction, extinction process, ecosystem degradation, over exploitation, invasive species. Human factors: social factors, economics, politics and action. Man wildlife conflicts. Endangered and endemic species of India, common plant species, common animal species.

Module 4: MONITORING AND MANAGEMENT OF BIODIVERSITY (09 Periods)

Strategies for conservation: In-situ and ex-situ conservation- environmental assessment, protected areas-biosphere reserves, national parks, sanctuaries, tiger reserves-project tiger. Ex situ conservation-Managed ecosystems, biological resources and gene banks, botanical gardens, bio-parks, In situ conservation.- Protected areas, Wildlife sanctuaries, National parks, 8 Biosphere reserves. Strategies for ex situ conservation – Botanical Gardens, Seed banks, Field gene banks, Test tube gene banks, pollen banks, DNA bank, in vitro conservation.

Module 5: ECOSYSTEM MANAGEMENT (09 Periods)

Global biodiversity and its importance, Different approaches of biodiversity conservation and management, registering biodiversity. Valuing biodiversity resources and their contribution to agriculture, community health and environment. Causes of biodiversity loss. Techniques of species reintroduction and restoration of the degraded habitat. Biodiversity policy and legislation. Wildlife conservation and management: Status of biodiversity conservation in India

Total Periods: 45

EXPERIENTIAL LEARNING

1. Submit a document on your plan of action in maintaining the sustainable environment.
2. Visit the nearest Biodiversity hotspot and write a report
3. Present a seminar on Biodiversity management practices.
4. Submit your ideas on the importance of Biodiversity management methods
5. Submit a proposal to maintain Biodiversity
6. Visit nearest Biodiversity reserves and submit your views on it.

RESOURCES

TEXT BOOKS:

1. Anubha Kaushik and C. P. Kaushik, Perspectives in Environmental Studies, New Age International (P) Ltd. Publications, 6 th Edition, 2018.
2. Erach Barucha, Environmental Studies, Orient Blackswan, 2nd Edition, 2013.

REFERENCE BOOKS:

1. Benny Joseph, Environmental Studies, Tata McGraw-Hill, 2nd Edition, 2009.
2. Cunningham W.P. and Cunningham M.A., Principles of Environmental Science, Tata

McGraw-Hill Publishing Company, New Delhi, 8th Edition,2016.

VIDEO LECTURES:

1. https://archive.nptel.ac.in/courses/102/104/102104068/
2. https://www.youtube.com/watch?v=nYSMyjH3wow
3. https://www.youtube.com/watch?v=nYSMyjH3wow&list=RDCMUCCDzHkpuIuD1ZC0wsCXUuPQ&start_radio=1&rv=nYSMyjH3wow&t=38

WEB RESOURCES:

1. https://archive.nptel.ac.in/courses/102/104/102104068/
2. https://www.youtube.com/watch?v=CXEpAmHgXK8
3. https://archive.nptel.ac.in/courses/127/106/127106004/
4. https://onlinecourses.nptel.ac.in/noc22_ag10/preview

SCHOOL CORE

Course Code	Course Title	L	T	P	S	C
22LG101402	TELUGU	2	-	-	-	2

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: తుమ్మల సీతారామమూర్తి-**ఎక్కట్లు,** తిక్కన-**నాడీజంఘోపాఖ్యానం,** పోతన-**ధ్రువోపాఖ్యానం,** దువ్వూరి రామిరెడ్డి - **కృషీ వలుడు, మరియు తెలుగు వ్యాకరణం మీద అవగాహన.**

COURSE OUTCOMES: కోర్సువిజయవంతంగాపూర్తిచేసినతర్వాత,విద్యార్థులువీటినిచేయగలరు:

CO1. విద్యార్థులలో మానవీయ విలువలు పెరిగి నైతిక వలువలతో జీవించడం

CO2. సమాజంలో మనకు చేతనైన సాయం చెయ్యడం ప్రతి మనిషి బాధ్యత అనే సందేశం

CO3. త్రికరణ శుద్ధితో కృషి చేస్తే ఏదైనా సాధించ వచ్చు అనే సందేశం

CO4. వ్యవసాయ రంగం గూర్చి విద్యార్థులలో అవగాహన కలగడం

CO5. తెలుగు వ్యాకరణం

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-
CO3	3	-	-	-	-	-	-	-	-
CO4	3	-	-	-	-	-	-	-	-
CO5	3	-	-	-	-	-	-	-	-
Course Correlation Mapping	3	-	-	-	-	-	-	-	-

Correlation Levels: 3: High; 2: Medium; 1: Low

పాఠ్య ప్రణాళిక

Module 1: **ఎక్కట్లు** – తుమ్మల సీతారామమూర్తి ***(06 Periods)***

సత్ప్రవర్తన, సచ్ఛీలత, సన్మార్గం, సమసమానత్వం గూర్చి వివరించడం.

Module 2: **నాడీజంఘోపాఖ్యానం** – తిక్కన ***(06 Periods)***

సహాయం చేసినివారిని మరచి పోరాదు. చేసిన మేలు మరచిన వారి జీవితం ఎంత హీనంగా ఉంటుందో తెలియజేయడం.

Module 3: **ధ్రువోపాఖ్యానం** – పోతన ***(06 Periods)***

ఎటువంటి కష్టాలకు సమస్యలకు కుంగి పోకుండా దీక్షతో పట్టుదలతో కృషితో అనుకున్నది సాధించాలని తెలియజేయడం.

Module 4: **కృషీ వలుడు** – దువ్వూరి రామిరెడ్డి ***(06 Periods)***

సమాజానికి వెన్నెముక అయిన రైతు యొక్క కష్టాలను త్యాగాలను వివరించడం.

Module 5: **సంధులు, సమాసాలు, అలంకారాలు.** ***(06 Periods)***

తెలుగు భాష యొక్క మూలాలను తెలుసుకోవడం.

Total Periods: 30

EXPERIENTIAL LEARNING

The experiential learning components wil`l be detailed in CHO.

RESOURCES

TEXT BOOKS:

1. **ఎక్కట్లు – కవి తుమ్మల సీతారామమూర్తి చౌదరి.**
2. **నాడీజంఘోపాఖ్యానం – కవి తిక్కన. (మహాభారతం – శాంతి పర్వం – తృతీయా శ్వాసం – 472 నుండి 511 పద్యాల వరకు).**
3. **ధ్రువోపాఖ్యానం** – కవి పోతన (ఆంధ్ర మాహాభాగవతం – చతుర్థ స్కందం – 216 నుండి 277 పద్యాల వరకు)
4. కృషీ వలుడు – కవి దువ్వూరి రామిరెడ్డి

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=5jX20h6HWzg
2. https://www.youtube.com/watch?v=FFtPSPByBmk
3. https://www.youtube.com/watch?v=nQHF_pgTfL8
4. https://www.youtube.com/watch?v=IEERKL3Q2Cs

Web Resources:

1. http://teluguvignanamvinodam1.blogspot.com/2021/06/maha-bharatam-in-telugu-pdf-free-download_25.html
2. https://www.freegurukul.org/blog/ramayanam-pdf/

SCHOOL CORE

Course Code	Course Title	L	T	P	S	C
22LG101404	**SANSKRIT**	**2**	**-**	**-**	**-**	**2**

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: अस्मिन् पाठ्यक्रमे संस्कृत गद्य, पद्य, व्याकरमेन सह महाभारतम् अपि च रामायणस्य कान्श्चन खण्डानां मेलनं भवति। अयं पाठ्यक्रमः छात्राणां कृते विभिन्न संस्कृत ग्रन्थानां अपि च साहित्यस्य समालोचनात्मक विश्लेषण करणमपि शिक्षयति। संपूर्ण पाठ्यक्रमे अस्मिन्, छात्राः देवनागरी लिपेः लिखनं अधिगच्छति, संस्कृतस्य शब्दानां उच्चारणं तथा हृदिस्थं करिष्यति, अपि च प्राथमिक व्याकरण पठिष्यति तेन ते संस्कृते सरल वाक्यानां निर्माणं कर्तुं प्रभवन्ति।

COURSE OUTCOMES: पाठ्यक्रमस्य सफलसमाप्तेः अनन्तरं छात्राः

CO1 कर्तव्यपरक शैक्षणिक वृत्तिपरक तथा शोधकर्तृणां निर्माणार्थं छात्राणां संज्ञानात्मक, प्रभावशाली तथा व्यवहारिक क्षमतानां आकार प्रदानार्थं सहायतां करोति।

CO2 सामाजिक परिवर्तने भागग्रहणार्थं सक्षमाः भवितुं छात्रेषु सेवायाः धारणा संचारः करोति।

CO3 समकालीन समस्या-समाधान स्थितिषु प्राचीन भारतीय ज्ञानस्य अनुप्रयोगस्य ज्ञानप्राप्तिः। सामान्य रूपेण तथा विशेष रूपेण अभ्यसने तथा तस्य मूल्यांकनस्य संदर्भे च नैतिक उपयुक्ततायाः एकः दृढतर भावनायाः विकासनार्थम्।

CO4 प्राचीन साहित्यतः प्राथमिक जीवनं तथा अवधारणानां ज्ञानप्रदानं यत् कालातीतः जातः तथापि इदानीमपि समाजाय अनुवर्तते।

आवेदनस्य प्रमुख क्षेत्रेषु प्राथमिक कौशलस्य अधिग्रहणे सुगमकरणम् उदा- नेतृत्वे, संचारे, अनुसंधान योग्यतायां, व्यवहार संशोधने इत्यादि।

CO5 सामाजिक विविधतायाः कृते सम्मान-विकसितं करनं तथा सामाजिक अपि च सांस्कृतिक प्रासंगिकतायाः अध्ययने अभिवृद्धि करनम्।

CO-PO Mapping Table:

Course Outcomes	Program Outcomes								
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	3	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-
CO3	3	-	-	-	-	-	-	-	-
CO4	3	-	-	-	-	-	-	-	-
CO5	3	-	-	-	-	-	-	-	-
Course Correlation Mapping	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module-1: प्राचीन पद्यसाहित्यम् **(06 Periods)**

1.आर्य पादुका पट्टाभिषेकः - वल्मीकिः – श्रीमद्रामायणम्

2. यक्षप्रश्नाः - वेदव्यासः – महाभारतम्

Module-2: चम्पूकाव्यम् & आधुनिक पद्यकाव्यम् **(06 Periods)**

3.गङ्गावतरणम् - भोजराजः - चम्पूरामायणम्

4. मोहापनोदः - श्री पमिडिपाटि पट्टाभिरामारावः – मूलकथा-'धर्मसौहृदम्' इति संस्कृत पद्यकाव्यम्

Module-3: गद्यसाहित्यम् **(06 Periods)**

5. अत्युत्कटैः पापपुण्यैः इहैव फलमश्नुते - नारायणपण्डितः - हितोपदेशः

6. शूद्रकवीरवरकथा - हितोपदेशः

Module-4: शब्दाः **(6 Periods)**

देव, कवि, भानु, पितृ, धातृ, गो, रमा, मति

Module 5: महाकवि, शास्त्रकाराः **(6 Periods)**

1.पाणिनिः 2.कौटिल्यः 3.भरतमुनिः 4.भारविः 5.माघः 6.भवभूतिः 7.शङ्कराचार्यः 8.दण्डी

Total Periods: 30

EXPERIENTIAL LEARNING

The experiential learning components will be detailed in CHO.

RESOURCES

TEXT BOOKS:

1.विश्वभारती 2,संस्कृत भारती 3.अमृतवाणी

REFERENCE BOOKS:

1.रामायणम् 2.महाभारतम् 3.अष्टाध्यायी 4.अमरकोशः

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=bh-14xfMeYk
2. https://www.youtube.com/watch?v=6xFkoOpzsvs

Web Resources:

1. https://www.forum.universityupdates.in/threads/ou-sanskrit-2nd-semester-study-material.33659/
2. https://cbpbu.ac.in/study_mat_sanskrit.php

SCHOOL CORE

Course Code	Course Title	L	T	P	S	C
22LG102405	**GENERAL ENGLISH**	**2**	**-**	**2**	**-**	**3**

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course deals with selected literary works of eminent writers, exercises on speaking, reading comprehensions for skimming and scanning, vocabulary, grammar, pronunciation, and conversation practice.

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

CO1 Demonstrate knowledge of literary works of various pieces of eminent writers.
CO2 Adapt general and technical vocabulary in communication.
CO3 Apply grammatically correct English in writing.
CO4 Analyze texts using reading techniques.
CO5 Apply different communication styles in various situations.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	-	-	-	-	-	-	2	2
CO2	3	2	-	-	-	-	-	2	2
CO3	2	3	-	-	-	-	-	2	2
CO4	2	3	-	2	-	-	-	2	2
CO5	2	2	-	3	-	-	-	2	2
Course Correlation Mapping	2	3	-	3	-	-	-	2	2

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: 'A SNAKE IN THE GRASS' SHORT STORY BY R.K. NARAYAN. (06 Periods)

A Snake in the Grass – A Short Story, Reading Comprehension, Grammar, Vocabulary, Pronunciation, and Conversation Practice.

Module 2: 'ON SAYING PLEASE' SHORT ESSAY BY A. G. GARDINER (06 Periods)

On Saying Please – A Short Essay, Reading Comprehension, Grammar Vocabulary, Pronunciation, and Conversation Practice.

Module 3: 'IF YOU FORGET ME 'POEM BY PABLO NERUDA (06 Periods)

If you Forget Me - A Poem, Reading Comprehension, Grammar, Pronunciation, and Conversation Practice.

Module 4: 'AFTER THE SUNSET' SHORT STORY BY BHOOPAL (06 Periods)
After the Sunset – A Short Story, Reading Comprehension, Grammar, Pronunciation, and Conversation Practice.

Module 5: 'MAN'S PERIL 'ESSAY BY BERTRAND RUSSEL (06 Periods)
Man's Peril - An Essay, Reading Comprehension, Vocabulary, Grammar, Pronunciation, and Conversation Practice.

Total Periods: 30

EXPERIENTIAL LEARNING

List of Exercises (Minimum 10 exercises to perform)

1. In rainy seasons a lot of snakes are found crawling around. Prepare a write-up on the reactions of people when they found snakes.
2. India is now for entrepreneurs and the government announced a lot of startup programmes for that. Prepare a presentation on recent entrepreneurs.
3. Small courtesies play a major role in creating an impression on other people. List out a few examples.
4. Prepare a PowerPoint presentation on the present scenario in higher education and jobs in India.
5. Being a shopkeeper and persuading a customer to buy a product which is introduced newly in the market. Prepare a conversation.
6. The English language has a rich vocabulary. List out the homophones and homonyms and write down the pronunciation and meaning of those words.
7. Describe a situation in your college where teamwork is needed and explain the strategies to manage the team effectively.
8. India is a country of unity in diversity. List out the existence of different racial and religious people and bring out reasons for the harmonious relationship among the people.
9. Forget and forgive are the most important quality of any human being. Prepare a write-up on any two experiences which come across in your life where you forgive or forget to maintain good relationships with friends or relatives.
10. Make a case study on the problems of second language learners of English and suggest solutions to overcome them.
11. How do you feel that the role of science and technology in nation-building?

RESOURCES

TEXTBOOKS:

1. G. Damodar "English Language for Undergraduate Students", Cambridge University-2019.

REFERENCE BOOKS:

1. https://www.researchgate.net/publication/331773456_RK_Narayan's_A_Snake_in_the_Grass_and_Stephen_Leacock's_With_the_Photographer_-_A_Comparative_Study
2. https://smartenglishnotes.com/2020/07/17/on-saying-please-summary-analysis-and-questions-and-answers/

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=WnOOKO0CdaM
2. https://www.youtube.com/watch?v=H6Nlz8qmcFc

3. https://www.youtube.com/watch?v=-lTliZO85YM
4. https://www.youtube.com/watch?v=048YjXwgHWE
5. https://www.youtube.com/watch?v=XLLQm7Grmcc

WEB RESOURCES:

1. https://www.researchgate.net/publication/331773456_RK_Narayan's_A_Snake_in_the_Grass_and_Stephen_Leacock's_With_the_Photographer_-_A_Comparative_Study
2. https://smartenglishnotes.com/2020/07/17/on-saying-please-summary-analysis-and-questions-and-answers/
3. http://www.emcp.com/product_catalog/school/litLink/Grade09/U09-04forgetme/
4. https://englishlanguage-lit.blogspot.com/2021/05/after-sunset-short-story-by-bhoopal.html
5. https://www.taylorfrancis.com/chapters/mono/10.4324/9781003090359-31/man-peril-bertrand-russell?context=ubx&refId=1d767e2d-ceb1-4537-9de5-6417eab47d1e

SCHOOL CORE

Course Code	Course Title	L	T	P	S	C
22LG102401	**ENGLISH FOR PROFESSIONALS**	**2**	**-**	**2**	**-**	**3**

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course deals with listening strategies, reading comprehension, grammar, vocabulary, pronunciation, Written, Verbal and Non-verbal communication, Channels of communication, Barriers to communication, Modes of technology-based communication, and Technical Communication

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

- **CO1** Understand the basics of Reading, Writing, Listening, and Speaking skills.
- **CO2** Analyzethe rules of English grammar in speaking and writing.
- **CO3** Demonstrate knowledge of English pronunciationin speaking.
- **CO4** Apply the knowledge of reading strategies and vocabulary in communication.
- **CO5** Apply the strategies of writing in preparing a report.

CO-PO Mapping Table:

Course Outcomes	*Program Outcomes*								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	-	-	-	-	-	-	-	-
CO2	-	3	2	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-
CO4	-	-	-	-	3	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-
Course Correlation Mapping	3	2	2	-	3	-	-	-	-

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: SUPER HEROES – THE SCIENCE BEHIND SUPER HEROES **(06 Periods)**

Reading for Comprehension, Grammar, Speaking, Listening, Vocabulary, Writing, Verbal and Non-verbal communication.

Module 2: ALIENS – THE CYLINDER OPENS **(06 Periods)**

Reading for comprehension, Grammar, Vocabulary, Writing, Listening, and Channels of communication.

Module 3: INVENTORS – THE RAMAN EFFECT **(06 Periods)**

Reading comprehension, Listening, Writing, Grammar, Speaking, Pronunciation, and communication barriers.

Module 4: HEALTH AND NUTRITION – WHAT SHOULD YOU BE EATING **(06 Periods)**

Reading comprehension, Listening, Speaking, Grammar,Writing, Pronunciation, and Modes of technology-based communication.

Module 5: NEW-AGE ENTREPRENEURS – HOW A CHINESE BILLIONAIRE BUILT HER FORTUNE **(06 Periods)**

Reading comprehension, Vocabulary, Listening, Grammar, Writing, and Technical Communication

Total Periods: 30

EXPERIENTIAL LEARNING

PART-A

Any six modules among the following:

1. Conversation starters and role play
2. Reading comprehension
3. Listening comprehension
4. Vocabulary Building (business and job-related vocabulary)
5. Describing people, places, objects, and Events
6. Phonetics - Accent/ Rhythm/ Intonation
7. Tenses
8. Proposal Writing

PART-B

Any four modules among the following:

1. Communicating effectively is important to become successful in any business. Prepare a Case study of successful business personnel regarding communication competence.
2. Prepare a PowerPoint presentation on an orator and analyze the voice dynamics.
3. People face situations to convince or agree with the points they have. The college arranges a 5-day tour program to Goa. Prepare a video on persuasive talk and convince parents to get permission.
4. Write an article on the famous clichés of our time.
5. Prepare a poster on the effects of social media on youth.
6. Give a short talk on the importance of inventors and their role in present socio, political and economic changes.
7. Prepare a collage of entrepreneurs' pictures and their achievements.
8. NASA released recent photos of the universe with the help of the James Webs Space Telescope. Write down the expected impact on the existing theory on planets and the universe.
9. Obesity is the most common problem for people. List out the reasons for the problem and prepare food habits to overcome.
10. Epics of India deals with superheroes of those days. Compare the weapons used in the battles of Mahabharata with modern weapons.
11. Write a report on your recently invented product so that it should be sold as a hot cake in the market.
12. Illustrate the essential rules for good precis writing.

RESOURCES

TEXTBOOK:

1. N.P. Sudharshana and C.Savitha, English for Technical Communication, Cambridge University Press. 2016.

REFERENCE BOOKS:

1. Kline, J. A. Speaking effectively: Achieving excellence in presentations. Upper Saddle River, NJ: Pearson/Prentice Hall, 2004.
2. Kuiper. S, Contemporary business report writing, Cincinnati, OH: Thomson/South, Western, 3rd Edition, 2007.
3. Locker, K. O. & Kaczmarek, S. K. Business communication: Building critical skills, New York: McGraw, Hill/Irwin, 3rd Edition, 2007.
4. Mascull. B, Business vocabulary in use: Advanced. Cambridge, Cambridge University Press, 2004.

5. Matthews, C. B. and Matthews,Quicksteps to winning business presentations: Make the most of your PowerPoint presentations, McGrawHill, 2007.
6. Marsh. C,Strategic writing: Multimedia writing for public relations, advertising, sales and marketing, and business communication, Pearson/Ally and Bacon, 2005.
7. Munter. M, and Russell. L,Guide to presentations, Pearson/Prentice Hall, 2nd Edition, 2008.
8. Reardon. K. K,The skilled negotiator: Mastering the language of engagement, Jossey, Bass, 2004.
9. Stiff. J. B, Persuasive communication, Guilford Press. Engagement, Jossey, Bass, 2nd Edition, 2003.

VIDEO LECTURES:

1. https://learnenglish.britishcouncil.org/general,english/video,zone/the,day,elizabeth,became,queen
2. https://www.youtube.com/watch?v=CscHc8qSn1A

WEB RESOURCES:

1. https://galgotiacollege.edu/assets/pdfs/study,material/Notes,english.pdf
2. https://lecturenotes.in/subject/183
3. https://www.fluentu.com/blog/english/professional,english/
4. https://learnenglish.britishcouncil.org/business,english

SCHOOL CORE

Course Code	Course Title	L	T	P	S	C
22LG107601	**PROFESSIONAL ETHICS AND HUMAN VALUES**	**2**	**-**	**-**	**-**	**2**

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course deals with personal conviction, and ethics and describes the accepted principles and standards of conduct regarding moral duties and virtues as applied to an organization. Codes of professional ethics guide the stakeholders of an organization about the desirable and undesirable acts related to the profession.

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

- **CO1** Demonstrate the principles of ethics, professional values, and social responsibility.
- **CO2** Analyze the problems in the implementation of moral autonomy and use ethical theories in resolving moral dilemmas.
- **CO3** Develop suitable strategies to resolve problems that arise in practicing professional ethics and Industrial standards.
- **CO4** Function as a member, consultant, manager, advisor and leader in multi-disciplinary teams.
- **CO5** Provide solutions to complex problems associated with professional ethics using analysis and interpretation.

CO-PO Mapping Table:

Course Outcomes	Program Outcomes								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	-	-	-	-	2	2	2	2
CO2	2	3	2	-	2	2	2	2	2
CO3	2	-	3	-	2	2	2	2	2
CO4	2	-	-	-	-	2	2	2	2
CO5	2	2	3	2	-	3	2	2	2
Course Correlation Mapping	2	3	-	-	2	2	2	2	2

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: PROFESSIONAL ETHICS **(06 Periods)**

Scope and aim of ethics, Senses of ethics, Variety of moral issues, Types of inquiry, Moral dilemmas, Moral autonomy-Kohlberg's theory, Gilligan's theory, Consensus, and controversy.

Module2: PROFESSIONAL IDEALS AND VIRTUES (06 Periods)

Theories on virtues and ideals, Professions, Professionalism, Characteristics, Expectations, Professional responsibility, Integrity, Self-respect, Sense of responsibility, Self-interest, Customs and religion, Self-interest and ethical egoism, Customs and ethical relativism, Religion and divine command ethics, Use of ethical theories, Resolving moral dilemmas and moral leadership.

Module 3: SOCIAL EXPERIMENTATION (06 Periods)

Experimentation, Similarities to standard experiments, Learning from the past and knowledge gained, responsible experimenters, Conscientiousness, Moral autonomy and accountability, The challenger case, Codes of ethics and limitations, Industrial standards and Problems with the law of engineering.

Module 4: RESPONSIBILITIES AND RIGHTS (06 Periods)

Collegiality and loyalty, Respect for authority, Collective bargaining, Confidentiality, Conflict of interests, Occupational crime, Rights of engineers, Professional rights, Whistle-blowing, The BART case, Employee rights, and discrimination.

Module 5: HARMONY WITH PROFESSIONALETHICS (06 Periods)

Acceptance of human values; Ethical Human Conduct; Basis for Humanistic Education, Constitution, and Universal Order; Competence in professional ethics; Case studies: Holistic technologies, Management Models and Production Systems; Transition from the present state to Universal Human Order: socially and ecologically responsible engineers, technologists and managers - enriching institutions and organizations.

Total Periods: 30

EXPERIENTIAL LEARNING

1. Demonstrate orally using your experiences of what is naturally acceptable in a relationship – Feeling of respect or disrespect and what is naturally acceptable is to nurture or exploit others.
2. Identify community partners and discuss with a community partner or organization. Prepare a report by identifying and analysing the issues or opportunities.
3. Field experiences may be directed to include a range of time-intensive endeavours that require varying levels of student interaction. Prepare a report on visiting a Juvenile home.
4. Students read a speech in the classroom by former United Nations Secretary-General Kofi Annan on human values.
5. Students are encouraged to bring a daily newspaper to class or to access any news related to the need for human values and note down the points.
6. Bring out the relevance of engineering ethics theory and practice with relevance to current trends.
7. Professional ideals and virtues are important to everyone. Prepare a case study on the professional ideals and virtue of any one of the famous sports personalities from India.
8. Compare the present to the past in engineering experimentations concerning the change in professionalism.
9. Make a study on occupational crime and the role of modern technology in finding solutions.
10. Prepare a case study on how to maintain harmony with different cultural people using professional ethics.

RESOURCES

TEXTBOOKS:

1. Gaur R R, Sangal R & G P Bagaria, Human Values and Professional Ethics,Excel Books, New Delhi, 2010.

2. Govindarajan, M., Nata Govindarajan, M., Natarajan, S. and Senthilkumar, V. S., Engineering Ethics, Prentice Hall of India, 2004.
3. Mike W. Martin and Roland Schinzinger, Ethics in Engineering, Tata McGraw-Hill, 3rd Edition, 2007.

REFERENCE BOOKS:

1. S. Kannan and K. Srilakshmi, Human Values and Professional Ethics, Taxmann Allied Services Pvt Ltd., 2009.
2. Edmund G. Seebauer and Robert L. Barry, Fundamental of Ethics for Scientists and Engineers, Oxford University Press, 2001.
3. Charles F. Fledderman, Engineering Ethics, Pearson Education, 2nd Edition, 2004.
4. R. Subramanaian, Professional Ethics, Oxford Higher Education, 2013.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=jfGIq_EiXzI
2. https://www.youtube.com/watch?v=QFHOtH54oUc
3. https://www.youtube.com/watch?v=JJshY11nX14
4. https://www.youtube.com/watch?v=TyP09S0UEzA
5. https://www.youtube.com/watch?v=0QMwjV_ZVtc

WEB RESOURCES:

1. https://siiet.ac.in/wp-content/uploads/2020/09/7.1.10-professional-ethics-manual.pdf
2. https://soaneemrana.org/onewebmedia/Professional%20Ethics%20and%20Human%20Values%20by%20R.S%20NAAGARAZAN.pdf
3. https://india.oup.com/productPage/5591038/7421214/9780199475070

SCHOOL CORE

Course Code	Course Title	L	T	P	S	C
22CE107602	DISASTER MITIGATION AND MANAGEMENT	2	-	-	-	2

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on disasters, earthquakes, floods, cyclones, droughts, landslides and disaster management.

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

CO1 Analyze the vulnerability of an area to natural and man-made disasters/hazards as per the guidelines to solve complex problems using appropriate techniques ensuring safety, environment and sustainability.

CO2 Propose appropriate mitigation strategies for earthquake and tsunami impacts as per code of practice using suitable techniques ensuring safety, environment and sustainability besides communicating effectively in graphical form.

CO3 Analyze the causes and impacts of floods, cyclones and droughts using appropriate tools and techniques and suggest mitigation measures ensuring safety, environment and sustainability besides communicating effectively in graphical form.

CO4 Analyze the causes and impacts of landslides using appropriate tools and techniques and suggest mitigation measures ensuring safety, environment and sustainability.

CO5 Design disaster management strategies to solve pre, during and post disaster problems using appropriate tools and techniques following the relevant guidelines and latest developments ensuring safety, environment and sustainability besides communicating effectively in graphical form.

CO-PO Mapping Table:

Course Outcomes	Program Outcomes								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	3	-	2	2	2	2	2	-
CO2	3	3	3	3	2	2	1	2	-
CO3	3	3	-	2	2	2	2	-	-
CO4	3	3	-	3	2	2	2	-	-
CO5	3	2	3	2	2	2	1	2	2
Course Correlation Mapping	3	3	3	3	2	2	2	2	2

Correlation Levels: **3: High; 2: Medium; 1: Low**

COURSE CONTENT

Module 1: DISASTERS **(06 Periods)**

Types of disasters - Natural disasters; Impact of disasters on environment, infrastructure and development; Concepts of hazards and vulnerability analysis, Hazard Assessment,

Guidelines for hazard assessment and vulnerability analysis, Basic principles and elements of disaster mitigation.

Module 2: EARTHQUAKES **(06 Periods)**

Introduction to earthquake, Intensity scale (MSK–64), Seismic zones and activity in India, Action plan for earthquake disaster preparedness, Elements at risk, Recovery and rehabilitation after earthquake, Concepts of Earthquake resistant design and construction of buildings; Tsunami – Onset, Types and causes, Warning, Elements at risk, Typical effects, Specific preparedness and mitigation strategies, Case studies.

Module 3: FLOODS, CYCLONES AND DROUGHTS **(07 Periods)**

Floods and Cyclones: Onset, Types, Causes, Warnings, Elements at risk, Typical effects, Indian floods and cyclones, Hazard zones, Potential for reducing hazards, Mitigation strategies and community based mitigation, Case studies.

Droughts: Onset, Types and warning; Causes, Impact, Early warning and response mechanisms, Mitigation strategies, Droughts in India, Case studies.

Module 4: LANDSLIDES **(06 Periods)**

Onset, Types and warning; Causes, Elements at risk, Indian landslides, Hazards zones, Typical effects, Mitigation strategies and community based mitigation, Case studies.

Module 5: DISASTER MANAGEMENT **(05 Periods)**

Disaster management organization and methodology, Disaster management cycle, Disaster management in India – Typical cases and Cost–benefit analysis, Disaster management programs implemented by NGOs and Government of India, Usage of GIS and Remote sensing techniques in disaster management, Leadership and Coordination in Disaster management, Emerging trends in disaster management.

Total Periods: 30

EXPERIENTIAL LEARNING

1. Perform hazard assessment and vulnerability analysis for any nearby town/city and prepare a detailed report of possible impacts of various disasters on environment, infrastructure and development.
2. Prepare a detailed report on the causes and effects of Tsunami that was occurred in the year 2004. Also discuss various advancements in Tsunami warning systems.
3. Identify the major causes of urban floods in cities like Chennai, Hyderabad & Mumbai and submit a report along with various mitigation strategies to reduce the impact of floods.
4. Prepare a detailed report on how various man-made activities are directly/indirectly related to the occurrence of landslides that occurred in recent days in India.
5. Visit AP State Disaster Response and Fire Services Department and record about various methods used by them in mitigating disasters and their management.

RESOURCES

TEXT BOOKS:

1. Sharma V. K., Disaster Management, Medtech Publishing, 2nd Edition, 2013.
2. Anand S. Arya, Anup Karanth, and Ankush Agarwal, Hazards, Disasters and Your Community: A Primer for Parliamentarians, GOI–UNDP Disaster Risk Management Programme, Government of India, National Disaster Management Division, Ministry of Home Affairs, New Delhi, Version 1.0, 2005

REFERENCE BOOKS:

1. Donald Hyndman and David Hyndman, Natural Hazards and Disasters, Cengage Learning, USA, 5th Edition, 2015.
2. Disaster Management in India, A Status Report, Ministry of Home Affairs, Govt. of India, May 2011.
3. Rajendra Kumar Bhandari, Disaster Education and Management: A Joyride for Students, Teachers, and Disaster Managers, Springer India, 2014.
4. Singh R. B., Natural Hazards and Disaster Management, Rawat Publications, 2009.

VIDEO LECTURES:

1. https://nptel.ac.in/courses/105104183
2. https://www.digimat.in/nptel/courses/video/124107010/L01.html

WEB RESOURCES:

1. https://egyankosh.ac.in/handle/123456789/25093
2. https://www.egyankosh.ac.in/handle/123456789/25912
3. https://www.nios.ac.in/media/documents/333courseE/12.pdf
4. https://ndmindia.mha.gov.in/images/public-awareness/Primer%20for%20Parliamentarians.pdf

SCHOOL CORE

Course Code	Course Title	L	T	P	S	C
22LG107602	**ESSENTIAL LIFE SKILLS FOR HOLISTIC DEVELOPMENT**	**2**	**-**	**-**	**-**	**2**

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course deals with different types of thinking skills, self-awareness, coping with stress and emotion, transformational skills, group and team dynamics, and leadership.

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

CO1 Understand different life skills required in personal and professional life.

CO2 Analyze well-defined techniques to cope with emotions and stress.

CO3 Apply appropriate thinking and problem-solving methods to solve problems.

CO4 Function effectively in a team and as an individual.

CO5 Demonstrate the qualities of an effective leader.

CO-PO Mapping Table:

Course Outcomes	Program Outcomes								
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	3	-	-	-	-	-	-	-	-
CO2	2	3	-	-	2	-	-	-	-
CO3	2	3	-	-	2	-	-	-	-
CO4	2	2	-	-	2	-	-	-	3
CO5	2	2	-	-	-	-	-	-	-
Course Correlation Mapping	2	3	2	-	2	-	-	-	3

Correlation Levels: **3: High;** **2: Medium;** **1: Low**

COURSE CONTENT

Module 1: OVERVIEW OF LIFE SKILLS (06 Periods)

Meaning and significance of life skills, Life skills identified by WHO: Self-awareness, Empathy, Critical thinking, Creative thinking, Decision making, problem-solving, Effective Communication, interpersonal relationships, coping with stress, coping with emotion.
Ethics, Moral & Professional Values: Human Values, Civic Rights, Engineering Ethics, Engineering as Social Experimentation, Environmental Ethics, Global Issues, Code of Ethics like ASME, ASCE, IEEE.

Module 2: STRESS MANAGEMENT (06 Periods)

Stress Management: Stress, reasons, and effects, identifying stress, stress diaries, the four A's of stress management, techniques, **Approaches**: action-oriented, emotion-oriented, acceptance oriented, resilience, Gratitude Training, **Coping with emotions**: Identifying and managing emotions, harmful ways of dealing with emotions, PATH method, and relaxation techniques.

Module 3: TRANSFORMATIONAL SKILLS (06 Periods)

Creativity, Critical Thinking, Collaboration, Problem Solving, Decision Making, Need for Creativity in the 21st century, Imagination, Intuition, Experience, Sources of Creativity, Lateral Thinking, Myths of creativity, Critical thinking Vs Creative thinking, Functions of Left Brain & Right brain, Convergent & Divergent Thinking, Critical reading & Multiple Intelligence.

Module 4: GROUP AND TEAM DYNAMICS (06 Periods)

Introduction to Groups: Composition, formation, Cycle, thinking, Clarifying expectations, Problem Solving, Consensus, Dynamics techniques, Group vs Team, Team Dynamics, and Virtual Teams. Managing team performance and managing conflicts, Intrapreneurship.

Module 5: LEADERSHIP (06 Periods)

Leadership framework, entrepreneurial and moral leadership, vision, cultural dimensions. Growing as a leader, managing diverse stakeholders, crisis management. Types of Leadership, Traits, Styles, VUCA Leadership, Levels of Leadership,Transactional vs Transformational Leaders, Leadership Grid, Effective Leaders.

Total Periods: 30

EXPERIENTIAL LEARNING

1. Prepare an attitude test and measure the attitudes of your class.
2. Prepare a Case study on the Campus Interview pressure and stress of students using SWOT analysis.
3. Record and prepare videos of various cultural people and make a comment on their accents.
4. Prepare a short film of a leader of your choice and list out the best qualities.
5. Prepare a presentation on the impact of social media on leadership management.
6. 'Knowledge of present technologies helps us to live a harmonious life.'
   Make a video to justify the statement.

7. Identify life skills needed in our day-to-day life and explain their importance.
8. Come up with strategies to become successful in professional life.
9. Find methods and solutions to overcome the self-pity of a person.
10. Identify the persons who are irregular to class. Find out their problems and come up with solutions.

(Note: It's an indicative one. Course Instructor may change activities and shall be reflected in course Handout)

RESOURCES

TEXTBOOKS:

1. Dr. K Alex, "Soft Skills". S Chand & Company Pvt.Ltd.2013.
2. Monmohan Joshi, "Soft Skills". Boolkboon.com, First Edition, 2017.

REFERENCE BOOKS:

1. Barun K. Mitra. "Personality Development & Soft Skills", First Edition; Oxford Publishers. 2011.
2. Kalyana. "Soft Skill for Managers"; First Edition; Wiley Publishing Ltd. 2015.
3. Shalini Verma. "Development of Life Skills and Professional Practice"; First Edition; Sultan Chand (G/L) & Company, 2014.
4. John C. Maxwell. "The 5 Levels of Leadership", Centre Street, A division of Hachette Book Group Inc. 2014.
5. Daniel Goleman, "Emotional Intelligence"; Bantam, 2006.
6. Remesh S., Vishnu R.G. "Life Skills for Engineers", Ridhima Publications, First Edition, 2016.
7. Butterfield Jeff. "Soft Skills for Everyone", Cengage Learning India Pvt Ltd; 1 edition, 2011.
8. Training in Interpersonal Skills: Tips for Managing People at Work, Pearson Education, India; 6 edition, 2015.
9. The Ace of Soft Skills: Attitude, Communication and Etiquette for Success, Pearson Education; 1 edition, 2013.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=xM0fajUl7Bg
2. https://www.youtube.com/watch?v=HwLK9dBQn0g
3. https://www.youtube.com/watch?v=sxX5LoojdJw
4. https://www.youtube.com/watch?v=xJBgqW9-lzc
5. https://www.youtube.com/watch?v=QVwTVM1Iv1c

WEB RESOURCES:

1. https://www.clarke.edu/campus-life/health-wellness/counseling/articles-advice/developing-a-positive-attitude/
2. https://www.skillsyouneed.com/ps/personal-swot-analysis.html
3. https://ecampusontario.pressbooks.pub/profcommsontario/chapter/cross-cultural-communication/

4. https://thepeakperformancecenter.com/educational-learning/thinking/#:~:text=There%20are%20several%20core%20thinking,storing%20and%20then%20retrieving%20information.
5. https://www.webmd.com/anxiety-panic/guide/stage-fright-performance-anxiety
6. https://www.ktunotes.in/ktu-syllabus-life-skills/

SCHOOL CORE

Course Code	Course Title	L	T	P	S	C
22MG107401	**INNOVATION, INCUBATION, AND ENTREPRENEURSHIP**	**2**	**-**	**-**	**-**	**2**

Pre-Requisite -
Anti-Requisite -
Co-Requisite -

COURSE DESCRIPTION: To sensitize students on the prospects, opportunities, and challenges in entrepreneurship and the potential for value creation from prospective idea

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

CO1 Understand the basics of generating new business ideas
CO2 Explain the concept of design thinking and product innovation.
CO3 Illustrate the roles of digital technology in entrepreneurship.
CO4 Understand the need for startup economics and market conditions
CO5 Evaluate the reasons for successful entrepreneurship.

CO-PO Mapping Table:

Course Outcomes	Program Outcomes								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	2	1	2	1	-	-	-	-	-
CO2	1	1	1	-	-	-	-		1
CO3	2	2	1	-	-	-	-	1	-
CO4	3	1	1	-	-	-	-	-	-
CO5	2	2	-	-	-	1	-	-	-
Course Correlation Mapping	2	2	1	1	-	1	-	1	1

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: Introduction (06 Periods)
Concept & Definition, Taking product or service ideas to creating value: Why should one choose to become an entrepreneur, Entrepreneurial mind-set, Intrapreneurship

Module 2: Product Innovation (06 Periods)
Product innovation process, engineering design process and the concept of frugal engineering for developing innovative affordable products, effective user-interface.

Module 3: Digital Technology Entrepreneurship (06 Periods)
Industry 4.0 landscape and innovations using digital technologies like AI, IOT, AR/VR, Cloud, SAAS, User Applications.

Module 4: Startup Economics & Market considerations (06 Periods)
Economic consideration for starting a venture, Understanding Feasibility analysis, Understanding market, targeting customer and positioning product

Module 5: Successful Business Incubation **(06 Periods)**

Business model innovation, Business process management , competitive advantages, Business model canvas, Bootstrapping.

Total Periods: 30

EXPERIENTIAL LEARNING

1. Create and present a prototype of a new product of your choice.
2. Present at least three cases of successful business Ideas in recent times
3. Discuss in the group Entrepreneurship opportunities in terms of Orientation and Develop mentation.

(Note: It's an indicative one. Course Instructor may change activities and shall be reflected in course Handout)

RESOURCES

TEXT BOOKS:

1. Robert D. Hisrich, Entrepreneurship,
2. Kuratko & Hodgetts, Entrepreneurship- Theory, Process & Practice, Thompson South-Western Publication

REFERENCE BOOKS:

1. Peter Drucker, Innovation and Entrepreneurship, Harper Collins
2. Thomas N. Duening, Robert D. Hisrich and Michael A. Lechter, Technology Entrepreneurship Taking Innovation to the Marketplace, Elsevier
3. Prof. Nigel Cross, Bloomsbury Design Thinking Understanding How Designers Think and Work, 2019 Edition

VIDEO LECTURES:

1. https://onlinecourses.nptel.ac.in/noc21_mg63/preview
2. https://onlinecourses.nptel.ac.in/noc22_de08/preview

WEB RESOURCES:

1. nhttps://ciie.iitism.ac.in/files/CIIE-POLICY.pdf
2. https://www.nios.ac.in/media/documents/249_Enterpreneurship/English_pdf/249_Enterpreneurship_Lesson_16.pdf

SCHOOL CORE

Course Code	Course Title	L	T	P	S	C
22EE107001	**INTELLECTUAL PROPERTY RIGHTS**	**2**	**-**	**-**	**-**	**2**

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: The course is designed to provide comprehensive knowledge to the students regarding the general principles of intellectual property rights, Concept and Theories, Criticisms of Intellectual Property Rights, International Regime Relating to IPR. The course provides an awareness on how to protect ones unique creation, claim ownership, knowledge of what falls under the purview of someone's rights and what doesn't, and safeguard their creations and gain a competitive edge over the peers.

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

CO1 Understand the need and the concepts of intellectual property right and avenues for filling intellectual property rights.

CO2 Understand the legislative practices and protocols for acquisition of trademark and the judicial consequences for violating laws of trademark protection.

CO3 Understand the legislative practices and protocols for acquisition of copyrights and the judicial consequences for violating laws of copyrights protection.

CO4 Understand the fundamentals of patent laws, legislative practices and protocols for acquisition of trade secrets and the judicial consequences for violating laws of trade secrets protection.

CO5 Understand the importance of geographical indications and various laws and protocols for protecting geographical indications.

CO-PO Mapping Table:

Course Outcomes	Program Outcomes								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	-	-	-	-	-	-	-	2
CO2	3	-	-	-	1	-	-	3	2
CO3	3	-	-	-	1	-	-	3	2
CO4	3	-	-	-	1	-	-	3	2
CO5	3	-	-	-	1	-	-	3	2
Course Correlation Level	3	-	-	-	1	-	-	3	2

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: INTRODUCTION TO INTELLECTUAL PROPERTY RIGHTS (06 Periods)

Introduction and the need for intellectual property rights (IPR); types of intellectual property- Design; International organizations, agencies and treaties.

Module 2: TRADEMARKS (06 Periods)

Introduction to trademark, Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

Module 3: LAW OF COPYRIGHTS (06 Periods)

Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.
Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer.

Module 4: TRADE SECRETS (06 Periods)

Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation.
Unfair competition: Misappropriation right of publicity, false advertising.

Module 5: GEOGRAPHICAL INDICATIONS (06 Periods)

The Geographical indications law in India, The objectives and features, the registry of geographical indications powers and functions. Types of goods offered. Protection: Agriculture goods, manufactured goods and natural goods. Registration of indications and the requirements. Prohibition of misleading use of indications of geographical origins, prohibition of dilution of geographical origins.

Total Periods: 30

EXPERIENTIAL LEARNING

1. Should conduct a survey based on the real scenario, where IPR is misused or unethically used and present an article.
2. Prepare an article on the registration processes of IPR practically (copy right/trade mark/ patents).
3. Should study a case of conflict on trademarks/patents and should produce an article mentioning the circumstances and remedial measures.
4. Prepare an article on the latest development in the international intellectual property rights.

(Note: It's an indicative one. The course instructor may change the activities and the same shall be reflected in course handout.)

RESOURCES

TEXT BOOKS:

1. Deborah, E. Bouchoux, Intellectual property: The law of Trademarks, Copyright, Patents, and Trade Secrets, Cengage learning, 4th Edition, 2013.
2. Prabuddha Ganguli, Intellectual property right - Unleashing the knowledge economy, Tata McGraw Hill Publishing Company Ltd.
3. Marsha AEchols, Geographical Indications for Food Products, Wolters, 2008

REFERENCE BOOKS:

1. Neeraj P., & Khusdeep D, Intellectual Property Rights, PHI learning Private Limited. 1st Edition 2019.
2. Nithyananda, K V. Intellectual Property Rights: Protection and Management, Cengage Learning India Private Limited, 2019

VIDEO LECTURES:

1. https://nptel.ac.in/courses/110105139

WEB RESOURCES:

1. Subramanian, N., & Sundararaman, M. (2018). Intellectual Property Rights – An Overview. Retrieved from http://www.bdu.ac.in/cells/ipr/docs/ipr-eng-ebook.pdf
2. World Intellectual Property Organisation. (2004). WIPO Intellectual property Handbook. Retrieved from https://www.wipo.int/edocs/pubdocs/en/intproperty/489/wipo_pub_489.pdf
3. Cell for IPR Promotion and Management (http://cipam.gov.in/)
4. World Intellectual Property Organisation (https://www.wipo.int/about-ip/en/)
5. Office of the Controller General of Patents, Designs & Trademarks (http://www.ipindia.nic.in/)

SCHOOL CORE

Course Code	Course Title	L	T	P	S	C
22EE107002	FUNDAMENTALS OF RESEARCH METHODOLOGY	2	-	-	-	2

Pre-Requisite --
Anti-Requisite --
Co-Requisite --

COURSE DESCRIPTION: The course is developed for the students to understand the underlying concepts of research methodology and a systematic approach for carrying out research in the domain of interest. The course is emphasized on developing skills to recognize and reflect on the strength and limitations of different types of research; data collection methods, and methods of Processing and analyzing data. The course also emphasizes interpreting the findings and research articulating skills.

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

CO1 Understands the underlying concepts of research methodology, types of research and the systematic research process.
CO2 Understand the philosophy of research design, types of research design and develop skills for a good research design.
CO3 Understand the philosophy of formulation of a research problem, methods of data collection, review of literature and formulation of working hypothesis.
CO4 Understand various data processing and analyzing techniques and their significance in the research.
CO5 Develop skills to interpret the findings and research articulating skills along with the ethics of research.

CO-PO Mapping Table:

Course Outcome	Program Outcomes								
	PO1	P2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	-	-	-	-	-	-	-	-
CO2	3	-	1	-	-	-	-	-	-
CO3	3	-	-	-	2	1	-	-	-
CO4	3	2	-	-	3	1	-	-	-
CO5	3	-	-	-	-	-	-	-	3
Course Correlation Level	3	2	1	-	3	1	-	-	3

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: INTRODUCTION TO RESEARCH METHODOLOGY (06 Periods)

Meaning of Research, Objectives of Research, Motivation in Research, Types of Research, Research Approaches, Significance of Research, Research and Scientific Method, Research Process, Criteria of Good Research.

Module 2: RESEARCH DESIGN (06 Periods)

Research design—Basic Principles, Need of research design, Features of good design, Important concepts relating to research design, Different research designs, Basic principles of experimental designs, Developing a research plan.

Module 3: RESEARCH FORMULATION (06 Periods)

Defining and formulating the research problem - Selecting the problem - Necessity of defining the problem - Importance of literature review in defining a problem – Data

collection – Primary and secondary sources; Critical literature review – Identifying gap areas from literature review, Development of working hypothesis.

Module 4: PROCESSING AND ANALYSIS OF DATA (06 Periods)

Processing Operations, Elements/Types of Analysis, Statistics in Research, Measures of Central Tendency, Measures of Dispersion, Measures of Relationship, Simple Regression Analysis.

Module 5: INTERPRETATION AND REPORT WRITING (06 Periods)

Interpretation: Meaning of interpretation; Techniques of interpretation; Precautions in Interpretation.
Report Writing: Significance, Different Steps, Layout, Types of reports, Mechanics of Writing a Research Report, Precautions in Writing Reports.

Total Periods: 30

EXPERIENTIAL LEARNING:

1. Should conduct a survey based on a hypothesis, analyze the data collected and draw inferences from the data.
2. Should review the literature on the given topic and should identify the scope/gaps in the literature and develop a research hypothesis.
3. Should study a case, formulate the hypothesis and identify an appropriate testing technique for the hypothesis.
4. Study an article and submit a report on the inferences and should interpret the findings of the article.

(Note: It's an indicative one. Course Instructor may change activities and shall be reflected in course Handout)

RESOURCES

TEXT BOOKS:

1. C.R. Kothari, Research Methodology: Methods and Techniques, New Age International Publishers, 2nd revised edition, New Delhi, 2004.
2. Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., 2002. An introduction to Research Methodology, RBSA Publishers.

REFERENCE BOOKS:

1. R. Panneerselvam, Research Methodology, PHI learning Pvt. Ltd., 2009.
2. Singh, Yogesh Kumar. Fundamental of research methodology and statistics. New Age International, 2006.

VIDEO LECTURES:

1. https://nptel.ac.in/courses/121106007
2. https://onlinecourses.nptel.ac.in/noc22_ge08/preview
3. https://www.youtube.com/watch?v=VK-rnA3-41c

WEB RESOURCES:

1. https://www.scribbr.com/category/methodology/
2. https://leverageedu.com/blog/research-design/
3. https://prothesiswriter.com/blog/how-to-formulate-research-problem
4. https://www.formpl.us/blog/hypothesis-testing
5. https://www.datapine.com/blog/data-interpretation-methods-benefits-problems/
6. https://leverageedu.com/blog/report-writing/

PROGRAM CORE

Course Code	Course Title	L	T	P	S	C
22BS101072	DIGITAL FORENSICS	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on Fundamentals and Concepts, Computer Crimes, Classification of Computer Crimes, Computer Forensics Investigations, Elements of Computer Crime Investigations.

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

CO1 Demonstrate the basics of digital forensics.

CO2 Understand the concepts of computer crimes.

CO3 Analyze the concepts of computer forensic investigations.

CO4 Know the elements involved in investigation of computer crimes.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	3	-	1
CO2	3	-	-	-	-	-	-	-	-	3	-	1
CO3	3	1	-	-	-	-	2	-	-	3	-	1
CO4	3	1	-	-	-	-	2	-	-	3	-	1
Course Correlation Mapping	3	1	-	-	-	-	2	-	-	3	-	1

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: FUNDAMENTALS AND CONCEPTS **(09 Periods)**

Fundamentals of computers Hardware and accessories – development of hard disk, physical construction, CHS and LBA addressing, encoding methods and formats. Memory and processor. Methods of storing data. Operating system. Software. Introduction to network, LAN, WAN and MAN.

Module 2: COMPUTER CRIMES (09 Periods)

Definition and types of computer crimes. The distinction between computer crimes and conventional crimes. Reasons for the commission of computer crimes. Breaching security and operation of digital systems. Computer virus, and computer worm – Trojan horse, trap door, super zapping, logic bombs.

Module 3: CLASSIFICATION OF COMPUTER CRIMES (09 Periods)

Types of computer crimes – computer stalking, pornography, hacking, crimes related to intellectual property rights, computer terrorism, hate speech, private and national security in cyberspace. An overview of hacking, spamming, phishing and stalking.

Module 4: COMPUTER FORENSICS INVESTIGATIONS (09 Periods)

Seizure of suspected computer. Preparation required before the seizure. Protocol to be taken at the scene. Extraction of information from the hard disk. Treatment of exhibits. Creating bit stream of the original media.

Module 5: ELEMENTS OF COMPUTER CRIME INVESTIGATIONS (09 Periods)

Collection and seizure of magnetic media. Legal and privacy issues. Examining forensically sterile media. Restoration of deleted files. Password cracking and E-mail tracking. Encryption and decryption methods. Tracking users.

Total Periods: 45

EXPERIENTIAL LEARNING

1. Case study on various digital crimes.
2 Importance of digital crimes knowledge in this modern world.

RESOURCES

TEXT BOOKS:

1. C.B. Leshin, Internet Investigations in Criminal Justice, Prentice Hall, New Jersey, 2017.
2. E. Casey, Digital Evidence and Computer Crime, Academic Press, London, 2010.

REFERENCE BOOKS:

1. R.K. Tiwari, P.K. Sastry and KV Ravikumar, Computer Crimes and Computer Forensics, Select Publishers, New Delhi, 2013.
2. R. Saferstein, Criminalistics, 12th Edition, Prentice Hall, New Jersey, 2017.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=u2zgEFm5RHQ
2. https://www.youtube.com/watch?v=SEzeyvqgHzc
3. https://www.youtube.com/watch?v=K-o7jXToDnU
4. https://www.youtube.com/watch?v=f452CYRijFo

WEB RESOURCES:

1. https://www.simplilearn.com/what-is-digital-forensics-article
2. https://www.ibm.com/topics/computer-forensics
3. https://www.cisa.gov/sites/default/files/publications/forensics.pdf
4. https://shorturl.at/hyHV7

PROGRAM CORE

Course Code	Course Title	L	T	P	S	C
22BS102070	**FUNDAMENTALS OF FORENSIC SCIENCES**	**3**	**-**	**2**	**-**	**4**

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on the significance of forensic science to human society, fundamental principles and functions of forensic science, divisions in a forensic science laboratory and the working of the forensic establishments in India and abroad.

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

CO1 Understand history and development of forensic science.

CO2 Learn basic principles of Forensic sciences.

CO3 Understand various departments under forensic sciences

CO4 Demonstrate forensic laboratory set up.

CO5 Understand crime investigation techniques by the help of police and detective

CO6 Work individually or in teams to solve problems with effective communication

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	1	-	-	-	3	-	-
CO2	3	-	-	-	-	1	-	-	1	3	-	-
CO3	3	-	-	-	-	1	-	-	-	3	-	-
CO4	3	-	-	-	-	1	-	-		3	-	-
CO5	3	-	-	-	-	1	-	-	-	3	-	-
CO6	3	-	-	-	-	1	-	-	-	3	-	-
Course Correlation Mapping	3	-	-	-	-	1	-	-	1	3	-	-

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: HISTORY AND DEVELOPMENT OF FORENSIC SCIENCE (9 Periods)

History of Development of Forensic Science in India, Functions of forensic science, Historical aspects of forensic science, Definitions and concepts in forensic science.

Module 2: BASIC PRINCIPLE OF FORENSIC SCIENCE (9 Periods)

Scope of forensic science, Need of forensic science, Basic principles of forensic science. Frye case and Daubert standard. Tools and Techniques in Forensic Science Branches of forensic science

Module 3: INTERNATIONAL PERSPECTIVES (9 Periods)

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.

Module 4: ORGANIZATION SET UP OF FORENSIC SCIENCE LAB (9 Periods)

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.

Module 5: POLICE AND DETECTIVE (9 Periods)

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.

Total Periods: 45

EXPERIENTIAL LEARNING

LIST OF EXPERIMENTS:

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. FIRST YEAR
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.

RESOURCES

TEXT BOOKS:

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, New Delhi, 2002.

REFERENCE BOOKS:

1. S.H. James and J.J. Nordby, Forensic Science: An Introduction to Scientific and Investigative Techniques, 2nd Edition, CRC Press, Boca Raton, 2005.
2. W.G. Eckert and R.K. Wright in Introduction to Forensic Sciences, 2nd Edition, W.G. Eckert (ED.), CRC Press, Boca Raton, 1997.
3. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey, 2004.
4. W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's Techniques of Crime Scene Investigation, CRC Press, Boca Raton, 2013.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=dQlIB2eAgU0
2. https://www.youtube.com/watch?v=8L69-tkkaYE
3. https://www.youtube.com/watch?v=NKXtw2e2LuI
4. https://www.youtube.com/watch?v=hR_rCPtJMz8

WEB RESOURCES:

1. https://www.interpol.int/en
2. http://dfs.nic.in/
3. https://forensicfield.blog/indian-history-of-forensic-science/

PROGRAM CORE

Course Code	Course Title	L	T	P	S	C
22BS101070	**FORENSIC SCIENCES PHYSICS**	**3**	**-**	**-**	**-**	**3**

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on the significance of forensic science to human society, fundamental principles and functions of forensic science, divisions in a forensic science laboratory and the working of the forensic establishments in India and abroad.

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

CO1 Analyze the Glass and paint evidence involved in the crime.

CO2 Demonstrate the Soil and fibres evidence from the crime scene.

CO3 Classified tool marks

CO4 Design a standard protocol for Restoration of erased serial numbers and engraved marks

CO5 Work individually or in teams to solve problems with effective communication

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	1	1	-	-	3	1	-
CO2	3	2	-	-	-	1	1	-	1	3	1	-
CO3	3	2	-	-	-	1	1	-	-	3	1	-
CO4	3	2	-	-	-	1	1	-		3	1	-
CO5	3	2	-	-	-	1	1	-	-	3	1	-
Course Correlation Mapping	3	2	-	-	-	1	1	-	1	3	1	-

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: GLASS EVIDENCE COLLECTION AND ANALYSIS (9 Periods)

Collection, packaging, analysis of glass evidence. Matching of glass samples by mechanical fit and refractive index measurements. Analysis by spectroscopic methods. Fracture analysis and direction of impact.

Module 2: PAINT EVIDENCE COLLECTION AND ANALYSIS (9 Periods)

Paint evidence – collection, packaging and preservation. Analysis by destructive and non-destructive methods. Importance of paint evidence in hit and run cases.

Module 3: SOIL, CLOTH AND FIBER EVDENCE COLLECTION (9 Periods)

Importance, location, collection and comparison of soil samples. Cloth evidence – importance, collection, analysis of adhering material. Matching of pieces. Fiber evidence – artificial and man – made fibers. Collection of fiber evidence. Identification and comparison of fibers.

Module 4: TOOL MARKS (9 Periods)

Tool marks: Classification of tool marks. Forensic importance of tool marks. Collection, preservation and matching of tool marks

Module 5: RESTORATION OF ERASED SERIAL NUMERS AND EBGRAVED MARKS (9 Periods)

Restoration of erased serial numbers and engraved marks. Forensic gemology. Accident Analysis – Extent of vehicle damage, Estimation of speed, Tyre tread marks and skid marks, Trace evidence at accident sites, Hit and run investigations.

Total Periods: 45

EXPERIENTIAL LEARNING

1. Demonstrate various evidence collection from crime scene.
2. Perform the
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. FIRST YEAR
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.

RESOURCES

TEXT BOOKS:

1. E. Elaad in Encyclopedia of Forensic Science, Volume 2, J.A. Siegel, P.J. Saukko and G.C. Knupfer (Eds.), Academic Press, London, 2000.
2. S.H. James and J.J. Nordby, Forensic Science: An Introduction to Scientific and Investigative Techniques, 2nd Edition, CRC Press, Boca Raton, 2005.

REFERENCE BOOKS:

1. J. Gardener and T.M. Anderson, Criminal Evidence, 4th Ed., Wadsworth, Belmont, 2001.
2. W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's Techniques of Crime Scene Investigation, CRC Press, Boca Raton, 2013.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=dQlIB2eAgU0
2. https://www.youtube.com/watch?v=8L69-tkkaYE
3. https://www.youtube.com/watch?v=NKXtw2e2LuI
4. https://www.youtube.com/watch?v=hR_rCPtJMz8

WEB RESOURCES:

1. https://www.interpol.int/en
2. http://dfs.nic.in/
3. https://forensicfield.blog/indian-history-of-forensic-science/

PROGRAM CORE

Course Code	Course Title	L	T	P	S	C
22BS102071	**CRIMINALISTICS**	**3**	**-**	**2**	**-**	**4**

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on Crime Scene Management, Preliminary Procedures related to Crime Scene Management, Crime Scene Evidence, Forensic Physics about Glass, Paint, Fibre, Soil, and Tool Marks.

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

CO1 Demonstrate the methods of securing, searching and documenting crime scenes.

CO2 Analysis of evidence at crime scenes by collecting, packaging and preserving different types traces

CO3 Demonstrate the legal importance of chain of custody.

CO4 Apply the tools and techniques for analysis of glass and paint as crime scene evidence

CO5 Apply the tools and techniques for analysis of fibre, soil and tool marks as crime scene evidence

CO6 Work independently and in teams to solve problems with effective communications

CO-PO-PSO Mapping Table

Course Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	3	1	1
CO2	2	3	-	-	-	-	-	-	-	3	1	1
CO3	3	-	-	-	-	-	-	-	-	3	1	1
CO4	3	2	-	3	-	-	-	-	-	3	1	1
CO5	2	2	-	3	-	-	-	-	-	3	1	1
CO6	2	1	-	-	-	-	-	-	3	3	1	1
Course Correlation Mapping	3	2	-	3	-	-	-	-	3	3	1	1

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: CRIME SCENE MANAGEMENT (09 Periods)

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.

Module 2: PRELIMINARY PROCEDURES RELATED TO CRIME SCENE MANAGEMENT (09 Periods)

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.

Module 3: CRIME SCENE EVIDENCE (09 Periods)

Classification of crime scene evidence – physical and trace evidence. Locard principle. Collection, labelling, sealing of evidence. Hazardous evidence. Preservation of evidence. Chain of custody. Reconstruction of a crime scene.

Module 4: FORENSIC PHYSICS ABOUT GLASS AND PAINT (09 Periods)

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. Bayes Theorem in analysis and applications.

Module 5: FORENSIC PHYSICS ABOUT FIBRE, SOIL, AND TOOL MARKS (09 Periods)

Fibre evidence – Natural and Artificial fibres. Collection of fibre evidence. Identification and comparison of fibres. Soil evidence – importance, location, collection, and comparison of soil samples. Cloth evidence – importance, collection, analysis of adhering material. Matching of pieces. Tool mark evidence. Classification of tool marks. Forensic importance of tool marks. Collection, preservation, and matching of tool marks. Restoration of erased serial numbers and engraved marks.

Total Periods: 45

EXPERIENTIAL LEARNING

LIST OF EXPERIMENTS: (Minimum 10 exercises shall be conducted)

1. To prepare a report on the evaluation of the crime scene.
2. To reconstruct a crime scene (outdoor and indoor)
3. To prepare Crime Scene Photography, Videography, and Documentation
4. To compare soil samples by density gradient method
5. To compare paint samples by the physical matching method

6. To compare tool mark evidences by comparison microscope
7. To compare paint samples by the thin-layer chromatography method
8. To identify and compare tool marks
9. To compare glass samples by refractive index method
10. To compare cloth samples by physical matching
11. To the restoration of erased serial numbers and engraved marks using chemical methods
12. To compare fibre analysis using various types of cloth evidence
13. To prepare a report on the evaluation of soil evidence and tool mark evidence
14. To prepare a report on cases related to soil evidences
15. To compare evidences using Bayes theorem. Different case studies on crime and society

RESOURCES

TEXT BOOKS:

1. M. Byrd, Crime Scene Evidence: A Guide to the Recovery and Collection of Physical Evidence, CRC Press, Boca Raton (2010).
2. T J Gardener and T. M. Anderson, Criminal Evidence, 6 ed., Wadsworth, Belmont (2011).

REFERENCE BOOKS:

1. W. J. Tilstone, M.L. Hastrup and C. Hald, Fisher's, Techniques of Crime Scene Investigation, CRC Press, Boca Raton (2013).
2. S. H. James and J. J. Nothrdby, Forensic Science: An Introduction to Scientific and Investigative Techniques, 5 Ed., CRC Press, Boca Raton (2015)

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=DZlviqZ4iN0&list=PLjxsjHQoMl2tDAv6zRr9fMz0RK2O_5SNf
2. https://www.youtube.com/watch?v=kHZsPthQdH0&t=515s
3. https://www.youtube.com/playlist?app=desktop&list=PLUQDAGXE92AK_3X7-x7Y_dqoX5p4jM35b

WEB RESOURCES:

1. https://www.encyclopedia.com/science/encyclopedias-almanacs-transcripts-and-maps/criminalistics
2. https://samples.jblearning.com/9781284211450/9781284245585_Ch01_Secured.pdf
3. https://jhpolice.gov.in/sites/default/files/documents-reports/jhpolice_ebook_a_forensic_guide_for_crime_investigators.pdf
4. https://www.britannica.com/science/forensic-science/Jurisprudence
5. https://samples.jbpub.com/9780763777319/Chapter_1.pdf

PROGRAM CORE

Course Code	Course Title	L	T	P	S	C
22BS102072	CRIMINAL LAW	3	-	2	-	4

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course deals with Indian Penal Code, code of criminal procedure, Indian evidence act, Judicial activism & social legislation

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

CO1 Demonstrate the elements of Indian Penal Code

CO2 Illustrate the Penal Codes related to Offences

CO3 Demonstrate the Criminal Procedural Code

CO4 Demonstrate the various elements of Indian Evidence act

CO5 Demonstrate the acts pertaining to social legislation

CO6 Work independently and in teams to solve problems with effective communications

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	2	-	1
CO2	3	-	-	-	-	-	-	-	-	2	-	1
CO3	3	-	-	-	-	-	-	-	-	3	-	1
CO4	3	-	-	-	-	-	-	-	-	3	-	1
CO5	3	2	-	-	-	-	2	-	-	3	-	1
CO6	2	2	-	-	-	-	-	-	3	3	1	1
Course Correlation Mapping	3	2	-	-	-	-	2	-	3	3	1	1

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: INTRODUCTION TO I.P.C. – I (09 Periods)

Historical development of Penal code, Common Intention – S – 34, General Exceptions (S – 76-106.), Attempt – S – 511, Abettor – S – 107, 108, 108A, 109, 110. Conspiracy – S – 120A, 120B, 121. Crime against Nation/State S – 124, 124A.

Module 2: INTRODUCTION TO I.P.C. – II (09 Periods)

Crime against Human Body – S – 299 – 309, 319 – 326, 351-366, 375, 376 A, B, C - I

Crime against Women – S–304B, 326A, 326B, 354 A, B, C, D, E, F, 376 with amendments, 498A.

Crime Against Property – S – 378 – 386, 390 – 400, 415 – 420, 441 – 458,

Module 3: CODE OF CRIMINAL PROCEDURE (09 Periods)

Introduction, Organization and Powers of Criminal Law Courts in India. Provisions for Summary Trial, Judgement in abridged form. Police Powers of Arrest, Search and Seizure. Provisions regarding Bail and bond, Summons, Warrants and Proclamations. Provision regarding Examination, Cross-Examination & Re-Examination.

Module 4: INDIAN EVIDENCE ACT (09 Periods)

Historical development and Meaning. Relevancy, Importance of Relevancy & Fact

Admissions, Confessions and Dying Declarations Expert Evidence, Oral and Documentary Evidence Digital evidences, Evidentiary values of forensic science and its importance.

Module 5: JUDICIAL ACTIVISM & SOCIAL LEGISLATION (09 Periods)

Fundaments of Judicial Functioning: Due Process, Speedy Trials and Fair Deal to victims of crime; Writ Provisions. Modernisation and reforms in Criminal Justice System.

Dowry Prohibition Act 1961, JJ ACT 1986 – 2018, NDPS Act 1988, Prevention of Corruption Act 1988, Prohibition of Child Marriage Act 2006, The Protection of Women from Domestic Violence Act 2005, The Protection of Children from Sexual Offences Act 2012, The Lokpal and Lokayuktas Act 2013, Sexual Harassment of Women at Workplace Act 2013,

Total Periods: 45

EXPERIENTIAL LEARNING

List of Experiments (Minimum 10 experiments shall be conducted)

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.

RESOURCES

TEXT BOOKS:

1. Ratanlal and Dhirajlal. Ratanlal and Dhirajlal's The Code of Criminal Procedure - As amended by the Criminal Law (Amendment) Act, 2013. Lexis Nexis 22nd Edition. 2017.

REFERENCE BOOKS:

1. Ratanlal and Dhirajlal. Ratanlal&Dhirajlal's the Indian Penal Code. Lexis Nexis 35th Edition. 2017., Robert Reiner. The Oxford Handbook of Criminology. Oxford University Press. 2007.
2. Ratanlal and Dhirajlal. Ratanlal&Dhirajlal's the Law of Evidence. Lexis Nexis 26th Edition. 2017.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=EX56vNgMHeg
2. https://www.indiacode.nic.in/bitstream/123456789/15272/1/the_code_of_criminal_procedure%2C_1973.pdf
3. https://www.youtube.com/watch?v=0bntIWwAfJY

WEB RESOURCES:

1. https://lddashboard.legislative.gov.in/actsofparliamentfromtheyear/indian-penal-code
2. https://www.indiacode.nic.in/bitstream/123456789/15272/1/the_code_of_criminal_procedure%2C_1973.pdf
3. https://www.legalserviceindia.com/

PROGRAM CORE

Course Code	Course Title	L	T	P	S	C
22BS102073	TECHNOLOGICAL METHODS IN FORENSIC SCIENCE	3	-	3	-	4.5

Pre-Requisite -
Anti-Requisite -
Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on chromatographic techniques, spectroscopic techniques, electro and radio analytical techniques, microscopy forensic photography

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

CO1 Understanding and Application of Chromatographic Techniques.
CO2 Gain proficiency and understanding of various spectroscopic techniques
CO3 Get knowledge of Electro- and Radio analytical Techniques
CO4 Develop microscopy Skills for Forensic Analysis
CO5 Attain competence in Forensic Photography.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	3	1	1
CO2	3	2	-	-	-	-	-	-	-	3	1	1
CO3	3	2	-	-	-	-	-	-	-	3	1	1
CO4	3	2	-	-	-	-	-	-	-	3	1	1
CO5	3	2	-	-	-	-	-	-	-	3	1	1
Course Correlation Mapping	3	3	-	-	-	-	-	-	3	3	1	1

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: CHROMATOGRAPHIC TECHNIQUES (09 Periods)
Sample preparation for chromatographic and spectroscopic evidence, Chromatographic methods. Fundamental principles and forensic applications of thin-layer chromatography, gaschromatography and liquid chromatography.

Module 2: SPECTROSCOPIC TECHNIQUES (09 Periods)
SpectroscopiVARIOUS methods. Fundamental principles and forensic applications of Ultraviolet-visible spectroscopy, infrared spectroscopy, atomic absorption spectroscopy, atomic emissionspectroscopy and mass spectroscopy. Colorimetric analysis and Lambert-Beer law

Module 3: ELECTRO AND RADIO ANALYTICAL TECHNIQUES (09 Periods)

X-ray spectrometry. Electrophoresis – fundamental principles and forensic applications. Neutron activation analysis – fundamental principle and forensic applications.

Module 4: MICROSCOPY (10 Periods)

Fundamental principles. Different types of microscopes. Electron microscope. Comparison Microscope. Forensic applications of microscopy.

Module 5: FORENSIC PHOTOGRAPHY (08 Periods)

Basic principles and applications of photography in forensic science. 3D photography. Photographic evidence. Infrared and ultraviolet photography. Digital photography. Videography, Crime scene and laboratory photography.

Total Periods: 45

EXPERIENTIAL LEARNING: (Minimum 10 experiments shall be conducted)

List of Experiments

1. To carry out the separation of organic compounds by paper chromatography.
2. To carry out thin layer chromatography of ink samples
3. To determine the concentration of a coloured compound by colorimetric analysis
4. To identify drug samples using UV-Visible spectroscopy.
5. To experiment Beer-Lambert's law and learn Forensic applications.
6. Demonstrate the Use of the Compound Microscope
7. To prepare a sample for a compound microscope and understand the working.
8. To take photographs of crime scene exhibits at different angles.
9. To record videography of a crime scene.
10. To prepare a report on Recent cases of Drug abuse.
11. To Study Crime Scene Photography.
12. To Study recent advancements in TLCs procedures.

RESOURCES

TEXT BOOKS:

1. D.A. Skoog, DM West, F.J. Holler, Fundamentals of Analytical Chemistry, 8th Edition, Saunders College Publishing, Fort Worth, 2012.
2. W. Kemp, Organic Spectroscopy, 5thEdition, Macmillan, Hampshire, 2011.

REFERENCE BOOKS:

1. J. W. Robinson, Undergraduate Instrumental Analysis, 8th Edition, Marcel Dekker, Inc., New York 2015.
2. Thomas, K. P. Nicholas, Forensic science laboratory manual and workbook, 3rd Edition, CRC press, 2011.
3. D. R. Redsicker, The Practical Methodology of Forensic Photography, 5th Edition, CRC Press, Boca Raton (2010).

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=Qm7fKGrroQo

2. https://www.youtube.com/watch?v=_6WWV500q9E
3. https://www.youtube.com/watch?v=6ELOd_y01R4

WEB RESOURCES:

1. https://www.forensicscolleges.com/blog/resources/10-modern-forensic-science-technologies
2. https://www.excedr.com/resources/chromatography-techniques
3. https://egyankosh.ac.in/bitstream/123456789/43341/1/Unit-13.pdf
4. https://www.bhu.ac.in/Content/Syllabus/Syllabus_300620200523100800.pdf
5. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6080161/

PROGRAM CORE

Course Code	Course Title	L	T	P	S	C
22BS102074	DERMATOGLYPHICS	3	-	3	-	4.5

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on basics of fingerprinting, classification and documentation of fingerprints, development of fingerprints, preservation of fingerprints, other impressions

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

CO1 Understand The fundamental principles on which the science of finger printing is based.

CO2 Identify the importance method of classifying criminal record by fingerprints.

CO3 Analyze the physical and chemical techniques of developing fingerprints on crime sceneevidence

CO4 Get keen knowledge on various methods of preserving fingerprints.

CO5 Understand the importance of foot, palm, ear and lip prints

CO6 Work independently and in teams to solve problems with effective communications

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	3	1	1
CO2	3	-	-	-	-	-	-	-	-	3	1	1
CO3	3	2	-	-	-	-	-	-	-	3	1	1
CO4	3	-	-	-	-	-	-	-	-	3	1	1
CO5	3	2	-	-	-	-	-	-	-	3	1	1
CO6	2	1	-	-	-	-	-	-	3	3	1	1
Course Correlation Mapping	3	2	-	-	-	-	-	-	3	3	1	1

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: BASICS OF FINGERPRINTING (09 Periods)

Introduction and history, with special reference to India. Biological basis of fingerprints. Formation of ridges. Fundamental principles of fingerprinting. Types of fingerprints. Fingerprint patterns. Fingerprint characters/minutiae. Plain and rolled fingerprints.

Module 2: CLASSIFICATION AND DOCUMENTATION OF FINGERPRINTS (09 Periods)

Classification and cataloguing of fingerprint records. Automated Fingerprint Identification System. Significance of poroscopy and edgeoscopy.

Module 3: DEVELOPMENT OF FINGERPRINTS (09 Periods)

Latent prints. Constituents of sweat residue. Latent fingerprints' detection by physical and chemical techniques. Mechanism of detection of fingerprints by different developing reagents. Application of light sources in fingerprint detection.

Module 4 PRESERVATION OF FINGERPRINTS (10 Periods)

Preservation of developed fingerprints. Digital imaging for fingerprint enhancement. Finger printing the deceased. Developing fingerprints on gloves.

Module 5 OTHER IMPRESSIONS (08 Periods)

Importance of footprints, The 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.

Total Periods: 45

EXPERIENTIAL LEARNING: (Minimum 10 experiments shall be conducted)

List of Experiments

1. To record plain and rolled finger prints
2. To carry out a ten-digit classification of fingerprints
3. To identify different finger print 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 Identification and Matching of Fingerprints.
9. To use different light sources for enhancing developed fingerprints.
10. To prepare a cast of footprints.
11. To prepare a case report on Fingerprint cases.
12. To prepare a study on advancement on Fingerprinting.

RESOURCES

TEXT BOOKS:

1. J. E. Cowger, Friction Ridge Skin, CRC Press, Boca Raton, 2013.
2. D. A. Ashbaugh, Quantitative-Qualitative Friction Ridge Analysis, CRC Press, Boca Raton 2010.

REFERENCE BOOKS:

1. Lee and Gaensleen, Advances in Fingerprint Technology, 3rd Edition, R. S. Ramotowski (Ed.), CRC Press, Boca Raton, 2013.
2. C. Champod, C. Lennard, P. Margot and M. Stoilovic, Fingerprints and other Ridge Skin Impressions, CRC Press, Boca Raton, 2014.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=ePJu3fdNG4E
2. https://www.youtube.com/watch?v=gz_W0dyeft8
3. https://www.youtube.com/watch?v=0wMz-_EKTJE
4. https://www.youtube.com/watch?v=Od0yP81kqrg

WEB RESOURCES:

1. https://www.forensicsciencesimplified.org/prints/Fingerprints.pdf
2. https://www.cse.msu.edu/~cse802/Papers/802_FPClassification.pdf
3. https://www.ojp.gov/pdffiles1/nij/225327.pdf
4. https://prezi.com/7ewt9svflti5/preservation-of-developed-fingerprints/
5. https://studycorgi.com/fingerprint-analysis-collection-and-preservation/

PROGRAM CORE

Course Code	Course Title	L	T	P	S	C
22BS102075	FORENSIC BALLISTICS	3	-	2	-	4

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on Firearms, Ammunition, Characterization of gunshot residues Firearm evidence, External and terminal ballistics of firearms.

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

CO1 Understand The classification of firearms and their firing mechanisms.
CO2 Familiar with the methods of identifying firearms.
CO3 Analyze the characteristics of ammunition
CO4 Get keen knowledge on importance of firearm evidence.
CO5 Understand the importance of methods for characterization of gunshot residues and the nature of firearm injuries
CO6 Work independently and in teams to solve problems with effective communications

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	3	-	1
CO2	3	-	-	-	-	-	-	-	-	3	-	1
CO3	3	2	-	-	-	-	1	-	-	3	-	1
CO4	3	2	-	-	-	-	1	-	-	3	-	1
CO5	3	2	-	-	-	-	1	-	-	3	-	1
CO6	2	1	-	-	-	-	-	-	3	3	1	1
Course Correlation Mapping	3	2	-	-	-	-	1	-	3	3	-	1

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: FIREARMS (09 Periods)

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, barrel time, erosion, corrosion, and gas cutting.

Module 2: AMMUNITION (09 Periods)

Types of ammunition. Constructional features and characteristics of different types of cartridges and bullets. Primers and priming compounds. Projectiles. Headstamp markings on ammunition. Different types of marks are produced during the firing process on cartridges – firing pin marks, breech face marks, chamber marks, extractor, and ejector marks.

Module 3: CHARACTERIZATION OF GUNSHOT RESIDUES (09 Periods)

Methods of analysis of gunshot residues from shooting hands and targets, with special reference to clothing items. Identification and nature of firearms injuries. Reconstruction concerning accident, suicide, murder, and self-defence.

Module 4: FIREARM EVIDENCE (08 Periods)

Matching of bullets and cartridge cases in regular firearms. Identification of bullets, pellets, and wads fired - from the improvised & country-made firearms. The automated method of bullet and cartridge case comparison. Determination of range of fire and time of the fire. Mechanisms of formation of gunshot residues

Module 5: EXTERNAL AND TERMINAL BALLISTICS OF FIREARMS (10 Periods)

External Ballistics – Vacuum trajectory, the effect of air resistance on the trajectory, base drag, drop, drift, yaw, the shape of projectile and stability, trajectory computation, ballistics coefficient and limiting velocity, Measurements of trajectory parameters, introduction to an automated system of trajectory computation and automated management of ballistic data. **Terminal Ballistics-**Effect of a projectile on hitting the target, function of bullet shape, striking velocity, striking angle and nature of the target, tumbling of bullets, the effect of instability of bullet, the effect of intermediate targets, the influence of range. Ricochet and its effects, stopping power.

Total Periods: 45

EXPERIENTIAL LEARNING:

List of Experiments (Minimum 10 experiments shall be conducted)

1. To describe, with the aid of diagrams, the firing mechanisms of different types of firearms
2. To correlate the velocity of a 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 the distance from which the bullet was fired..
9. To differentiate, with the aid of a diagram, contact wounds, close-range wounds, and distant wounds.
10. To prepare a report on Wound Ballistics
11 To study the importance of Photography in Forensic Ballistics
12. To study advanced research in ballistics and identification of Gunshot Residues.
13. To prepare a report on Gunshot cases in ballistics.

RESOURCES

TEXT BOOKS:

1. A. J. Schwoeble and D. L. Exline, Current Methods in Forensic Gunshot Residue Analysis, CRC Press, Boca Raton, 2010.
2. W.F. Rowe, Firearms identification, Forensic Science Handbook, Vol. 4, R. Saferstein (Ed.), Prentice Hall, New Jersey, 2013.

REFERENCE BOOKS:

1. B. J. Heard, Handbook of Firearms and Ballistics, 2nd edition, Wiley and Sons, Chichester, 2008.
2. Dodd, M., & Byrne, K. Terminal ballistics 3rd edition, Boca Raton: CRCPress/Taylor & Francis. 2010.
3. Carlucci, D., & Jacobson, S. Ballistics Theory and Design of Guns and Ammunition, 3rd edition, CRC Press, 2018.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=ZQma-rcYkBY
2. https://www.youtube.com/watch?v=mYxTrcBV73s
3. https://www.youtube.com/watch?v=1bNMcPp3uYk

WEB RESOURCES:

1. https://sifs.in/blog-details/forensic-ballistics/91
2. https://tpwd.texas.gov/education/hunter-education/online-course/firearms-and-ammunition-1
3. https://www.britannica.com/science/ballistics

PROGRAM CORE

Course Code	Course Title	L	T	P	S	C
22BS102076	**FORENSIC TOXICOLOGY**	**3**	**-**	**2**	**-**	**4**

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on Basics of Toxicology, Poisons, Identification of Toxins, Narcotics, Drugs and Psychotropic Substances, Analysis of Narcotics

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

CO1 Understand the significance of toxicological studies in forensic science.
CO2 Familiar with the classification of poisons and their modes of actions
CO3 Analyze the absorption of poisons in body fluids and the forensic identification of illicit liquors
CO4 Classify and characteristics of the narcotics, drugs and psychotropicsubstances.
CO5 identify and purifying narcotics, drugs and psychotropicsubstances.
CO6 Work independently and in teams to solve problems with effective communications

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	3	-	1
CO2	3	-	-	-	-	-	-	-	-	3	-	1
CO3	3	2	-	-	-	-	-	-	-	3	-	1
CO4	3	-	-	-	-	-	-	-	-	3	-	1
CO5	3	2	-	-	-	-	-	-	-	3	-	1
CO6	2	1	-	-	-	-	-	-	3	3	1	1
Course Correlation Mapping	**3**	**2**	-	-	-	-	-	-	**3**	**3**	**1**	**1**

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: BASICS OF TOXICOLOGY (09 Periods)

Significance of toxicological findings. Techniques used in toxicology. Toxicological analysisand chemical intoxication tests. Post-mortem Toxicology. Human performance toxicology. Dose-response relationship. Lethal dose 50 and effective dose 50

Module 2: POISONS (08 Periods)

Classification of poisons. Physio-chemical characteristics and mode of action of poisons. Accidental, suicidal, and homicidal poisonings. Signs and symptoms of common poisoning and their antidotes. Collection and preservation of viscera, blood, and urine for various poison cases. Identification of biocides and metal salts in body fluids. Metabolism and excretion of poisons.

Module 3: IDENTIFICATION OF TOXINS (08 Periods)

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 ethyl alcohol. Estimation of ethyl alcohol in blood and urine. Proof spirit. Crime scene management in illicit liquor cases

Module 4 NARCOTICS, DRUGS AND PSYCHOTROPIC SUBSTANCES (10 Periods)

Natural, synthetic, and semisynthetic narcotics, drugs, and psychotropic substances. Designer drugs. Tolerance, addiction, and withdrawal symptoms of narcotics, drugs, and psychotropic 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

Module 5 ANALYSIS OF NARCOTICS (10 Periods)

Testing 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 post-mortem blood. Post-mortem changes affecting the analysis ofnarcotics, drugs, and psychotropic substances

Total Periods: 45

EXPERIENTIAL LEARNING:

List of Experiments (Minimum 10 experiments shall be conducted)

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 a quantitative estimation of ethyl alcohol
7. To prepare iodoform
8. To identify drugs of abuse by spot tests
9. To perform colour tests for barbiturates
10. To different drugs of abuse by thin-layer chromatography
11. To prepare a toxicological report on poison cases.
12. To study new methods on identification on drugs of abuse.
13. To prepare a report on a case study on Plant Poisons.

RESOURCES

TEXT BOOKS:

1. F. G. Hofmann, A Handbook on Drug and Alcohol Abuse, 4th Edition, Oxford University Press, New York, 2010.
2. S. B. Karch, The Pathology of Drug Abuse, CRC Press, Boca Raton, 2013.

REFERENCE BOOKS:

1. A. Poklis, Forensic toxicology in, Introduction to Forensic Sciences, 5th Edition, W.G. Eckert (Ed.), CRC Press, Boca Raton, 2015.
2. W.J. Tilstone, M.L. Hastrup, C. Hald, Fisher's, Techniques of Crime SceneInvestigation, CRC Press, Boca Raton, 2013.

VIDEO LECTURES:

1. https://study.com/academy/lesson/forensic-toxicology-definition-purpose.html
2. https://www.youtube.com/watch?v=qEkB9s9qqAM
3. https://www.youtube.com/watch?v=rjZ2MWIPdx0

WEB RESOURCES:

1. https://explorehealthcareers.org/career/forensic-science/forensic-toxicologist/
2. https://www.mdpi.com/journal/toxins/special_issues/detect-identi-toxins
3. https://www.sciensano.be/sites/default/files/1541-4337.12571.pdf
4. https://www.dor.gov.in/sites/default/files/Narcotic-Drugs-and-Psychotropic-Substances-Act-1985.pdf

PROGRAM CORE

Course Code	Course Title	L	T	P	S	C
22BS102077	**FORENSIC CHEMISTRY**	**3**	**-**	**2**	**-**	**4**

Pre-Requisite -
Anti-Requisite -
Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on Petroleum and Petroleum Products, Post-fire Analysis of Materials, Explosives, Explosion Process and Detection.

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

CO1 Familiar with the method of detecting food adulteration
CO2 Analyze trace amounts of petroleum products incrime sceneevidence.
CO3 process of post-fire analysis of materials
CO4 Classify the explosives, including the synthesis and characterization of representative analogs
CO5 Understand the techniques of locating hidden explosives and the significance of bomb scenemanagement
CO6 Work independently and in teams to solve problems with effective communications

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	1	-	-	-	3	1	1
CO2	3	-	-	-	-	-	-	-	-	3	1	1
CO3	3	-	-	-	-	1	-	-	-	3	1	1
CO4	3	-	-	-	-	-	-	-	-	3	1	1
CO5	3	-	-	-	-	-	-	-	-	3	1	1
CO6	2	1	-	-	-	-	-	-	3	3	1	1
Course Correlation Mapping	**3**	**1**	-	-	-	**1**	-	-	**3**	**3**	**1**	**1**

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: FOOD ADULTERATION (09 Periods)

Contamination of wheat, rice, dhal, milk, butter, etc. With clay, sand, stone, water and toxic chemicals (e.g. Kasseri dhal with mentanil yellow). Food poisons: natural poisons (alkaloids, nephrotoxins), pesticides (DDT, BHC, Follidol), Chemical poisons (KCN). First aid and Antidotes for poisoned persons. Heavy metal (Hg, Pb, Cd) Contamination of Sea food. Use of neutron activation analysis in detecting poisoning (e.g., As in human hair)

Module 2: PETROLEUM AND PETROLEUM PRODUCTS (09 Periods)

Distillation and fractionation of petroleum. Commercial uses of different petroleum fractions. Analysis of petroleum products. Analysis of traces of petroleum products in forensic exhibits. Comparison of petroleum products. Adulteration of petroleum products.

Module 3: POST-FIRE ANALYSIS OF MATERIALS (09 Periods)

Analysis of fire debris. Analysis of ignitable liquid residue. Post-flash over burning. Scientific investigation and evaluation of clue materials. Information from smoke staining

Module 4: EXPLOSIVES (09 Periods)

Classification of explosives – low explosives and high explosives. Homemade explosives. Military explosives. Blasting agents. Synthesis and characteristics of TNT, PETN and RDX

Module 5: EXPLOSION PROCESS AND DETECTION (09 Periods)

Explosion process. Blast-waves. Bomb scene management. Searching the scene of an explosion. Mechanism of explosion. Post-blast residue collection and analysis. Blast injuries. Detection of hidden explosives.

Total Periods: 45

EXPERIENTIAL LEARNING:

List of Experiments (Minimum 10 experiments shall be conducted)

1. To carry out analysis of gasoline
2. To carry out an analysis of diesel
3. To carry out an analysis of kerosene oil
4. To analyze arson accelerators.
5. To prepare a case report on a case involving arson.
6. To carry out analysis of explosive substances
7. To separate explosive substances using thin-layer chromatography
8. To prepare a case report on bomb scene management
9. To prepare a case report on Terrorism attacks using IEDs
10. To carry out a study on IED Devices
11 To prepare a case report on Fire Accident incidents.
12. To carry out a study on Bomb disposal devices.

RESOURCES

TEXT BOOKS:

1. W. J. Tilstone, M. L. Hastrup, and C. Hald, Fisher's, Techniques of Crime Scene Investigation, CRC Press, Boca Raton, 2013.
2. J D DeHaan, Kirk's Fire Investigation, 5 Edition, Prentice Hall, New Jersey, 2015.

REFERENCE BOOKS:

1. A. A. Moenssens, J. Starrs,$_{th}$C. E. Henderson and F. E. Inbau, Scientific Evidence in Civil and Criminal Cases, 8th Edition, The Foundation Press, Inc., New York (2013).
2. R. Saferstein, Criminalistics,12 Edition, Prentice Hall, New Jersey (2017).
3. S. Ballou, M. Houck ,J. A. Siegel, C. A. Crouse, J. J. Lentini and S.Palenikin, Forensic Science, D. H. Ubelaker (Ed.), Wiley-Blackwell, Chichester (2013).

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=iNW37r_snHY
2. https://www.youtube.com/watch?v=OZ4fDMlNfhY
3. https://www.youtube.com/watch?v=06BcxrO0An4

WEB RESOURCES:

1. https://www.vedantu.com/chemistry/forensic-chemistry
2. https://www.britannica.com/topic/list-of-petroleum-products-2069393
3. https://cfslhyd.gov.in/Explosives%20Division.html
4. http://dfs.nic.in/pdfs/EXPLOsive.pdf

PROGRAM CORE

Course Code	Course Title	L	T	P	S	C
22BS102078	**FORENSIC BIOLOGY**	**3**	**-**	**3**	**-**	**4.5**

Pre-Requisite -
Anti-Requisite -
Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on Biological Evidence, Hair as Evidence, Forensic Entomology, Wildlife Forensics, Microorganisms and Botanical Evidences in Forensics.

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

CO1 Understand the role and significance of biological evidence in forensics.
CO2 Know how wildlife forensics aid in conserving natural resources
CO3 Importance of forensic entomology assists in death investigations.
CO4 Work independently and in teams to solve problems with effective communications

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	-	-	-	1	-	-	-	3	1	1
CO2	3	1	-	-	-	-	-	-	-	3	1	1
CO3	3	1	-	-	-	1	-	-	-	3	1	1
CO4	3	2	-	-	-	-	-	-	**3**	3	1	1
Course Correlation Mapping	**3**	**2**	-	-	-	**1**	-	-	**3**	**3**	**1**	**1**

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: BIOLOGICAL EVIDENCE (09 Periods)

Nature and importance of biological evidence. Types of biological evidences. Collection of biological evidences. Preservation of biological evidence. Significance of hair evidence. Transfer, persistence, and recovery of hair evidence

Module 2: HAIR AS EVIDENCE (09 Periods)

Structure of human hair. Comparison of hair samples. Morphology and biochemistry of human hair. Comparison of human and animal hair. A sampling of hair evidence. Applications of hair as evidence

Module 3: MICROORGANISMS AND BOTANICAL EVIDENCES IN FORENSICS (09 Periods)

Types and identification of microbial organisms of forensic significance. Identification ofwood, leaves, pollens, and juices as botanical evidence. Diatoms and their forensic significance.

Module 4: WILDLIFE FORENSICS (09 Periods)

Fundamentals of wildlife forensics. Significance of wildlife forensics. Protected and endangered species of animals and plants. Illegal trading in wildlife items includes skin, fur, bone, horn, teeth, flowers, and plants. Identification of physical evidence of wildlife forensics.Identification of pug marks of various animals

Module 5: FORENSIC ENTOMOLOGY (09 Periods)

Basics of forensic entomology, Insects of forensic importance, Collection of entomological evidence during death investigations, Preservation and Analysis of entomological evidence, Metamorphosis of entomological insects and time interval, Estimation of time of death with entomological evidence

Total Periods: 45

EXPERIENTIAL LEARNING:

List of Experiments (Minimum 10 experiments shall be conducted)

1. To prepare slides of scale pattern of human hair.
2. To examine human hair for cortex and medulla.
3. To identify various microorganisms under a microscope.
4. To carry out the microscopic examination of pollen grains.
5. To carry out the microscopic examination of diatoms.
6. To cite a criminal case in which diatoms have served as forensic evidence
7. To prepare a case report on problems of wildlife forensics.
8. Collection methods for entomological evidence
9. To identification of footprints of animals.
10. To prepare a case report on forensic entomology.
11 To examine hair morphology and determine the species to which the hair belongs
12. To prepare a report on hair fibre evidence.

RESOURCES

TEXT BOOKS:

1. L. Stryer, Biochemistry, 6th Edition, W.H. Freeman and Company, New York, 2010.
2. R.K. Murray, D.K. Granner, P.A. Mayes and V.W. Rodwell, Harper's Biochemistry, APPLETON & Lange, Norwalk, 2013.

REFERENCE BOOKS:

1. S. Chowdhuri, Forensic Biology, BPRD, New Delhi, 2011.
2. G.T. Duncan and M.I. Tracey, Serology and DNA typing in, Introduction to Forensic Sciences, 5th Edition, W.G. Eckert (Ed.), CRC Press, Boca Raton, 2013.
3. R. Saferstein, Forensic Science Handbook, Vol. IV, Prentice Hall, New Jersey (2013).

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=to96vIX5Dug
2. https://www.youtube.com/watch?v=49gSR3GSZxk
3. https://www.youtube.com/watch?v=b7A44N9Uwww
4. https://www.youtube.com/watch?v=H-y5MxKnTiQ

WEB RESOURCES:

1. https://forensic.unl.edu/forensic-biology
2. https://ncfs.ucf.edu/research/biological-evidence/
3. https://cites.org/eng/prog/imp/Wildlife_forensics

PROGRAM CORE

Course Code	Course Title	L	T	P	S	C
22BS102079	QUESTIONED DOCUMENT	3	-	3	-	4.5

Pre-Requisite -
Anti-Requisite -
Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on Nature and Scope of Questioned Documents, Tools for Examining Questioned Documents, Comparison of Documents, Comparative Procedure of Handwriting, Forgeries.

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

CO1 Understand the importance of examining questioned documents in crime cases.
CO2 Familiar with the tools required for examination of questioned documents.
CO3 Understand comparison process of documents in forensic science
CO4 Understand the importance of detecting frauds and forgeries by analyzing questioned documents
CO5 Work independently and in teams to solve problems with effective communications

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	1	-	-	-	3	1	1
CO2	3	-	-	-	-	-	-	-	-	3	1	1
CO3	3	-	-	-	-	1	-	-	-	3	1	1
CO4	3	-	-	-	-	-	-	-	-	3	1	1
CO5	2	1	-	-	-	-	-	-	3	3	1	1
Course Correlation Mapping	3	1	-	-	-	1	-	-	3	3	1	1

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: INTRODUCTION TO QUESTIONED DOCUMENT (09 Periods)

Terminology of documents- History of forensic document examination. Classification of documents-procurement of standard admitted/specimen writings-handling and marking of documents-preliminary examination of documents – Types of crimes related to documents – criminal investigation

Module 2: HANDWRITING ANALYSIS (09 Periods)

Definition of Graphology- Basics of Handwriting Identification - Individuality of handwriting - General characteristics of handwriting- Analysis of hand writing- Tools for Forensic document examination- Simulation and Comparison of Handwriting- Collection of proper standards

Module 3: DISGUISED WRITING AND ANONYMOUS LETTERS **(09 Periods)**

Identification of writer-Examination of signatures. Characteristics of forged and genuine signatures. Examination of alterations, erasures, over writings, additions and obliterations. Decipherment of secret writings indented and charred documents. Examination of seal impressions and mechanical impressions.

Module 4: FORGERIES AND THEIR DETECTION. **(09 Periods)**

Definition of Forgery, Types of forgeries. Examination of built up documents. Determination of sequence of strokes, physical matching of documents. Examination of black and white, colour Xerox copies, carbon copies and fax messages- Identification of type writer writings- identification of type writer, identification of printed matter, various types of printing of security documents, printing of currency notes. Examination of counterfeit currency notes, passports, visa, stamp papers, postal stamps etc.

Module 5: DETERMINATION OF AGE OF DOCUMENTS **(09 Periods)**

Examination of signatures, paper, ink writing/signatures etc. Examination of computer printouts- dot matrix, ink jet and laser printers, electronic type writers, credit cards, E-documents, digital signatures. Opinion writing, Reasons for opinion and court testimony. Instrumentation and Principles of Video Spectral Comparator, Stereoscopic microscopes, TLC, HPLC, Spectrofluorometric and X-Ray fluorine

Total Periods: 45

EXPERIENTIAL LEARNING:

List of Experiments (Minimum 10 experiments shall be conducted)

1. To identify handwriting characters.
2. To study natural variations in handwriting.
3. To compare handwriting samples.
4. To detect simulated forgery..
5. To detect traced forgery.
6. To study the line quality defects in handwriting samples
7. To examine the security features of currency notes, passports, and plastic money.
8. To study alterations, obliterations, and erasures in handwriting samples
9. To compare and analyse the printed document
10. To compare and analyse the xeroxed document
11 To prepare a case report on forged documents
12. To study new methods on the fake currency

RESOURCES

TEXT BOOKS:

1. O. Hilton, Scientific Examination of Questioned Documents, CRC Press, BocaRaton, 2010.
2. A.A. Moenssens, J. Starrs, C.E. Henderson, and F.E. Inbau, Scientific Evidence in Civil and Criminal Cases, 6th Edition, Foundation Press, New York, 2015.

REFERENCE BOOKS:

1. E. David, The Scientific Examination of Documents – Methods and Techniques, 4th Edition, Taylor & Francis, Hants, 2011.

2. R.N. Morris, Forensic Handwriting Identification: Fundamental Concepts andPrinciples, Academic Press, London, 2010.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=1ejMGqBIIqg
2. https://www.youtube.com/watch?v=Ng5Bdw2RV4E
3. https://www.youtube.com/watch?v=Z9CgAdtdKV0

WEB RESOURCES:

1. https://ifflab.org/types-of-questioned-documents-forensic-document-examination/
2. https://www.forensicsciencesimplified.org/docs/glossary.html
3. https://www.investopedia.com/terms/q/questioned-document-investigation.asp
4. https://core.ac.uk/download/pdf/232564181.pdf

PROGRAM CORE

Course Code	Course Title	L	T	P	S	C
22BS102080	**FORENSIC SEROLOGY**	**3**	**-**	**2**	**-**	**4**

Pre-Requisite - 22BS102078 Forensic Biology
Anti-Requisite -
Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on Forensic Importance of Body fluids, Various Aspects of Semen Analysis, Analysis of Other Bodily Fluids, Genetic Marker Analysis, Bloodstain Pattern Analysis.

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

CO1 Understand the forensic importance of biological fluids
CO2 Familiar with the analysis of various aspects of semen.
CO3 Understand significance of bodily fluids other than blood and semen
CO4 study the usefulness of genetic markers in forensic investigations
CO5 Know the forensic importance of bloodstain patterns
CO6 Work independently and in teams to solve problems with effective communications

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	1	-	-	-	3	-	1
CO2	3	-	-	-	-	-	-	-	-	3	-	1
CO3	3	-	-	-	-	1	-	-	-	3	-	1
CO4	3	-	-	-	-	-	-	-	-	3	-	1
CO5	2	1	-	-	-	-	-	-	3	3	-	1
CO6	2	1	-	-	-	-	2	-	3	3	-	1
Course Correlation Mapping	3	1	-	-	-	1	2	-	3	3	-	1

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: FORENSIC IMPORTANCE OF BODY FLUIDS (09 Periods)

Common body fluids. Composition and functions of blood. Collection and preservation of blood evidence. The distinction between human and non-human blood. Forensic characterization of bloodstains. Typing of dried stains. Blood enzymes and proteins.

Module 2: VARIOUS ASPECTS OF SEMEN ANALYSIS (09 Periods)

Semen. Forensic significance of semen. Composition, functions, and morphology of spermatozoa. Collection, evaluation, and tests for identification of semen. Individualization based on semen examination.

Module 3: ANALYSIS OF OTHER BODILY FLUIDS (09 Periods)

Composition, functions, and forensic significance of saliva, sweat, milk, and urine. Tests for their identifications

Module 4: GENETIC MARKER ANALYSIS (09 Periods)

Cellular antigens. Determination of blood groups. Antigens and antibodies. ABO blood groups. Extracellular proteins and intracellular enzymes. Significance of genetic marker typing data. Sexual assault investigations.

Module 5: BLOODSTAIN PATTERN ANALYSIS (09 Periods)

Bloodstain characteristics. Impact bloodstain patterns. Cast-off bloodstain patterns. Projected bloodstain patterns. Contact bloodstain patterns. Blood trails. Bloodstain drying times. Documentation of bloodstain pattern evidence. Crime scene reconstruction with the aid of bloodstain pattern analysis

Total Periods: 45

EXPERIENTIAL LEARNING:

List of Experiments (Minimum 10 experiments shall be conducted)

1. To determine blood group from fresh blood samples
2. To determine the blood group from a dried blood sample
3. To carry out the crystal test on a blood sample.
4. To identify blood samples by chemical tests
5. To identify the given stain as saliva
6. To identify the given stain as urine
7. To identify the blood group with saliva
8. To carry out cross-over electrophoresis
9. To study the correlation between impact angle and shape of the bloodstain
10. To identify the point of convergence from the bloodstain patterns.
11 To prepare a report on the Serology case
12 To study advancement on serology evidences

RESOURCES

TEXT BOOKS:

1. W.G. Eckert and S.H. James, Interpretation of Bloodstain Evidence at Crime Scenes, CRC Press, Boca Raton, 2010.
2. G.T. Duncan and M.I. Tracey in Introduction to Forensic Sciences, 5th Edition, W.G. Eckert (Ed.), CRC Press, Boca Raton, 2015.

REFERENCE BOOKS:

1. T. Bevel and R.M. Gardner, Bloodstain Pattern Analysis, 3rd Edition, CRC Press, Boca Raton, 2008.
2. R. Saferstein, Criminalistics, 12th Edition, Prentice Hall, New Jersey 2017.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=MZTDjix4_Zw
2. https://www.youtube.com/watch?v=QIo9yK6ktYA

3. https://www.youtube.com/watch?v=Sz650ulDL3E
4. https://www.youtube.com/watch?v=SELUheGAZe4
5. https://www.youtube.com/watch?v=LHU2243yFnI

WEB RESOURCES:

1. https://www.bhu.ac.in/Content/Syllabus/Syllabus_300620200419103243.pdf
2. https://www.forensic-access.co.uk/forensic-services/biology/body-fluid-analysis/
3. https://www.forensicsciencesimplified.org/blood/
4. https://www.sciencedirect.com/topics/immunology-and-microbiology/genetic-marker

PROGRAM CORE

Course Code	Course Title	L	T	P	S	C
22BS102081	**DNA FORENSICS**	**3**	**-**	**2**	**-**	**4**

Pre-Requisite - 22BS102078 Forensic Biology
Anti-Requisite -
Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on Basic Principles Forensic DNA Typing, Short Tandem Repeat in DNA Technique, Parentage Testing, DNA evidence in Report Writing

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

CO1 Understand the basic principle of DNA analysis
CO2 Familiar with the forensic significance of DNA typing.
CO3 Understand significance of short tandem repeats and restriction fragment length polymorphism in DNA technique
CO4 Develop knowledge on Principles of parentage testing
CO5 Apply DNA evidence in report writing
CO6 Work independently and in teams to solve problems with effective communications

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	1	-	-	-	3	-	1
CO2	3	-	-	-	-	-	-	-	-	3	-	1
CO3	3	-	-	-	-	1	-	-	-	3	-	1
CO4	3	-	-	-	-	-	-	-	-	3	-	1
CO5	2	1	-	-	-	-	-	-	3	3	-	1
CO6	2	1	-	-	-	-	2	-	3	3	-	1
Course Correlation Mapping	3	1	-	-	-	1	2	-	3	3	-	1

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: BASIC PRINCIPLES **(09 Periods)**

DNA as a biological blueprint of life. Extraction of DNA for analysis. Quantitation of DNA –yield gel quantitation and slot blot quantitation. Mitochondrial DNA – sequence analysis

Module 2: FORENSIC DNA TYPING **(09 Periods)**

Collection of specimens. Polymerase chain reaction – historical perspective, sequence polymorphisms, individualization of evidence. Identification of Marijuana by DNA analysis:

DNA, Genomic DNA, Primers, Polymerase chain reaction, and analysis of products in agarose gels

Module 3: SHORT TANDEM REPEAT IN DNA TECHNIQUE (09 Periods)

Short tandem repeats (STR) – the role of fluorescent dyes, nature of STR loci. Restriction fragment length polymorphism (RFLP) – genetic markers used in RFLP, typing procedure, and interpretation of results. Touch DNA

Module 4: PARENTAGE TESTING (09 Periods)

Principles of heredity, Genetics of paternity, DNA testing in disputed paternity, Mendelian laws of parentage testing, The mathematical basis of parentage identification, Missing body cases, Reference populations and databases, Bayes Theorem in analysis and its applications in DNA forensics

Module 5: DNA EVIDENCE IN REPORT WRITING (09 Periods)

Role of DNA typing in identifying unrecognizable bodies, Allele frequency determination, Hardy-Weinberg law, Probability determination in a population database.

Total Periods: 45

EXPERIENTIAL LEARNING:

List of Experiments (Minimum 10 experiments shall be conducted)

1. To carry out the separation of amino acids by thin-layer chromatography
2. To carry out extraction of DNA from body fluids
3. To preparation of gel plates for electrophoresis
4. To carry out electrophoresis for the separation of enzymes
5. To prepare a report on the role of DNA typing in solving paternity disputes
6. Isolation of plant DNA by CTAB method
7. Designing of primers to amplify DNA from plant genomic DNA
8. Agarose gel electrophoresis
9. Setting a PCR reaction and amplification of DNA
10. Southern Hybridization of Plant DNA with a probe
11. To compare evidences using Bayes theorem
12. To prepare a report on Sexual assault kit DNA samples

RESOURCES

TEXT BOOKS:

1. K. Inman and N. Rudin, An Introduction to Forensic DNA Analysis, CRC Press, Boca Raton (2010).
2. H. Coleman and E. Swenson, DNA in the Courtroom: A Trial Watcher's Guide, GeneLex Corporation, Washington (2012).

REFERENCE BOOKS:

1. J.M. Butler, Forensic DNA Typing, Elsevier, Burlington, 2015.
2. W.J. Tilstone, M.L. Hastrup, C. Hald, Fisher's, Techniques of Crime Scene Investigation, CRC Press, Boca Raton, 2013.
3. G.T. Duncan, M.I. Tracey, Serology and DNA typing in, Introduction to Forensic Sciences, 5th Edition, W.G. Eckert (Ed.), CRC Press, Boca Raton,

2010.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=98sJQtlltmY
2. https://www.youtube.com/watch?v=nPVkooi8m9I
3. https://www.youtube.com/watch?v=scA7qUhUq7o
4. https://www.youtube.com/watch?v=rODCvPk3tiE

WEB RESOURCES:

1. https://www.dnaforensics.in/
2. https://www.sciencedirect.com/topics/medicine-and-dentistry/forensic-dna-typing
3. https://www.testing.com/tests/paternity-test/
4. https://www.voanews.com/MediaAssets2/projects/ferguson-documents/3_reports/2014-08-14_-_12_pgs___dna-analysis-report.pdf

PROGRAM CORE

Course Code	Course Title	L	T	P	S	C
22BS103070	**FUNDAMENTALS OF CRIME, CRIMINOLOGY AND POLICE**	**3**	**-**	**-**	**4**	**4**

Pre-Requisite -
Anti-Requisite -
Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on Introduction to criminology, Explanations of crime, Typology of crime and criminal behavior, history of police and central police organization, Police investigation.

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

CO1 Demonstrate knowledge on crime and its nature

CO2 Illustrate on different theories of crime

CO3 Demonstrate the concepts of various crimes and offences

CO4 Demonstrate the historical development of Police and its administrative organization

CO5 Demonstrate the concepts of FIR, Investigation and filing.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	1	2	-	1
CO2	3	-	-	-	-	-	-	-	1	2	-	1
CO3	3	-	-	-	-	-	-	-	1	3	-	1
CO4	3	-	-	-	-	-	-	-	1	3	-	1
CO5	3	2	-	-	-	-	2	-	1	3	-	1
Course Correlation Mapping	3	2	-	-	-	-	2	-	1	3	-	1

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: INTRODUCTION TO CRIMINOLOGY (09 Periods)

Crime – definitions – historical perspectives – nature, origin and scope – Deviance, social context of deviance, delinquency – Criminology and its relations with other social sciences – Criminology's interdisciplinary nature. Criminal profiling. Understanding modus operandi

Module 2: EXPLANATIONS OF CRIME (09 Periods)

Pre-classical school – Classical school – Biological positivism – Cartographic school – Neo-classical school – Positive school-Italian School. Sociological Theories

Module 3 TYPOLOGY OF CRIME AND CRIMINAL BEHAVIOUR (09 Periods)

Crime against person – Crime against property – Conventional crime – White collar crime – Organized crime – Cybercrime – Environmental crime – Habitual offenders – Professional criminals – Violent and aggressive offenders, Violence against women, sexual offenders – Recidivists, Hate Crime, Workplace Violence.

Module 4 HISTORY OF POLICE AND CENTRAL POLICE ORGANIZATION (09 Periods)

Historical development of police - Ancient, Medieval and Modern Indian Police. General organization of the State Police - Administrative hierarchy and the Ranges.

C I D- Organization and functions of various branches, Economic Crime Wing – Cyber division, Intelligence Wing, Training wing, Technical Services - SCRB, FSL, FPB.

Organizational set up and functions of

- Line Units: Assam Rifles; CRPF; RPF; ITBP; CISF; BSF; NSG&SPG.
- Staff Units: BPR&D – NCRB, SVNPA, LNJNICFS, CDTS,
- Directorate of Forensic Sciences: CFSL, CFPB, GEQD, DNA fingerprint unit.
- Mixed Units:CBI, IB& R and A Wing.

Module 5 POLICE INVESTIGATION (09 Periods)

Definition and scope. Investigation - FIR, case diary. Cognizable &Non-cognizable offences, investigation in cognizable offences. Police's power of investigation. Who is an Investigator? Investigator and his qualities, General guidelines for investigator. Interview of witness. Interrogation of suspect. Filing of criminal charges. Policing styles and principles. Community policing.

Total Periods: 45

EXPERIENTIAL LEARNING

LIST OF EXPERIMENTS:

1. Preparation of a document on Criminology and its relations with other social sciences
2. Prepare a PPT on typology of crime and criminal behaviour
3. Submit a document on police investigation

RESOURCES

TEXT BOOKS:

1. N. V. Paranjape. Criminology & Penology. Central Law Publication. 2018..
2. Frank E Hagan. Introduction to Criminology-Theories, Methods & Criminal Behaviours. Sage Publication 2016.

REFERENCE BOOKS:

1. Mike Maguire, Rod Morgan, Robert Reiner. The Oxford Handbook of Criminology. Oxford University Press. 2007
2. Siegel Larry. Criminology: Theories, Patterns and Typologies. Cengage Learning, 2016

VIDEO LECTURES:

1 https://www.youtube.com/watch?v=kHZsPthQdH0

2 https://www.youtube.com/watch?v=NNtVbIkE6Pw

3 https://www.youtube.com/watch?v=Sgs6idCKTkE

WEB RESOURCES:

1 https://bnblegal.com/article/white-collar-crimes-in-india-a-legal-perspective/
2 https://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/
3 https://www.legalserviceindia.com/Criminallaws/fir.htm
4 https://online.maryville.edu/online-bachelors-degrees/criminal-justice/resources/what-is-criminology/

PROGRAM CORE

Course Code	Course Title	L	T	P	S	C
22BS101011	GENERAL CHEMISTRY	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on basis of organic chemistry alkanes, cycloalkanes, alkenes and alkynes. Benzene and its reactivity. Surface chemistry and selectrochemistry of organic compounds.

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

CO1 Understand and explain differential behaviour organic compound based on the fundamental concepts learnt.

CO2 Formulate and identify the mechanism of organic reactions by recalling and correlating the fundamental properties of the reactants learnt.

CO3 Describe the concept of aromaticity, molecular structure of benzene based on modern concepts. Ring activating and deactivating groups.

CO4 Explain about colloids, emulsions and their properties. Adsorption isotherms. Formation of molecular orbital, shapes of the molecules and predict the magnetic behaviour of the molecule.

CO5 Correlate and explain stereo chemical properties of organic compounds and configurations.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	1	3
CO2	3	-	-	-	-	-	-	-	-	-	1	3
CO3	3	-	-	-	-	-	-	-	-	-	1	3
CO4	3	1	-	1	-	-	-	-	1	-	1	3
CO5	3	-	-	-	-	-	-	-	-	-	1	3
Course Correlation Mapping	3	1	-	1	-	-	-	-	1	-	1	3

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: THEORIES OF BONDING IN METALS **(08 Periods)**

Valence bond theory, Explanation of metallic properties and its limitations, Free electrontheory, thermal and electrical conductivity of metals, limitations, Band theory, formationof bands, explanation of conductors, semiconductors: n-type and p-type, extrinsic &intrinsic semiconductors, and insulators.

Module 2: MATERIAL SCIENCE **(08 Periods)**

Classification of materials- metals, ceramics, organic polymers, composites

Ceramics-Types and applications

Conducting polymers: Definition, types of conducting polymers: Intrinsic and extrinsic conducting polymers with examples, engineering applications of conducting polymers

Composites – Introduction, types of composites: fiber reinforced particulate and layered composites with examples, advantages of composites and applications

Module 3: CHROMATOGRAPHY **(10 Periods)**

Definition, principles of chromatography, Nature of adsorbents, solvent systems, Rf values, factors effecting Rf values.

Classification of chromatography methods: paper chromatography- choice of paper and solvent systems, developments of chromatogram - ascending, descending and radial, applications; Thin layer Chromatography- Preparation of plates. Development of the chromatogram, Detection of the spots, Applications.

Module 4: CHEMICALBONDING AND MOLECULAR STRUCTURE **(10 Periods)**

Valence bond theory, hybridization, VB theory as applied to ClF_3**,** $Ni(CO)_4$,Molecular orbital theory - LCAO method, bonding and anti-bonding MOs and their Characteristics, construction of M.O. diagrams for homo-nuclear and hetero-nuclear diatomic molecules (N_2, O_2, CO andNO), Comparison of VB and MO approaches.

Module 5: SURFACECHEMISTRY **(09 Periods)**

Colloids: Definition. Solids in liquids(sols), properties - kinetic, optical, electrical. Stability of colloids, Hardy-Schulze law, protective colloid, gold number. Liquids in liquids (emulsions) properties, uses. Liquids in solids (gels) preparation, uses.

Adsorption:physisorption, chemisorption. Freundlisch, Langmuir adsorption isotherms. Applications of adsorption.

Total Periods: 45

EXPERIENTIAL LEARNING

LIST OF EXERCISES:

1. How can you use metallic bonding theory to explain the physical properties of metals?
2. Narrate the role of material science modern technology
3. How do you do a chromatography experiment at home?
4. Is chemical bonding and molecular structure important? Justify
5. Describe the role of surface chemistry in day to day life

RESOURCES

TEXT BOOKS:

1. G.M. Barrow, Physical Chemistry, 6th Edition, Tata McGraw Hill Publishing Co. Ltd. New Delhi, 2007.
2. Arun Bahl, B.S. Bahl, and G.D. Tuli.Essential of Physical Chemistry, 28thEdition, S. Chand & Company, New Delhi, 2020

REFERENCE BOOKS:

1. J.C. Kotz, P.M. Treichel, and J.R. Townsend, General Chemistry, 3rd Edition, Cengage Learning India Pvt. Ltd., New Delhi, 2009.
2. G.E. Rodgers, Inorganic and Solid State Chemistry, 1st Edition, Cengage Learning India Ltd., 2008.

VIDEO LECTURES:

1. https://archive.nptel.ac.in/courses/113/104/113104106/
2. https://www.nagwa.com/en/videos/639142632348/
3. https://www.youtube.com/watch?v=SnbXQTTHGs4

WEB RESOURCES:

1. https://chem.libretexts.org/Bookshelves/General_Chemistry/Map%3A_General_Chemistry_(Petrucci_et_al.)/11%3A_Chemical_Bonding_II%3A_Additional_Aspects/11.7%3A_Bonding_in_Metals
2. https://www.britannica.com/technology/materials-science
3. https://chem.libretexts.org/Bookshelves/Analytical_Chemistry/Supplemental_Modules_(Analytical_Chemistry)/Instrumentation_and_Analysis/Chromatography
4. https://ncert.nic.in/textbook/pdf/kech104.pdf
5. https://www.vedantu.com/chemistry/surface-chemistry

PROGRAM CORE

Course Code	Course Title	L	T	P	S	C
22BS102013	**INORGANIC AND PHYSICAL CHEMISTRY**	**3**	**-**	**3**	**-**	**4.5**

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on the chemistry of p, d and f block elements, Theories of Bonding in Metals, liquidstate, Solutions and applications of X-ray diffraction to study solids.

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

CO1 Understand the advanced concepts of p, d and f block elements.

CO2 Study and Analyze the properties and conductivity of metals.

CO3 Explain the liquid crystals properties and their applications.

CO4 Identify and Summarize the important feature of solutions.

CO5 Know basics and role of X-ray diffraction to study solids.

CO6 Work independently and in teams to solve problems with effective communications

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	-	2	-	-	-	-	-	2	-	-	3
CO2	3	-	-	-	-	-	-	-	-	-	-	3
CO3	3	-	-	-	-	-	-	-	-	-	-	3
CO4	3	1	-	-	-	-	-	-	-	-	-	-
CO5	3	-	-	1	-	-	-	-	2	-	-	-
CO6							3	3				
Course Correlation Mapping	3	1	2	1	-	-	3	3	2	-	-	3

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: CHEMISTRY OF p-BLOCK ELEMENTS **(08 Periods)**

Group 13:Synthesis and structure of diborane and higher Boranes (B_4H_{10} and B_5H_9),Boron nitrogen compounds ($B_3N_3H_6$ and BN), Lewis acid nature of BX_3

Group 14:Preparation, classification and uses of silicones.

Group 15: Nitrides –Classification –ionic, covalent and interstitial. Reactivity–hydrolysis. Preparation and reactions of hydrazine, hydroxyl amine, phosphazenes.

Group 16: Oxides and Oxoacids of Sulphur (structures only).

Group 17:Pseudohalogens, Structures of Interhalogen compounds.

Module 2: CHEMISTRY OF d AND f -BLOCK ELEMENTS **(10 Periods)**

d-block Elements: Characteristics of d-block elements with special reference to electronic configuration, variable valence, magnetic properties, catalytic properties and ability to form complexes. Stability of various oxidation states.

f-block Elements: Chemistry of lanthanides - electronic structure, oxidation states, lanthanide contraction, consequences of lanthanide contraction, magnetic properties. Chemistry of actinides - electronic configuration, oxidation states, actinide contraction, comparison of lanthanides and actinides.

Module 3: THEORIES OF BONDING IN METALS **(08 Periods)**

Metallic properties and its limitations, Valence bond theory, Free electron theory, Explanation of thermal and electrical conductivity of metals, Band theory- formation of bands, explanation of conductors, semiconductors and insulators.

Module 4: LIQUIDSTATE AND SOLUTIONS **(10 Periods)**

Liquid State: Structural differences between solids, liquids and gases. Liquid crystals, Classification of liquid crystals, Properties of Liquid crystals, Application of liquid crystals.

Solutions: ideal solutions, Raoult's law. Ideally dilute solutions, Henry's law. Non-ideal solutions. Azeotropes-HCl-H_2O, ethanol-water systems, Partially miscible liquids-phenol-water, Effect of impurity on consulate temperature. Immiscible liquids and steam distillation. Nernst distribution law. Calculation of the partition coefficient. Applications of distribution law.

Module 5: SOLID STATE **(09 Periods)**

Symmetry in crystals. Law of constancy of interfacial angles. The law of rationality of indices. The law of symmetry. Definition of lattice point, space lattice, unit cell. Bravais lattices and crystal systems. X-ray diffraction and crystal structure. Bragg's law. Defects in crystals.

Total Periods: 45

EXPERIENTIAL LEARNING

LIST OF EXERCISES:(Minimum 10 exercises shall be conducted)

Qualitative inorganic analysis

Analysis of mixture salt containing two anions and two cations (From two different groups) from the following.

Anions:	**Cations:**
Carbonate	Lead
Sulphate	Copper
Chloride	Iron
Bromide	Aluminum
Acetate	Zinc
Nitrate	Manganese
Borate	Calcium
Phosphate	Strontium
	Barium
	Potassium
	Ammonium

A student has to identify two cations and two anions from the mixture selected by the faculty on the given day.

RESOURCES

TEXT BOOKS:

1 Madan Malik Tuli, Text Book of Inorganic Chemistry, 4th Edition, S. Chand & Company, New Delhi, 2018

2 Samuel Glasstone, Text book of Physical Chemistry, 2nd Edition, D. Van Nostrand company, inc., 1940.

REFERENCE BOOKS:

1 J.E. Huheey, Inorganic Chemistry, 2nd Edition, McGraw Hill, 2015.

2 Bahl andTuli, Advanced physical chemistry, 28th Edition, schamd publishers, 2020.

VIDEO LECTURES:

1 https://www.youtube.com/watch?v=Nmp6APGBtz0

2 https://youtu.be/ALAaALyxayM

WEB RESOURCES:

1 https://books.google.co.in/books?id=UOV9_MJH7w8C&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

2 https://www.ebooknetworking.net/ebooks/inorganic-chemistry-malik-madan-tuli.html

3 https://www.sciencedirect.com/book/9780120442621/a-textbook-of-physical-chemistry

4 https://chemistryhall.com/best-physical-chemistry-textbook/

PROGRAM CORE

Course Code	Course Title	L	T	P	S	C
22BS102014	**BASIC ORGANIC CHEMISTRY**	**3**	**-**	**3**	**-**	**4.5**

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on basis of organic chemistry alkanes, cycloalkanes, alkenes and alkynes. Benzene and its reactivity. Surface chemistry and electrochemistry of organic compounds.

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

CO1 Recall and apply the basic concepts of nomenclature, classification and basic properties of organic compounds.

CO2 Understand and explain differential behaviour organic compound based on the fundamental concepts learnt.

CO3 Formulate and identify the mechanism of organic reactions by recalling and correlating the fundamental properties of the reactants learnt.

CO4 Describe the concept of aromaticity, molecular structure of benzene based on modern concepts. Ring activating and deactivating groups.

CO5 Correlate and explain stereo chemical properties of organic compounds and configurations.

CO6 Develops independent working ability, through problem solving and effective communication.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	3
CO2	3	1	-	-	1	-	-	-	-	-	-	3
CO3	3	1	-	-	1	-	-	-	-	-	-	3
CO4	2	1	-	-	1	-	-	-	-	-	-	3
CO5	2	2	-	-	-	-	-	-	-	-	-	3
CO6	3	-	1	1	1	2	2	1	1	-	-	3
Course Correlation Mapping	**3**	**1**	**1**	**1**	**1**	**2**	**2**	**1**	1	**-**	-	**3**

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: NOMENCLATURE, CLASSIFICATION AND BASIC PROPERTIES (09 Periods)

Trivial, IUPAC nomenclature, Classification, Geometry of molecules, Hybridization.Cleavage of bonds: homolytic and heterolytic cleavages. Inductive, mesomeric, resonance, hyperconjugation and steric effects. Tautomerism: Definition, keto-enol tautomerism. Stability of reaction intermediates, carbocation, carbanion, and free radicals.

Module 2: ALKANES AND CYCLOALKANES (08 Periods)

Alkanes: General methods of preparation of alkanes Wurtz, Wurtz-Fitting and Corey-House reaction. Physical and chemical properties of alkanes, isomerism and its effects on properties. Free radical substitution, Halogenation, concept of reactivity v/s selectivity.

Cycloalkanes: Nomenclature, Preparation by Freunds method, Types of cycloalkanes and their relative stability, Baeyer strain theory, Conformations of cyclohexane with energy diagram.

Module 3: ALKENES AND ALKYNES (10 Periods)

Alkenes: General methods of preparation, physical and chemical properties.

Reaction Mechanisms: Elimination (E1, E2, E1Cb, Hoffmann and Saytzeff),electrophilic addition (Markownikoff's/AntiMarkownikoff), Free radical addition, addition of hydrogen,halogen, hydrogen halide (Markownikoff's rule), hydrogen bromide (peroxide effect). Hydroboration, ozonolysis, hydroxylation.

Dienes: Stability of dienes (conjugated, isolated and cumulative dienes)

General methods of preparation, mechanism of dehydrohalogenation.

Reactions: Mechanism of 1,2- and 1,4-additions, Diels-Alder reactions.

Alkynes: Preparation: Mechanism of dehydrohalogenation and dehydrogenation.

Reactions: Acidity of alkynes, Mechanism of addition of water,hydrogen halides and halogens, oxidation, ozonolysis and hydroboration/oxidation.

Module 4: BENZENE AND ITS REACTIVITY (08 Periods)

Concept of aromaticity - aromaticity (definition), Huckel's rule – application to Benzenoid (Benzene, Naphthalene) and Non-Benzenoid compounds (cyclopropenyl cation, cyclopentadienyl anion and tropylium cation), Molecular structure of Benzenebased on modern concepts (VBT andMOT).

Reactions: Mechanism of nitration, Friedel Craft's alkylation and acylation. Orientation of aromatic substitution-Definition of ortho, para and meta directing groups. Ring activating and deactivating groups with examples (i) Amino, methoxy and methyl groups(ii) Carboxy, nitro, nitrile, carbonyl and sulphonic acid groups (iii) Halogens.

Module 5: STEREOCHEMISTRY OFCARBONCOMPOUNDS (10 Periods)

Optical isomerism: Optical activity-wave nature of light, plane polarised light, optical rotation and specificrotation.

Chiral molecules-definition and criteria (Symmetry elements)-Definition of enantiomers and diastereomers–Explanation of optical isomerism with examples Glyceraldehyde, Lactic acid, Alanine, Tartaric acid, 2,3-dibromopentane.

D,L and R,S configuration methods and E,Z- configuration with examples.

Total Periods: 45

EXPERIENTIAL LEARNING

LIST OF EXPERIMENTS:(Minimum 10 exercises shall be conducted)

ORGANIC QUALITATIVE ANALYSIS

1. Determination of melting and boiling points of organic substances.

2. Analysis of Organic compounds:
   a. Identification of acidic, basic, phenolic, and neutral organic substances.
   b. Detection of N, S and halogens.
   c. Test for aliphatic and aromatic nature of substances.
   d. Test for saturation and unsaturation.
   e. Identification of functional groups:
   i) Carboxylic acids ii) Phenols iii) Aldehydes iv) Ketonesv) Esters
   vi) Carbohydrates vii) Amines viii) Amidesix) Halogen compounds
   f. Preparation of derivatives for the functional groups

RESOURCES

TEXT BOOKS:

1. R.P. Goyal, Unified Chemistry-1, Shivalal Agarwala & Company, New Delhi, 8thedition, 2015.
2. B.S. Furniss, A.J. Hannaford, P.W. G. Smith and A.R. Tatchell, Vogel's Text Book of Practical Organic Chemistry, Pearson Education, London, 5thedition, 2005.

REFERENCE BOOKS:

1. Jerry March, Advanced Organic Chemistry, John Wiley And Sons, New York, 4th Edition, 1992.
2. P. S. Kalsi, Stereochemistry: Conformation and Mechanism, Wiley Eastern Ltd, New Delhi, 2nd edition, 1993.

VIDEO LECTURES:

1. https://archive.nptel.ac.in/courses/104/101/104101115/
2. https://archive.nptel.ac.in/courses/104/106/104106127/
3. https://www.youtube.com/watch?v=nDV5yWfHKko

WEB RESOURCES:

1. https://www.vedantu.com/chemistry/benzene-reactions
2. https://www.angelo.edu/faculty/kboudrea/organic/IUPAC_Handout.pdf
3. https://www.vanderbilt.edu/AnS/Chemistry/Rizzo/chem220a/Ch3slides.pdf
4. https://faculty.ksu.edu.sa/sites/default/files/vogel_-_practical_organic_chemistry_5th_edition.pdf

PROGRAM CORE

Course Code	Course Title	L	T	P	S	C
22BS102007	**BIOPHYSICAL TECHNIQUES**	**3**	**-**	**3**	**-**	**4.5**

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on Biophysical concepts, Chromatography, Centrifugation, Electrophoresis, Spectroscopy and Radioisotopes, and hands-on experience on Isolation and characterization of biomolecules.

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

CO1 Understand biophysical concepts, water quality parameters and water pollutants.
CO2 Identify different tools for tissue homogenization and techniques to separate Biochemical constituents.
CO3 Analyze various biochemical constituents in biological mixtures by using techniques such as Chromatography, Electrophoresis and identification by spectroscopy.
CO4 Gain knowledge on Radioisotopes, radioactive emission, radioactive hazards and applications of radioisotopes in biology.
CO5 Apply suitable methods for isolation and characterization of different biological constituents.
CO6 Work independently and in teams to solve problems with effective communications.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	2	-	1	3	-	-	-	-	-	3	1
CO2	3	3	-	2	-	-	-	-	-	-	3	1
CO3	3	3	-	2	-	-	-	-	-	-	3	1
CO4	3	3	-	2	-	-	-	-	-	-	3	1
CO5	3	3	-	3	-	-	-	-	-	-	3	1
CO6	3	3	-	-	-	-	3	-	3	-	3	1
Course Correlation Mapping	3	3	-	2	3	-	3	-	3	-	3	1

Correlation Levels: 3: High; 2: Medium;1: Low

COURSE CONTENT

Module 1: BIOPHYSICAL CONCEPTS (08 Periods)

Water as biological solvent, Buffers, Henderson Hasselbalch equation. Acid dissociation Ka, pKa, measurement of pH, Biological relevance of pH, pH meter, Oxygen electrode, water quality parameters, BOD, COD, DO and TDS, Electrical conductivity.

Module 2: HOMOGENIZATION AND CENTRIFUGATION (07Periods)

Homogenization techniques - Mortar and Pestle, Potter Elvehjem, Ultra sonication, French press and Microfluidizer. Principles of centrifugation, Svedberg, Centrifugal force, RCF, RPM, Preparative centrifugation, Differential centrifugation Density gradient-Rate zonal and isopycnic, Ultracentrifugation, Analytical ultra centrifugation, sedimentation equilibrium and Sedimentation velocity.

Module 3: CHROMATOGRAPHY (10 Periods)

Chromatography principle, Types of chromatography, Paper chromatography, Rf Value and its importance. Partition Principle and Partition coefficient, Thin layer chromatography, Gel filtration, Ion exchange and separation of metal ions using Ion exchange chromatography, Affinity chromatography, Determination of Molecular weight of protein by Gel filtration chromatography.

Module 4: ELECTROPHORESIS (10 Periods)

Basics of Electrophoresis, Paper Electrophoresis, SDS PAGE, Native PAGE, Determination of Molecular weight using SDS PAGE, Isoelectric focussing, Chromatofocussing, Capillary Electrophoresis, Immuno Electrophoresis.

Module 5: SPECTROSCOPY AND RADIOISOTOPES (10 Periods)

Laws of Absorption, Absorbance, Transmittance, Colorimeter, U.V- Visible spectroscopy and its applications, Fluroscence, Jabalonski diagram, Stoke's shift and Fluorimetry, Radio activity, Half life period, Radio activity units, safety measures in Radiation laboratories, Different types of radio activity measurements, GM counter, Liquid scintillography, Uses of Radio isotopes in Biology, Half life, Units of Radioactivity.

Total Periods: 45

EXPERIENTIAL LEARNING (Minimum 10 experiments shall be conducted)

LIST OF EXERCISES:

1. Separation of Amino acids by Paper Chromatography
2. Separation of carbohydrates by TLC
3. Separation of Plant pigments by TLC
4. Separation of Nucleic acids by Agarose Gel Electrophoresis
5. Extraction of starch from potatoes
6. Isolation of DNA from Plant source
7. Isolation of DNA from bacteria/yeast
8. Isolation of Albumin from Egg
9. Isolation of Cholesterol from Egg yolk.
10. Isolation of Casein from milk
11. Immobilization of Yeast
12. Paper Electrophoresis of serum proteins.

RESOURCES

TEXT BOOKS:

1. A. Upadhyay, K. Upadhyay and N. Nath, Biophysical Chemistry Principles and Techniques, Fourth Revised Edition, Himalaya publishing house, 2020.
2. J. Jayaraman, Laboratory manual in Biochemistry, 3rd Edition, New Age, 2012.

REFERENCE BOOKS:

1. K. Wilson and J. Walker, Principles and Techniques of Biochemistry and Molecular Biology, 8th Edition, Cambridge University Press, 2018.
2. G. Karp, J. Iwasa and W. Marshall, Cell and Molecular Biology: Concepts and Experiments, 8th Edition, Wiley publisher, 2015.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=ZCzgQXGz9Tg
2. https://www.youtube.com/watch?v=bFzHhM1iMKA

WEB RESOURCES:

1. https://www.sciencedirect.com/topics/chemistry/biophysical-methods
2. https://world-nuclear.org/information-library/non-power-nuclear-applications/radioisotopes-research/radioisotopes-in-medicine.aspx
3. https://www.ncbi.nlm.nih.gov/books/NBK585057/

PROGRAM CORE

Course Code	Course Title	L	T	P	S	C
22BS102025	PRINCIPLES OF MICROBIOLOGY	3	-	3	-	4.5

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on overview of cell and cell organelles, Cytoskeleton and cell movement, Cell Communication, Cell development and Cancer development and treatment. This course also provides hands on training on culturing, Isolation and Identification of Bacteria.

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

CO1 Understand the History and different types of Microbial taxonomy.

CO2 Identify physical and chemical means of sterilization

CO3 Understand methods used for studying Microbes.

CO4 Understand and classify the structures in prokaryotic cells and how those structures vary across major groups of microorganisms

CO5 Understand Structure, Classification of viruses and how these are different from.

CO6 Evaluate methods to culture bacteria and characterization of different cells. Also work independently and in teams to solve problems with effective communications.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	3	-	-
CO2	3	3	-	-	-	-	-	-	-	3	-	-
CO3	3	2	-	-	-	-	-	-	-	3	-	-
CO4	3	3	-	-	-	-	-	-	-	3	-	-
CO5	3	3	-	3	-	-	-	-	-	3	-	-
CO6	3	3	-	3	-	-	3	3	-	3	-	-
Course Correlation Mapping	3	3	-	3	-	-	3	3	-	3	-	-

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: HISTORY AND SCOPE OF MICROBIOLOGY AND MICROBIAL TAXONOMY (09 Periods)

Overview of history of Microbiology - Biogenesis and abiogenesis Contributions of Redi, Spallanzani, Needham, Pasteur, Tyndal, Joseph Lister, Koch [Germ Theory], Edward Jenner and Flemming [Penicillin], Importance and applications of Microbiology.

Classification of Microbes - Systems of classification, Numerical taxonomy, Identifying characters for classification, General properties and principles of classification of microorganisms Systematics of bacteria, Nutritional types [Definition and examples]. Classification on the basis of oxygen requirement.

Module 2: CONCEPT OF STERILIZATION AND MICROSCOPY (08 Periods)

Concept of Sterilization - Definition of sterilization, dry and moist heat, pasteurization, tyndalization; radiation, ultrasonication, filtration. Physical and Chemical methods of sterilization; disinfection sanitization, antisepsis sterilants and fumigation. Determination of phenol coefficient of disinfectant.

Module 3: MICROSCOPY AND STAINING METHODS (10 Periods)

Light & Electron Microscopy, Preparation for light microscopy

Stains and staining techniques – Definition of auxochrome , chromophores, dyes, Classification of stains, Theories of staining, Mechanism of gram staining, acid fast staining, negative staining, capsule staining, flagella staining, endospore staining.

Module 4 STRUCTURE AND FUNCTIONS OF PROKARYOTIC CELLS (08 Periods)

Size, shape and arrangement of prokaryotic cells, Cell wall, cytoplasmic membrane, membrane transport systems, Cytoplasm, cytoplasmic inclusions and vacuoles, cytoskeleton Structure and germination of endospore, microbial locomotion, An overview of difference between prokaryotes and eukaryotes.

Module 5 BASIC CONCEPTS OF VIROLOGY (10 Periods)

Basic concepts of Virology - General characteristics of viruses, differences between bacteria and viruses. Classification of viruses Physical and chemical Structures of different Viruses on the basis of capsid symmetry - enveloped (Herpes virus), helical (TMV) and icosahedral (Polyoma viruses), Capsids, complex (Bacteriophage, and Virion size, enveloped (Herpes), helical (TMV) and icosahedral (Polyoma), Capsids.

Total Periods: 45

EXPERIENTIAL LEARNING: (Minimum 10 experiments shall be conducted)

LIST OF EXPERIMENTS:

1. Sampling and quantification of microorganisms in air, soil and water.
2. Sampling and quantification of microorganisms in air, soil and water2
3. Isolation of bacteria [Streak plate, spread plate]
4. Isolation of bacteria [pour plate, serial dilution]
5. Identification of microorganisms from the habitats -Simple staining
6. Identification of microorganisms from the habitats - Differential staining
7. Identification of microorganisms from the habitats - Differential staining2
8. Identification of microorganisms from the habitats -Capsule staining and Spore staining

9. Motility Test
10. Methods of inoculation of different microbes in selective media.
11. Methods of inoculation of different microbes in selective media2.
12. Microscopic measurements, micrometer (ocular and stage), haemocytometer.

RESOURCES

TEXT BOOKS:

1. M. J Pelczar, E. C. S Chan and N. R Krieg. Microbiology, 5th edition, McGraw Hill Book Company, 2001.
2. G. J. Tortora, B. R. Funke and C. L. Case, Microbiology: An Introduction, Eleventh edition, Pearson Education, 2013.
3. R. M Atlas, Principles of Microbiology. 2nd Edition, Mc Graw Hill education, 2014.

REFERENCES BOOKS:

1. L.M. Prescott, J.P. Harley, & D.A. Klein, Microbiology. 11th ed, McGraw Hill, New York, 2020.
2. G.M. Garrity, Bergey's Manual of Systematic Bacteriology. 2nd ed, Vol.1 to 5, Springer, New York, 2005.
3. G. J Tortora, R.F Berdell, and L. C. Christine, Microbiology: An Introduction. 9th ed, Benjamin Cummings, USA, 2006..

VIDEO LECTURES:

1. http://ecoursesonline.iasri.res.in/course/view.php?id=108
2. http://www.digimat.in/nptel/courses/video/102106053/L02.html
3. https://nptel.ac.in/courses/102107028
4. https://www.youtube.com/watch?v=mC0rYNlMz9Q

WEB RESOURCES:

1. https://nios.ac.in/media/documents/dmlt/Microbiology/Lesson-04.pdf
2. https://www.youtube.com/watch?v=aMU2euxpcyw

PROGRAM ELECTIVE

Course Code	Course Title	L	T	P	S	C
22BS103071	CRIME AND SOCIETY	3	-	-	4	4

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on basics of criminology, criminal behavior, Social Aspects of Crime, Juvenile delinquency, criminal justice system.

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

CO1 Demonstrate knowledge on fundamentals of criminology

CO2 Understand the criminal behaviour

CO3 Demonstrate knowledge on criminal profiling

CO4 Demonstrate knowledge of crime in society

CO5 Demonstrate knowledge of criminal justice system

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	2	-	1
CO2	3	-	-	-	-	-	-	-	-	2	-	1
CO3	3	-	-	-	-	-	-	-	-	2	-	1
CO4	3	-	-	-	-	-	-	-	-	2	-	1
CO5	3	-	-	-	-	-	-	-	-	2	-	1
Course Correlation Mapping	3	-	-	-	-	-	-	-	-	2	-	1

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: BASICS OF CRIMINOLOGY (09 Periods)

Definition, aims, and Scope. Theories of criminal behaviour – classical, positivist, sociological. Criminal anthropology. Criminal profiling. Understanding modus operandi. Investigative strategy. Role of media.

Module 2: CRIMINAL BEHAVIOUR (09 Periods)

Elements, nature, causes, and consequences of crime. Deviant behaviour. Hate crimes, organized crimes, and public disorder. Domestic violence and workplace violence. White-collar crimes Victimology.

Module 3: SOCIAL ASPECTS OF CRIME (09 Periods)

Sociological Aspects of Crime and Criminal in the Society, Social Change and Crime, Organized Crime, Effect of Urbanization and Industrialization, Drugs and Crime, Psychological Disorders and Criminality. Situational crime prevention.

Module 4: JUVENILE DELINQUENCY (09 Periods)

Introduction, Nature, Types of Juvenile Delinquents, Factors of Juvenile Delinquency, Juvenile Justice, Juvenile Court, Procedure of Juvenile Court, Counseling of Juvenile Delinquents, Juvenile Justice (Care and Prevention) Act, Juvenile Justice Board.

Module 5: CRIMINAL JUSTICE SYSTEM (09 Periods)

Broad components of the criminal justice system. Policing styles and principles. Police's power of investigation. Filing of criminal charges. Community policing. Policing a heterogeneous society. Disciplinary measures and rehabilitation of offenders. Human rights and criminal justice system in India.

Total Periods: 45

EXPERIENTIAL LEARNING

1. Different case studies on crime and society

RESOURCES

TEXT BOOKS:

1. R. Saferstein, Criminalistics, 12th Edition, Prentice Hall, New Jersey, 2017.
2. J.L. Jackson and E. Barkley, Offender Profiling: Theory, Research, and Practice, Wiley, Chichester, 2010.

REFERENCE BOOKS:

1. S.H. James and J.J. Nordby, Forensic Science: An Introduction to Scientific and Investigative Techniques, 5th Edition, CRC Press, Boca Raton, 2015.

2. R. Gupta, Sexual Harassment at Workplace, LexisNexis, Gurgaon, 2014.

3. D.E. Zulawski and D.E. Wicklander, Practical Aspects of Interview and Interrogation, CRC Press, Boca Raton, 2012.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=ajJZCZdtnBY
2. https://www.youtube.com/watch?v=-7F8Axukdg0
3. https://www.youtube.com/watch?v=mvjds3W9Mog
4. https://www.youtube.com/watch?v=DxwQLrXhS0M

WEB RESOURCES:

1. https://www.studysmarter.co.uk/explanations/social-studies/crime-and-deviance/crime-and-society/
2. https://lexpeeps.in/crime-and-society/
3. https://www.unodc.org/pdf/crime/forum/GdocsFORUM_ON_CRIME_AND_SOCIETYVol._3_-_1_and_2_2003_-_crime_trendsforum3.pdf
4. https://www.scribd.com/presentation/362337158/Chapter-1-Intro-to-Crime-Society

PROGRAM ELECTIVE

Course Code	Course Title	L	T	P	S	C
22BS101073	**ECONOMIC OFFENCES**	**3**	**1**	**-**	**-**	**4**

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on Taxonomy of Economic Offences/Criminogenic Factors, Illicit Trafficking, Applied Economics in Processing Evidence, Laws Related to Economic Offences, Prevention of Economic Crimes.

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

CO1 Gain knowledge of taxonomy of economic crimes

CO2 Gain knowledge of illicit trafficking investigation

CO3 Gain knowledge of processing of economic crimes evidence

CO4 Gain legal knowledge related to economic crime

CO5 Gain knowledge of crime prevention strategies

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	2	-	1
CO2	3	-	-	-	-	-	-	-	-	2	-	1
CO3	3	-	-	-	-	-	-	-	-	2	-	1
CO4	3	-	-	-	-	-	-	-	-	2	-	1
CO5	3	-	-	-	-	-	-	-	-	2	-	1
Course Correlation Mapping	3	-	-	-	-	-	-	-	-	2	-	1

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: TAXONOMY OF ECONOMIC OFFENCES/CRIMINOGENIC FACTORS (09 Periods)

Fundamentals of economics in economic offences. Tax evasion. Excise duty evasion. Fraudulent bankruptcy. White collar crime. Economic exclusion. Black money. Corruption and bribery of public servants. Money laundering and hawala transactions. Insurance frauds. Corporate frauds. Bank frauds. Ponzi scheme. Pyramid scheme.

Module 2: ILLICIT TRAFFICKING (09 Periods)

Illicit trafficking in contraband goods. Illicit trafficking in arms. Illicit trafficking in explosives.Illicit drug trafficking. Trafficking in human organs. Cultural objects trafficking. Racketeering in employment. Racketeering in false travel documents

Module 3: APPLIED ECONOMICS IN PROCESSING EVIDENCE (09 Periods)

Forensic accountancy and forensic auditing. Valuation of economic losses. Violation ofIntellectual Property Rights.

Module 4: LAWS RELATED TO ECONOMIC OFFENCES (09 Periods)

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

Module 5: PREVENTION OF ECONOMIC CRIMES (09 Periods)

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

Total Periods: 45

EXPERIENTIAL LEARNING

1. Prepare a PPT on the role of technology in Forensic studies

RESOURCES

TEXT BOOKS:

1. R.V. Clarke, Situational Crime Prevention: Successful Case Studies, 5th Edition,Criminal Justice Press, New York, 2011.
2. G. Geis, R. Meier, L. Salinger (Eds.), White-Collar Crime: Classic & ContemporaryViews, Free Press, New York, 2015.

REFERENCE BOOKS:

3. J. Reiman, The Rich get Richer and the Poor get Prison, Allyn & Bacon, Boston, State Crime Branch, Haryana, Investigation of Economic Offences, 2013.
4. S.P. Green, Lying, Cheating and Stealing: A Moral Theory of White-Collar Crime,Oxford University Press, Oxford, 2016.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=sIjACciadLg

2. https://www.youtube.com/watch?v=vHZYc7T4BvA
3. https://www.youtube.com/watch?v=QCk6yLtXVNc

WEB RESOURCES:

1. https://home.wb.gov.in/department/Directorate_of_Economic_Offences.html
2. https://blog.ipleaders.in/economic-offences-india-depletion-economic-status-nation/
3. https://www.rbi.org.in/commonman/Upload/English/Content/PDFs/LNA100112C_M.pdf

PROGRAM ELECTIVE

Course Code	Course Title	L	T	P	S	C
22BS101074	**ACCIDENT INVESTIGATIONS**	**3**	**-**	**-**	**-**	**3**

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on Motor Vehicle Accidents, Analysis of Motor Accidents, Accident Analysis, Analysis of Injuries, Tachographs

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

CO1 Gain knowledge of motor vehicle accidents

CO2 Gain knowledge of analyzing the motor vehicle accidents

CO3 Gain knowledge of analyze all categories of accidents

CO4 Gain knowledge of analyzing the injuries due to accident

CO5 Gain knowledge of tachographs

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	2	-	1
CO2	3	-	-	-	-	-	-	-	-	2	-	1
CO3	3	-	-	-	-	-	-	-	-	2	-	1
CO4	3	-	-	-	-	-	-	-	-	2	-	1
CO5	3	-	-	-	-	-	-	-	-	2	-	1
Course Correlation Mapping	3	-	-	-	-	-	-	-	-	2	-	1

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: MOTOR VEHICLE ACCIDENTS (09 Periods)

Accident scene. Sources of forensic information. Eyewitness accounts. The extent of vehicle damage. Visibility conditions. Photographs of the accident site.

Module 2: ANALYSIS OF MOTOR ACCIDENTS (09 Periods)

Estimation of speed. Tire marks, skid marks, scuff marks. Maintenance of vehicles. Abandoned vehicles. Importance of airbags. Railway accidents.

Module 3: ACCIDENT ANALYSIS (09 Periods)

Post-crash movement. Collision model. Gauging driver's reaction. Occupant's kinematics. Glass fracture analysis

Module 4: ANALYSIS OF INJURIES (09 Periods)

Types of injuries resulting from an accident. Biomechanics of injuries. Hit and run investigations—trace evidence at accident sites.

Module 5: TACHOGRAPHS (09 Periods)

Forensic significance of tachograph data. Tachograph charts. Principles of chart analysis. Accuracy of speed record. Tire slip effects. Falsification and diagnostic signals. Route tracing. Bayes Theorem in analysis and applications

Total Periods: 45

EXPERIENTIAL LEARNING

1. Prepare a PPT on the accident investigations

RESOURCES

TEXT BOOKS:

1. T.S. Ferry, Modern Accident Investigation and Analysis, Wiley, New York, 2010.
2. H.B. Baldwin, C.P. May in, Encyclopedia in Forensic Science, Volume 1, J.A. Siegel, P.J. Saukko, G.C. Knupfer (Eds.), Academic Press, London, 2014.

REFERENCE BOOKS:

1. D. Lowe, The Tachograph, 5th Edition, Kogan Page, London, 2011.
2. T.L. Bohan, A.C. Damask, Forensic Accident Investigation: Motor Vehicles, Michie Butterworth, Charlottesville, 2013.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=Xf2RPTwXGM8
2. https://www.youtube.com/watch?v=88FlFOSDr3s
3. https://www.youtube.com/watch?v=NNlaEA6rSx4
4. https://www.youtube.com/watch?v=kmg_eNjQr44

WEB RESOURCES:

1. https://www.isri.org/docs/default-source/safety/accident-investigation-guide.pdf?sfvrsn=a164a013_10
2. https://www.ccohs.ca/oshanswers/hsprograms/investig.html
3. https://risktec.tuv.com/knowledge-bank/six-steps-for-successful-incident-investigation/
4. https://www.pulpstream.com/resources/blog/accident-investigation

PROGRAM ELECTIVE

Course Code	Course Title	L	T	P	S	C
22BS101075	**FORENSIC MEDICINE**	**3**	**-**	**-**	**-**	**3**

Pre-Requisite - 2BS102078 Forensic Biology

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on Death Investigations, crime scene management in death cases, processing the evidence, Autopsy, Forensic Odontology.

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

CO1 Know the techniques of investigation of death

CO2 Know the techniques of management of crime scene

CO3 Know the techniques of processing the evidences

CO4 Gain knowledge of importance of autopsy

CO5 Gain knowledge of odontology and its importance in forensics

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	2	-	1
CO2	3	-	-	-	-	-	-	-	-	2	-	1
CO3	3	-	-	-	-	-	-	-	-	2	-	1
CO4	3	-	-	-	-	-	-	-	-	2	-	1
CO5	3	-	-	-	-	-	-	-	-	2	-	1
Course Correlation Mapping	3	-	-	-	-	-	-	-	-	2	-	1

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: DEATH INVESTIGATIONS (09 Periods)

Fundamental aspects and Scope of forensic medicine. We are approaching the crime scene of death, obtaining first-hand information from the caller, and rendering medical assistance to the victim, if alive. It is protecting life and recording dying declaration. Identifying witnesses and, if possible, suspects. We are interviewing onlookers and segregating possible witnesses. Suspect in custody – initial interrogation and searching for evidence. Miranda warning card.

Module 2: CRIME SCENE MANAGEMENT IN DEATH CASES (09 Periods)

Assessing the crime scene. Request for the forensic team. Importance of command post and a logbook. Management of crowd and media. Importance of taking notes. Items to be a part of noting. Documenting the death scene.

Module 3: PROCESSING THE EVIDENCE (09 Periods)

Processing evidence. Evaluation of injuries. Importance of canvass form. Indexing the death investigation. Handling buried body cases – search for buried bodies, methods of exhumation. Suicide cases – evaluating the type of injuries, gauging the psychological state of victim, suicide notes.

Module 4: AUTOPSY (09 Periods)

Forensic pathology. Medico-legal aspects of death. Causes of death. Determination of time since death. Investigation of sexual offences. Death by drowning. Injuries. Types and classification of injuries. Antemortem and post mortem injuries. Ageing of injuries. Faked injuries.

Module 5: FORENSIC ODONTOLOGY (09 Periods)

Development, Scope, and role of forensic odontology in mass disaster and anthropology. Types of teeth and their comparative anatomy. Bite marks. Forensic significance of bite marks. Collection, preservation, and photography of bite mark evidence. Legal aspects of bite marks. Estimation of age from teeth.

Total Periods: 45

EXPERIENTIAL LEARNING

1. Prepare a PPT on the support of medicine for Forensic studies

RESOURCES

TEXT BOOKS:

1. K. Smyth, The Cause of Death, Van Nostrand and Company, New York, 2010.
2. M. Bernstein, Forensic odontology in, Introduction to Forensic Sciences, 5th Edition, W.G. Eckert (Ed.), CRC Press, Boca Raton, 2015.

REFERENCE BOOKS:

1. J. Dix, Handbook for Death Scene Investigations, CRC Press, Boca Raton, 2010.
2. W.J. Tilstone, M.L. Hastrup, and C. Hald, Fisher's, Techniques of Crime Scene Investigation, CRC Press, Boca Raton, 2013.
3. Anderson, G. Biological Influences on Criminal Behavior. Boca Raton: CRC Press, 2011.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=PKMib2ekIB0
2. https://www.youtube.com/watch?v=HoeFPjsFHWo
3. https://www.ncbi.nlm.nih.gov/books/NBK539901/

WEB RESOURCES:

1. https://www.sciencedirect.com/topics/medicine-and-dentistry/forensic-medicine
2. https://www.nmc.org.in/wp-content/uploads/2019/09/MD-Forensic-Medicine.pdf
3. https://www.youtube.com/watch?v=kSDZZ0czZ3U

PROGRAM ELECTIVE

Course Code	Course Title	L	T	P	S	C
22BS101076	**FORENSIC PSYCHOLOGY**	**3**	**1**	**-**	**-**	**4**

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on Basics of Forensic Psychology, Legal Aspects of Forensic Psychology, Criminal Profiling, Psychology and Criminal Behavior, Detection of Deception.

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

CO1 Gain knowledge of fundamentals of forensic psychology

CO2 Gain knowledge on legal aspects of forensic psychology

CO3 Know the techniques of criminal profiling

CO4 Know the importance of behavior and its analysis

CO5 Know the techniques of detection of deception

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	2	-	1
CO2	3	-	-	-	-	-	-	-	-	2	-	1
CO3	3	-	-	-	-	-	-	-	-	2	-	1
CO4	3	-	-	-	-	-	-	-	-	2	-	1
CO5	3	-	-	-	-	-	-	-	-	2	-	1
Course Correlation Mapping	3	-	-	-	-	-	-	-	-	2	-	1

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: BASICS OF FORENSIC PSYCHOLOGY (09 Periods)

Definition and fundamental concepts of forensic psychology and forensic psychiatry. Forensic psychology compared to Forensic Psychiatry, the Scope and Goals of forensic psychology and Ethical issues in forensic psychology. Daubert's standard and Frye standard, Mc Naughten rule. Definitions of Sexual Assault and Rape, Typologies of Men Who Rape, The Massachusetts Treatment, Centre Rapist Typology and The Groth Rapist Typology

Module 2: LEGAL ASPECTS OF FORENSIC PSYCHOLOGY (09 Periods)

Psychology and law. Ethical issues in forensic psychology. Psychology in the courtroom, with particular reference to Section 84 IPC. Stages in Judicial Process in forensic psychological cases and competency to stand trial. Assessment of mental competency. Mental disorders and forensic psychology. The legal status of forensic psychological tests in India.

Module 3: CRIMINAL PROFILING (09 Periods)

Psychology of evidence – eyewitness testimony, confession evidence. Assessment of false memory, Interrogation and Confession: Reid Techniques in Interrogation of Suspects and PEACE Model. Criminal Profiling: Introduction-Types of profiling: Inductive and Deductive profiling- Process of profiling- FBI profiling stages.

Module 4: PSYCHOLOGY AND CRIMINAL BEHAVIOR (09 Periods)

Psychopathology and personality disorder. Psychological assessment and its importance. Psychology of terrorism. The Criminal Psychopath-General Behavioural Characteristics of Psychopaths. Antisocial Personality Disorder Sociopathy and Psychopathy. Criminal Homicide-Multiple Murder, Serial Killers, Mass Murders

Module 5: DETECTION OF DECEPTION (09 Periods)

Tools for detecting deception – interviews, non-verbal detection, statement analysis, voice stress analyzer, hypnosis. Narco analysis and brain electrical oscillation signatures– principle and theory, ethical and legal issues. Polygraph: Instrumentation, principles and procedure- Methods of formulation of relevant, irrelevant and control questions- Scoring and analysis. Brain Electrical Oscillation Signature Profiling (BEOS): Principles and procedure- Designing probes: audio and visual. Narco- Analysis: History- Principles and procedure

Total Periods: 45

EXPERIENTIAL LEARNING

1. Prepare a PPT on the role of forensic psychology in Forensic studies

RESOURCES

TEXT BOOKS:

1. Bartol, C., Bartol, A. Introduction to Forensic Psychology: Research and Application, 3rd edition, SAGE publications, London, 2012.
2. Howitt, D. Introduction to Forensic and Criminal Psychology, 3rd edition, Pearson Education Limited, England, 2009.

REFERENCE BOOKS:

1. Sadock, B., Sadock, V., & Ruiz, P. Synopsis of Psychiatry 11th edition, Philadelphia: Wolters Kluwer, 2015.
2. Towl, G., & Crighton, D. Forensic Psychology. Oxford: BlackwellPublishing Ltd. 2010.
3. Gordon, N. Essentials of Polygraph and Polygraph Testing. Boca Raton: CRC Press.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=x_bSodn1snA
2. https://www.youtube.com/watch?v=dOBSYw4KjYg
3. https://www.youtube.com/watch?v=PA_FlRaT2uU

WEB RESOURCES:

1. https://www.sciencedirect.com/topics/neuroscience/forensic-psychology
2. https://www.healthcareers.nhs.uk/explore-roles/psychological-therapies/roles/forensic-psychologist
3. https://www.verywellmind.com/history-of-forensic-psychology-2795254

PROGRAM ELECTIVE

Course Code	Course Title	L	T	P	S	C
22BS101077	**CYBER CRIME AND LAW**	**3**	**-**	**-**	**-**	**3**

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on Introduction to Cyber Crime, Computers and Cyber Security, Cyber Attacks, Cyber Laws, Regulatory Framework

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

CO1 Gain knowledge of Introduction to Cyber Crime

CO2 Gain knowledge of Computers and Cyber Security

CO3 Gain knowledge of Cyber Attacks

CO4 Gain knowledge of Cyber Laws

CO5 Gain knowledge of Regulatory Framework

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	2	-	1
CO2	3	-	-	-	-	-	-	-	-	2	-	1
CO3	3	-	-	-	-	-	-	-	-	2	-	1
CO4	3	-	-	-	-	-	-	-	-	2	-	1
CO5	3	-	-	-	-	-	-	-	-	2	-	1
Course Correlation Mapping	3	-	-	-	-	-	-	-	-	2	-	1

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: INTRODUCTION TO CYBER CRIME (09 Periods)

Introduction — Computer Crime and Cyber Crimes: Distinction between Cyber Crime and Conventional Crimes; Cyber Forensic; Kinds of Cyber Crimes — Cyber Stalking, Cyber Terrorism, Forgery and Fraud, Crimes Related to IPRs, Computer Vandalism: Privacy of Online Data; Cyber Jurisdiction; Copyright Issues; Domain Name Dispute, etc

Module 2: COMPUTERS AND CYBER SECURITY (09 Periods)

Software, Hardware, Classification, Computer Input-Output Devices, Windows, Linux/Mac Terminal and Commands, Basic Computer Terminology, Computer Security models, Computer Security Terms, Computer Ethics, Business and Professional Ethics, Need for cybersecurity; Digital Payments, Various Search Engines, Introduction to Auditing, Dark/Deep Web, Smartphone Operating systems, Globalization and border less world

Module 3: CYBER ATTACKS (09 Periods)

Denial-of-service attacks, Man-in-the middle attack, Phishing, spoofing and spam attacks, Drive-by attack, Password attack, SQL injection attack, Cross-site scripting attack, Eavesdropping attack, Birthday attack, Malware attacks, Social Engineering attacks

Module 4: CYBER LAWS (09 Periods)

Need for Cyber Regulations; Scope and Significance of Cyber laws: Information Technology Act 2000; **i.**[Section 43 of IT ACT] Penalty and compensation for damage to computer etc. **ii.**[Section 65 of IT ACT] Tampering with computer source documents **iii.**[Section 66A of IT ACT] Punishment for sending offensive messages through communication service etc. **iv.**[Section 66B of IT ACT] Penalty for receiving a stolen computer resource or communication device dishonestly **v.** [Section 66C of IT ACT] Punishment for identity theft **vi.**[Section 66D of IT ACT] Punishment for cheating by impersonation by using computer resource **vii.**[Section 66E of IT ACT] Punishment for violation of privacy **viii.**[Section 66F of IT ACT] Punishment for cyber terrorism **ix** [Section 67 of IT ACT] Punishment for electronically publishing or transmitting obscene material **x** [Section 67A of IT ACT] Punishment for publishing or transmitting material containing sexually explicit act, etc. in electronic form **xi**.[Section 67B of IT ACT] Punishment for publishing or transmitting material in electronic form depicting children in sexually explicit act, etc. in electronic form **xii**.[Section 72 of IT ACT] Breach of confidentiality and privacy. Xiii [Section 79A of IT Act] Examiner of Electronic evidence

Module 5: REGULATORY FRAMEWORK (09 Periods)

Regulation of Certifying Authorities; Appointment and Functions of Controller; License to Issue Digital Signatures Certificate; Renewal of License; Controller's Powers; Procedure to be Followed by Certifying Authority; Issue, Suspension and Revocation of Digital Signatures Certificate, Duties of Subscribers; Penalties and Adjudication; Appellate Tribunal; Offences

Total Periods: 45

EXPERIENTIAL LEARNING

1. Prepare a PPT on the role of technology in Forensic studies

RESOURCES

TEXT BOOKS:

1. Kamath Nandan, Law Relating to Computers Internet & E-commerce – A Guide to Cyberlaws & The Information Technology Act, Rules, Regulations and Notifications along with Latest

Case Laws 2016

REFERENCE BOOKS:

1. Karnika Seth, Computers Internet and New Technology Laws, 2nd edition, 2016
2. Vakul Sharma, Information Technology Law & Practice, 6th edition, 2018
3. Apar Gupta Commentary on Information Technology Act, 3rd edition. 2015
4. Alwyn Didar Singh, E-Commerce In India: Assessments And Strategies For The Developing World 2008

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=CPFY72yVQHE
2. https://www.youtube.com/watch?v=XF-rs3rNvc0
3. https://www.youtube.com/watch?v=_hMSU_ZRXgM

WEB RESOURCES:

1. https://delhidistrictcourts.nic.in/ejournals/CYBER%20LAW.pdf
2. https://iritm.indianrailways.gov.in/uploads/files/1360312590693-12.Cyber-Laws-chapter-in-Legal-Aspects-Book.pdf
3. https://www.bbau.ac.in/dept/Law/TM/1.pdf
4. https://www.tndalu.ac.in/econtent/15_Cyber_Law_And_Forensics.pdf

PROGRAM ELECTIVE

Course Code	Course Title	L	T	P	S	C
22BS101078	**CYBER FORENSICS**	**3**	**1**	**-**	**-**	**4**

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on Introduction to Digital Forensics, Branches of digital forensics, Preservation and Types of Digital Evidence, Forensic Tools and Techniques, Investigation of Mobile forensic.

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

CO1 Gain knowledge of Introduction of digital forensics

CO2 Gain knowledge of Branches of Digital Forensic

CO3 Gain knowledge of basics of Preservation and Types of Digital Evidence

CO4 Gain knowledge of Forensic Tools and Techniques

CO5 Gain knowledge of Investigation of Mobile forensic

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	2	-	1
CO2	3	-	-	-	-	-	-	-	-	2	-	1
CO3	3	-	-	-	-	-	-	-	-	2	-	1
CO4	3	-	-	-	-	-	-	-	-	2	-	1
CO5	3	-	-	-	-	-	-	-	-	2	-	1
Course Correlation Mapping	3	-	-	-	-	-	-	-	-	2	-	1

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: INTRODUCTION TO DIGITAL FORENSICS (09 Periods)

Introduction, Definition and Principle, Historical development of Digital Forensic, Types of Evidence, Emergence of computer crime: classification of computer crime, characteristics of computer crime and criminal, preservation of cybercrime. Services offered by Digital Forensics.

Module 2: BRANCHES OF DIGITAL FORENSICS (09 Periods)

Fundamentals of computer forensic, Mobile device forensic, Cyber forensic, Network forensic, Forensic Data analysis, Database Forensic, Cloud Forensic, Concept of Internet: Introduction, Applications and Working of Internet. Search Engines, Chat, E-mails. Cyber Incident Response, threat Classification, factors Contributing Severity and prioritization, types of data

Module 3: CYBER CRIME INVESTIGATION (09 Periods)

Preserving the Digital Crime Scene-Computer Evidence processing steps - Introduction to Cyber Crime Investigation, Procedure for Search and seizure of digital evidences in cyber-crime incident-Forensics Investigation Process. The Art of Protecting Secrets, Cryptography, Types of Encryptions, Types of Access Controls, Access Control Strategies, Identification, Authentication Methods, Types of Security Controls, Data Masking.

Module 4: FORENSIC TOOLS AND TECHNIQUES (09 Periods)

Forensics kit, Digital forensics workstation, Forensic investigation suite, Stakeholders, Purpose of communication processes, Role-based responsibilities, Common network-related symptoms, Containment techniques, Incident summary report

Module 5: INVESTIGATION OF MOBILE FORENSIC (09 Periods)

Introduction, Definition & Principle, Development of Mobile phone, Mobile Device as Evidence Process of Mobile Device Forensic: Seizure, Acquisition, Handling& Examination and Reporting. Process of Cloning of SIM Data and Password Extraction from Mobile Phones

Total Periods: 45

EXPERIENTIAL LEARNING

1. Prepare a PPT on the significance of digital forensic s in investigations

RESOURCES

TEXT BOOKS:

1. Suzanne Widup, Computer Forensics and Digital Investigation with EnCase® Forensic v7. Mc Graw Hill Publication, 2014.
2. Bill Nelson., Amelia Phillips. and Chris Steuart, Guide to Computer Forensics and Investigations: Processing Digital Evidence, 6th Edn. Cengage, 2019.

REFERENCE BOOKS:

1. Soufiane Tahiri, Mastering Mobile Forensics. Packt Publishing, 2016

2. Andrew Hoog, Android Forensics - Investigation, Analysis, and Mobile Security for Google Android. Elsevier, 2011.
3. Iosif I. Androulidakis. Mobile Phone Security and Forensics - A Practical Approach. 2nd Edition, Springer, 2016.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=JNIUeGMax-U
2. https://www.youtube.com/watch?v=rZ63OH2TAOo
3. https://www.youtube.com/watch?v=btfCf9Hylns

WEB RESOURCES:

1. https://www.mailxaminer.com/blog/what-is-digital-forensics-and-how-is-it-used-in-investigations/
2. https://www.unodc.org/e4j/zh/cybercrime/module-6/key-issues/handling-of-digital-evidence.html
3. https://www.geeksforgeeks.org/digital-evidence-preservation-digital-forensics/
4. https://nja.gov.in/Concluded_Programmes/2021-22/P-1271_PPTs/1.Digital%20Forensics%20Collection,%20Presservation%20and%20Appreciation%20of%20Electronic%20Evidence.pdf
5. https://nvlpubs.nist.gov/nistpubs/ir/2022/NIST.IR.8387.pdf

PROGRAM ELECTIVE

Course Code	Course Title	L	T	P	S	C
22BS101079	FORENSIC BALLISTICS AND EXPLOSIVES	3	1	-	-	4

Pre-Requisite -22BS101070 Forensic Sciences Physics

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on Introduction to Fire Arms and Ammunitions, Internal and External Ballistics, Wound/Terminal Ballistics, Firearm-Ammunition Linkage, Forensic Explosives.

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

CO1 Understand the historical development and basic concepts of Firearms and Ammunition.

CO2 Understand the various conceptual aspects of internal and external ballistics

CO3 Evaluate and interpret crucial information from firearm injuries and understand the concepts behind linkage of firearm and ammunition

CO4 Buildup conceptual understanding of explosives and its forensic aspects

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	2	-	1
CO2	3	-	-	-	-	-	-	-	-	2	-	1
CO3	3	-	-	-	-	-	-	-	-	2	-	1
CO4	3	-	-	-	-	-	-	-	-	2	-	1
Course Correlation Mapping	3	-	-	-	-	-	-	-	-	2	-	1

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: INTRODUCTION TO FIRE ARMS AND AMMUNITIONS (09 Periods)

Firearms: Definition, Classification of Firearms, Development, working, advantages and disadvantages of: Hand Cannon, Match Lock, Flint Lock, Wheel Lock and Percussion Lock firearms. Characteristics and firing mechanism of different Modern Firearms (Revolver, Pistol, Shot gun, Semi-automatic and Fully automatic firearms), Introduction to country made firearms.
Ammunition: Definition, Types, Components of Cartridge: Cartridge case, Primer, Propellant, Wads, Projectile.

Module 2: INTERNAL AND EXTERNAL BALLISTICS (09 Periods)

Internal Ballistics -Definition, Propellant: Shape and Size of the propellant, Ignition of the propellant, manner of burning, Lock time, Ignition time, barrel time, muzzle velocity, factors affecting muzzle velocity, theory of recoil.
External Ballistics- Definition, Shape of bullet, Effect of air on trajectory, drag, drop, drift, yaw, Projectile stability, Range: effective range, extreme range. Factors affecting the range of projectile.

Module 3: WOUND/TERMINAL BALLISTICS (09 Periods)

Introduction, Firearm Injuries: Types and Characteristics, Scorching, Burning, Blackening, Cavitation effect, Stopping power, Ricochet, Range determination from different type of firearms (smooth bore and rifled bore)

Module 4: FIREARM-AMMUNITION LINKAGE (09 Periods)

Identification of bullets, Test fire, Bullet recovery, Comparison of marks on bullets, cartridge case. Gunshot Residue- Definition, Composition, Location, Collection, Evaluation and Forensic significance.

Module 5: FORENSIC EXPLOSIVES (09 Periods)

Definition, Classification, composition and characteristics, IED, Explosion process, Reconstruction of sequence of events, Post blast residue collection, Forensic examination of various explosive materials.

Total Periods: 45

EXPERIENTIAL LEARNING

1. Prepare a PPT on the importance of the Forensic Ballistics and Explosives in Forensic studies

RESOURCES

TEXT BOOKS:

1. K.G. Sellier, B.P. Kneubuehl, Wound Ballistics and the Scientific Background. Elsevier: London, 1994.
2. Working Procedure Manual; Chemistry, Explosives and Narcotics, BPR&D Publications: New Delhi, 2000.

REFERENCE BOOKS:

1. Y. Jitrin, Modern Methods & Application in Analysis of Explosives.John Wiley & Sons: England,

1993.
2. I. V. Hogg, The Cartridges Guide: A Small Arms Ammunition Identification Manual. Stackpole Co: Philadelphia, 1982.
3. J.F. Boudreau, Q.Y. Kwan, W.E. Faragher, G.C. Denault, Arson and Arson Investigation: Survey & Assessment. National Institute of Law Enforcement, Dept. of Justice, US Govt. Printing Press, USA, 1977.
4. J.S. Hatcher, F.J. Jury, J. Weller, Firearms Investigation, Identification and Evidence. Ray Riling Arms Books: Philadelphia, 2006.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=EPGFgqkyfaY
2. https://www.youtube.com/watch?v=90pegOtVTRU
3. https://www.youtube.com/watch?v=Ko5ARyHbS0Y

WEB RESOURCES:

1. https://www.commackschools.org/Downloads/Chapter16%20Firearms,%20Ballistics,%20and%20Impression%20Evidence.pdf
2. https://courseware.cutm.ac.in/wp-content/uploads/2023/04/Handbook-of-Firearms-and-Ballistics.pdf
3. https://core.ac.uk/download/pdf/80691312.pdf

PROGRAM ELECTIVE

Course Code	Course Title	L	T	P	S	C
22BS101084	**FORENSIC SCIENCE AND SOCIETY**	**3**	**1**	**-**	**-**	**4**

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on Forensic Engineering, Graphics and Simulations, Forensic Archaeology, Forensic Intelligence, Social Aspects of Crime.

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

CO1 Apply technology in forensics

CO2 Design and apply graphics and simulation in forensics

CO3 Gain knowledge on the application of archaeology in forensics

CO4 Use the artificial intelligence in forensics

CO5 Understand the Social Aspects of Crime

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	2	-	1
CO2	3	-	-	-	-	-	-	-	-	2	-	1
CO3	3	-	-	-	-	-	-	-	-	2	-	1
CO4	3	-	-	-	-	-	-	-	-	2	-	1
CO5	3	-	-	-	-	-	-	-	-	2	-	1
Course Correlation Mapping	3	-	-	-	-	-	-	-	-	2	-	1

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: FORENSIC ENGINEERING (09 Periods)

Role of mechanical, electronics and computer engineers in forensic science. Accident investigations. Failure of signalling and control systems. Ergonomics.

Module 2: GRAPHICS AND SIMULATIONS (09 Periods)

Applications of animations, simulations and digital imaging in solving crime cases. Episodes involving fire engineering.

Module 3: FORENSIC ARCHAEOLOGY (09 Periods)

Role of forensic archaeology. Searching the archaeological site. Methods of digging the burial site. Recovery of remains. Documenting the recovered material. Preservation of remains.

Module 4: FORENSIC INTELLIGENCE (09 Periods)

Role of forensic intelligence in crime analysis. Methods of crime analysis. Databases in forensic intelligence. Management of serial crimes by application of forensic intelligence.

Module 5: SOCIAL ASPECTS OF CRIME (09 Periods)

Sociological Aspects of Crime and Criminal in the Society, Social Change and Crime, Organized Crime, Effect of Urbanization and Industrialization, Drugs and Crime

Total Periods: 45

EXPERIENTIAL LEARNING

1. Prepare a PPT on the role of technology in Forensic studies

RESOURCES

TEXT BOOKS:

1. J.F. Brown and K.S. Obenski, Forensic Engineering – Reconstruction of Accidents, C.C. Thomas, Springfield, 1990.
2. V J Geberth, Practical Homicide Investigation, CRC Press, Boca Raton, 2016.

REFERENCE BOOKS:

1. E.W. Killam, The Detection of Human Remains, C.C. Thomas, Springfield, 2010.
2. R.K. Noon, Introduction to Forensic Engineering, CRC Press, Boca Raton, 2012.

VIDEO LECTURES:

1. https://nij.ojp.gov/media/video/26161
2. https://www.youtube.com/watch?v=0sHeGqlHhv4
3. https://www.youtube.com/watch?v=MU0DzGYwYec
4. https://www.youtube.com/watch?v=Bsk62mC1VXI

WEB RESOURCES:

1. https://www.bartleby.com/essay/Forensic-Science-Impact-On-Society-A6E433FD7739C82D
2. https://www.sciencedirect.com/journal/journal-of-the-forensic-science-society
3. https://jhpolice.gov.in/sites/default/files/documents-reports/jhpolice_ebook_a_forensic_guide_for_crime_investigators.pdf
4. https://jhpolice.gov.in/sites/default/files/documents-reports/jhpolice_ebook_a_forensic_guide_for_crime_investigators.pdf
5. https://open.lib.umn.edu/socialproblems/chapter/8-4-explaining-crime/

PROGRAM ELECTIVE

Course Code	Course Title	L	T	P	S	C
22BS101086	**ADVANCED FORENSIC SCIENCE**	**3**	**1**	**-**	**-**	**4**

Pre-Requisite -
Anti-Requisite -
Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on Forensic psychology, wildlife forensics, forensic anthropology, forensic genetics, cyber forensics.

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

CO1 Understand the role of psychology studies in forensic science.
CO2 Apply the Forensics concepts for identification of Wild life
CO3 Discuss the importance of Anthropology and Genetics in forensic studies.
CO4 Apply the Cyber forensics in Crime Investigation

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	1	-	-	-	-	-	-	1	3	-	1
CO2	3	1	-	-	-	-	-	-	1	3	-	1
CO3	3	1	-	-	-	-	-	-	1	3	-	1
CO4	3	1	-	-	-	-	-	-	1	-	-	-
Course Correlation Mapping	3	1	-	-	-	-	-	-	1	3	-	1

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: FORENSIC PSYCHOLOGY **(9 Periods)**

Forensic psychology, Importance of forensic psychology, Role of forensic psychology in Civil and Criminal cases, Modus Operandi and its role in criminal investigations, criminal profiling, methods of investigations, Narco analysis, Hypnosis, Brain Fingerprinting.

Module 2: WILDLIFE FORENSICS **(9 Periods)**

Introduction to Wild life Forensics, Protected and endangered species of Animals and Plants, Identification of wild life materials, Identification of Pug marks of various animals, Forensic (medico-legal) necropsy of wildlife, Identification of Pollen grains

Module 3: FORENSIC ANTHROPOLOGY (9 Periods)

Definition and Scope, Identification of different types of bones, Age and gender determination from skull, Pelvis, and skeletal remains, Significance of Somatoscopy, Somatometery, Osteometery and Craniometery in Personal Identification

Module 4: FORENSIC GENETICS (9 Periods)

General principles of DNA extraction and PCR, Personal identification techniques - PCR, RFLP, Y-STR, Mitochondrial DNA, DNA profiling applications in disputed paternity cases, child swapping, missing person's identity

Module 5: CYBER FORENSICS (9 Periods)

Cyber Forensic, Cyberspace, Computer crime, LAN,WAN, MAN, IT ACT 2000, OSI Model, Basic principle of security, Active attack, Passive attack, Basic of Forensic Speaker Identification, Hacking and Types of Hackers, Basic of Cryptography and Stegnography

Total Periods: 45

EXPERIENTIAL LEARNING:

1. Identification of Pug marks of animals
2. Determination of sex from Skull Sutures and Pelvis
3. Determination of age from teeth and Skull
4. DNA extraction of conventional method

RESOURCES

TEXT BOOKS:

1 A Seigel, P.J Saukoo, G C Knupfer; Encyclopedia of Forensic Sciences Vol. I, II and III, Acad. Press, 2000.

2 Saferstein, Richard, Handbook of Forensic Science, Vol. I, II, (Ed.) Prentice Hall, Eaglewood Cliffs, New Jersey, 2003.

REFERENCE BOOKS:

1 William Goodwin, Adrian Linacre, Sibte Hadi; An introduction to forensic genetics John Wiley & Son's ltd, UK, 2001.

2 R.L. Beals, H. Hoizer, H. An introduction to Anthropology, Macmillan, New Delhi, 1985.

3 W.M. Krogman, M. Iscan, Human Skeleton in Forensic Medicine Charles &Thomas, U.S.A,1987.

VIDEO LECTURES:

1 https://www.youtube.com/watch?v=to96vIX5Dug
2 https://www.youtube.com/watch?v=s7Qqrb-m0rA
3 https://www.youtube.com/watch?v=wl9prpOuHD8
4 https://www.youtube.com/watch?v=9cvlsQoqWEY
5 https://www.peertechzpublications.org/journals/forensic-science-today

WEB RESOURCES:

1 https://www.cfsre.org/research/forensic-biology
2 https://www.ijfmt.com/issues.html
3 https://collegedunia.com/exams/forensic-chemistry-definition-methods-job-profile-chemistry-articleid-2167
4 https://cfslhyd.gov.in/Ballistics%20Division.html
5 https://www.youtube.com/watch?v=GjkaWca9rd0

PROGRAM ELECTIVE

Course Code	Course Title	L	T	P	S	C
22BS102024	FUNDAMENTALS OF ANALYTICAL CHEMISTRY	3	-	3	-	4.5

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on Quantitative analysis, Treatment of analytical data, Chromatography, Spectrophotometry and Atomic and molecular spectroscopy**.**

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

CO1 Understand the types of volumetric analysis and steps involved in gravimetric analysis.

CO2 Familiar with the types of analytical errors and can able to minimize them

CO3 Analyze and solve problems associated with water, and address the societal, health and safety issues related to quality of water

CO4 Apply chromatography techniques for separation of compounds.

CO5 Demonstrate the basic knowledge of instrumental methods and their applications in the structural analysis of materials

CO6 Work independently and in teams to solve problems with effective ccyberommunications.

CO-PO-PSO Mapping Table:

Learning Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	1	-	-	3
CO2	3	2	-	-	-	-	-	-	1	-	-	3
CO3	2	3	-	-	1	-	-	-	-	-	-	2
CO4	3	-	-	-	-	-	-	-	-	-	-	2
CO5	3	-	-	-	-	-	-	-	1	-	-	3
CO6	1	2	-	-	-	-	3	2	1	-	-	1
Course Correlation Mapping	3	2	-	-	1	-	3	2	1	-	-	3

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: QUANTITATIVE ANALYSIS (09 Periods)

Principles of volumetric analysis, concentration terms, preparing solutions-Standard solution, primary standards and secondary standards.
Principles of volumetric analysis: Theories of acid-base, redox, complexometric, iodometric and precipitation titrations - choice of indicators for these titrations.
Principles of gravimetric analysis: precipitation, coagulation, peptization, coprecipitation, post precipitation, digestion, filtration, and washing of precipitate, drying and ignition.

Module 2: TREATMENT OF ANALYTICAL DATA (09 Periods)

Description and use of common laboratory apparatus; Types of errors-Relative and absolute, significant figures and its importance, accuracy- methods of expressing accuracy, errors-Determinate and indeterminate and minimization of errors, precision-methods of expressing precision, standard deviation and confidence interval.

Module 3: WATER ANALYSIS AND SOLVENT EXTRACTION (09 Periods)

Water Analysis: Determination of dissolved solids, total hardness of water, turbidity, alkalinity, Dissolved oxygen, COD, determination of chloride using Mohr's method.
Solvent Extraction: Introduction, principle, techniques, factors affecting solvent extraction, Batch extraction, continuous extraction and counter current extraction; Waste water treatment by solvent extraction

Module 4: COLUMN CHROMATOGRAPHY AND LIQUID CHROMATOGRAPHY (08 Periods)

Column chromatography: Principle, Experimental procedure, stationary and mobile phases, development of the chromatogram, applications, Reverse phase column chromatography.
Liquid Chromatography: HPLC, Basic principles, instrumentation–block diagram and applications. Difference between column and HPLC.

Module 5: INTRODUCTION TO SPECTROSCOPY (10 Periods)

Introduction to spectroscopy–types of energy present in molecules, types of spectra, UV-Vis spectroscopy – principle, types of electronic transitions, chromophore, auxochrome, Bathochromic shift, Hypsochromic shift, Instrumentation of UV-Vis spectrophotometer, applications; Infrared spectroscopy – principle, types of vibrational modes, group frequencies, Instrumentation of IR spectrophotometer, applications; Mass spectrometry (MS) – Principle, Instrumentation and Applications; principle and applications of physicochemical methods (SEM, TEM, X-ray diffraction).

Total Periods: 45

EXPERIENTIAL LEARNING

LIST OF EXERCISES: Minimum 10 exercises have to be done

1. Determination of hardness of ground water sample
2. Determination of alkalinity of Water sample
3. Estimation of Dissolved Oxygen in water by Winkler's method

4. Estimation of residual chlorine in drinking water
5. Estimation of Iron(II) using standard Potassium dichromate solution
6. Verification of Beer lambert's law
7. Separation of given mixture of amino acids using ascending paper chromatography
8. Separation of a given dye mixture (methyl orange and methylene blue) using TLC (using alumina as adsorbent).
9. Separation of triglycerides using TLC
10. Separation of food dyes using Column Chromatography.
11. Identification of compounds using IR spectrum
12. Determination of Calcium in Limestone

RESOURCES

TEXT BOOKS:

1 F. James Holler, Stanley R Crouch, DonaldM. West and Douglas A. Skoog,Fundamentals of Analytical Chemistry, Cengage Publications, 9th edition.

2 John Mendham, Textbook of Vogel's Quantitative Chemical Analysis,Pearson Education Asia, 6th edition.

REFERENCE BOOKS:

1 Gary D. Christian, Purnendu K. Dasgupta and Kevin A. Schug, Analytical Chemistry, Wiley Publications, 7th edition.

2 S.S. Dara and D.D. Mishra,Textbook of Environmental Chemistry and Pollution Control, SChand & Co Ltd, Revised edition.

VIDEO LECTURES:

1. https://shorturl.at/adkzM
2. https://shorturl.at/esJW1
3. https://www.youtube.com/watch?v=eYYCWGRTmcg
4. https://www.youtube.com/watch?v=ZN7euA1fS4Y
5. https://archive.nptel.ac.in/courses/104/106/104106122/

WEB RESOURCES:

1. https://in.okfn.org/files/2013/07/An-Introductory-Course-of-Quantitative-Chemical-Analysis.pdf
2. https://bionmr.unl.edu/courses/chem221/lectures/chapter-00-01.ppt
3. https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/water-analysis
4. https://www.sciencedirect.com/topics/biochemistry-genetics-and-molecular-biology/column-chromatography
5. https://www.google.co.in/books/edition/Handbook_of_Spectroscopy/RkgGVFlck6QC?hl=en&gbpv=1&dq=spectroscopy&printsec=frontcover

PROGRAM ELECTIVE

Course Code	Course Title	L	T	P	S	C
22BS102027	ADVANCED GENERAL CHEMISTRY	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on Cyclic Aromatic Hydrocarbons, Medicinal Chemistry, Agriculture Chemistry, Fuel chemistry, Articles used in daily life

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

CO1 Understand the most popular cyclic aromatic hydrocarbons.
CO2 Know the role of Chemistry in medicine, Agriculture and fuels.
CO3 Apply the chemistry in daily life.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	3
CO2	3	-	-	-	-	-	-	-	-	-	-	3
CO3	3	-	-	-	1	1	-	-	-	-	-	2
Course Correlation Mapping	3	-	-	-	1	1	-	-	-	-	-	3

Correlation Levels: **3: High;** **2: Medium;** **1: Low**

COURSE CONTENT

Module 1: CYCLIC AROMATIC HYDROCARBONS **(09 Periods)**

Polycyclic aromatic hydrocarbons: Naphthalene and anthracene: Isolation from coal tar, Haworth synthesis, Products of electrophilic substitution: nitration, halogenation, sulphonation, addition reactions with hydrogen and bromine, carcinogenisity of hgiher poly aromatic hydrocarbons.

Heterocyclic compounds- Preparation and applications of furan, pyrrole, thiophene and pyridine

Module 2: MEDICINAL CHEMISTRY **(09 Periods)**

Classification of drugs, Sulpha drugs- synthesis of sulphanilimide, structure and uses of sulphadiazine and sulphamethoxazole, Antibiotics- Structure of penicillin, broad spectrum antibiotics and their uses, Biosynthesis of benzylpenicillin, Antipyretics:-synthesis and uses of aspirin, Anti-inflammatory- synthesis and uses of Ibubrufan

Module 3: AGRICULTURE CHEMISTRY **(09 Periods)**

Fertilizers: manufacture of urea, role of macro and micro nutrients.
Pesticides- synthesis and biological activity of DDT, BHC, Herbicides- synthesis and and biological activity of 2,4-D and 2,4,5-T, **fungicides** - synthesis and biological activity of thiocarbamate

Module 4: FUEL CHEMISTRY **(10 Periods)**

Types of fuels, Comparison between solid, liquid and gaseous fuels, calorific value, numerical problems based on calorific value;
Liquid fuels- petroleum, Refining of petroleum, cracking of oils (Thermal and fixed bed-catalytic cracking), knocking and anti-knock agents, Octane and Cetane values, Synthetic petrol: Fischer-Tropsch method and Bergius process

Module 5: ARTICLES USED IN DAILY LIFE **(08 Periods)**

Glass: composition, manufacture and uses
Cement: Manufacture, composition and setting of cement, basic details of green cement,
Biodegradable polymers- Definition, types, mechanism and applications

Total Periods: 45

EXPERIENTIAL LEARNING

1. Alternative to petroleum
2. Collection of names of analgesics, antipyretics, antiseptics, antimalarial, sadaditives
3. production of sugar and paper
4. Re-enfored plastics
5. Chemistry in daily life

RESOURCES

TEXT BOOKS:

1. Biswas, A.K., Frontiers in Applied Chemistry, Narosa publishing house, 1989

REFERENCE BOOKS:

1. I. L. Finar, Organic Chemistry, Vol-2, 5th edition, Pearson education, London, 1975.
2. Thiagarajan,V.T., Pharmaceutical chemistry, K.S.C. Desikan & Co, Chennai,1995

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=RaBI3lAACKg
2. https://archive.nptel.ac.in/courses/104/106/104106131/
3. https://www.youtube.com/watch?v=jWzAbjwl8mQ

WEB RESOURCES:

1. https://www.vedantu.com/chemistry/agricultural-chemistry
2. https://archive.nptel.ac.in/courses/103/105/103105110/
3. https://www.thoughtco.com/examples-of-chemistry-in-daily-life-606816

PROGRAM ELECTIVE

Course Code	Course Title	L	T	P	S	C
22BS102082	FORENSIC ANTHROPOLOGY	3	-	2	-	4

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on Significance of Forensic Anthropology, Personal Identification – Somatoscopy, Facial Reconstruction, Application of Somatoscopy and Craniometry.

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

CO1 Gain knowledge of anthropology and its significance in forensic

CO2 Gain knowledge of personal identification applying somatoscopy

CO3 Gain knowledge of personal identification applying somatometry

CO4 Know the techniques of facial reconstruction

CO5 Know the application of somatoscopy and craniometry in facial reconstruction

CO6 Evaluate methods to culture bacteria and characterization of different cells. Also work independently and in teams to solve problems with effective communications.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	2	-	1
CO2	3	-	-	-	-	-	-	-	-	2	-	1
CO3	3	-	-	-	-	-	-	-	-	2	-	1
CO4	3	-	-	-	-	-	-	-	-	2	-	1
CO5	3	-	-	-	-	-	-	-	-	2	-	1
CO6	2	3	-	-	-	-	-	-	2	-	-	-
Course Correlation Mapping	3	3	-	-	-	-	-	-	2	2	-	1

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: SIGNIFICANCE OF FORENSIC ANTHROPOLOGY (09 Periods)

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

Module 2: PERSONAL IDENTIFICATION – SOMATOSCOPY (09 Periods)

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

Module 3: PERSONAL IDENTIFICATION –SOMATOMETRY (09 Periods)

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

Module 4: FACIAL RECONSTRUCTION (09 Periods)

Portrait Parle/ Bertillon system. Photofit/identity kit. Facial superimposition techniques. Cranio facial super imposition techniques – photographic super imposition, video superimposition, Roentgenographic superimposition

Module 5: APPLICATION OF SOMATOSCOPY AND CRANIOMETRY (09 Periods)

Use of somatoscopic and craniometric methods in reconstruction. Importance of tissue depth in facial reconstruction. Genetic and congenital anomalies – causes, types, identification, and their forensic significance

Total Periods: 45

EXPERIENTIAL LEARNING

List of Experiments (Minimum 10 experiments shall be conducted)

1. To determine age from skull and teeth.
2. To determine sex from the skull.
3. To determine sex from the 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 the human skull
8. To estimate stature from long bone length
9. To conduct a portrait parley using a photofit identification kit
10. To prepare a report on anthropological criminal cases
11. To study missing persons using forensic odontology
12. To Prepare reports on cases using bite marks

RESOURCES

TEXT BOOKS:

1. M.Y. Iscan and S.R. Loth, The Scope of Forensic Anthropology, Introduction to Forensic Sciences, 5th edition W.G. Eckert (Ed.), CRC Press, Boca Raton, 2013.

REFERENCE BOOKS:

1. S. Rhine, Bone Voyage: A Journey in Forensic Anthropology, University of Mexico Press, Mexico, 2011.
2. D. Ubelaker and H. Scammell, Bones, M. Evans & Co., New York, 2010.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=9Jrd5kJ-vTU
2. https://www.youtube.com/watch?v=5aFTxkydkzk
3. https://www.youtube.com/watch?v=mWxcwr1BuU0
4. https://www.youtube.com/watch?v=eweluaZ0tCw
5. https://www.youtube.com/watch?v=6G0LvImAGAg

Web Resources:

1. https://egyankosh.ac.in/bitstream/123456789/89047/1/Unit-1.pdf
2. https://www.intechopen.com/chapters/73372
3. https://forensicfield.blog/personal-identification-technique-and-their-importance-in-determination-of-age-and-sex/
4. https://www.sci.muni.cz/somatoskopie/en
5. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4606364/

PROGRAM ELECTIVE

Course Code	Course Title	L	T	P	S	C
22BS102083	**WILDLIFE FORENCIS**	**3**	**-**	**2**	**-**	**4**

Pre-Requisite - 22BS102078 FORENSIC BIOLOGY

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course introduces wildlife forensics, focusing on the investigation of wildlife crime, species identification, and conservation practices. It covers evidence collection, legal protections, and forensic analysis of both animal and plant specimen.

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

CO1 Explain the fundamentals of wildlife forensics and wildlife crime investigation.

CO2 Identify, collect, and preserve various types of wildlife forensic samples

CO3 Analyze the Wildlife (Protection) Act of 1972 and related policies

CO4 Differentiate physical and genetic evidence in wildlife forensics

CO5 Apply knowledge of the Kingdom Animalia and Plantae

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	2	-	1
CO2	3	-	-	-	-	-	-	-	-	2	-	1
CO3	3	-	-	-	-	-	-	-	-	2	-	1
CO4	3	-	-	-	-	-	-	-	-	2	-	1
CO5	3	-	-	-	-	-	-	-	-	2	-	1
Course Correlation Mapping	3	3	-	-	-	-	-	-	2	2	-	1

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: INTRODUCTION TO WILDLIFE FORENSICS (09 Periods)

Concept of Wildlife crime, Wildlife crime investigation, Sample Types, Sample collection and preservation, Sample analysis, Wildlife conservation and Management Practices,

Module 2: CONCEPT OF WILDLIFE CRIME (09 Periods)

Protected and endangered species of animals and plants; Sanctuaries and their importance; Relevant provision of wild life and environmental act; Enforcement of wildlife protection policy, Wildlife (Protection) Act-1972 .

Module 3: SIGNIFICANCE OF WILDLIFE FORENSICS (09 Periods)

Fundamentals of wildlife forensics. Significance of wildlife forensics. Protected and endangered species of animals and plants. Illegal trading in wildlife items includes skin, fur, bone, horn, teeth, flowers, and plants. Identification of physical evidence of wildlife forensics. Identification of pug marks of various animals

Module 4: INTRODUCTION TO KINGDOM ANIMALIA (09 Periods)

Introduction to Kingdom Animalia, Trade or Commerce in Wild Animals, Animal Article and Trophies, Concept of endangered, vulnerable species, Biological and Toxicological examinations of fauna with respect to blood, tissue, hair, bones, nails, claws, teeth other body parts and their derivatives. Wildlife genetics

Module 5: INTRODUCTION TO KINGDOM PLANTAE (09 Periods)

Introduction to Kingdom Plantae, Plant as trace evidence, Collection and preservation of Botanical evidence, Trade or Commerce in Wild plants, medicinal and aromatic plants, Reserved and protected Forest area, Timber and other Forrest Produce, Morphological and anatomical study of Confiscated plant samples, Genetic Identification of plant and wood samples.

Total Periods: 45

EXPERIENTIAL LEARNING

List of Experiments (Minimum 10 experiments shall be conducted)

1. To determine age from skeletal remains .
2. To determine sex from the sketal remains.
3. To determine animal from the pug marks
4. To study identification and description of bones and their measurements.
5. To investigate the differences between animal and human bones
6. To compare & identify stature from length of the bone
7. To conduct a portrait parley using a photofit identification kit
8. To prepare a case report on problems of wildlife forensics

RESOURCES

TEXT BOOKS:

1. . Skoog, Holler, Crouch, Principles Of Instrumental Analysis, 6th Edition, 2007.
H.H Willard Et Al, Instrumental methods of analysis, CBS Publishers and Distributors,.

REFERENCE BOOKS:

1. Quantitative Chemical Analysis, Daniel C. Harris, 6th Ed. WH Freeman & Co. NewYork, 2003.
Chapmen JR; Practical Organic Mass Spectrometry- A Guide for Chemical and Biochemical Analysis, Wiley & sons, NY(1993)
Gray, Instrumental Methods of Analysis, 1st Edition, CBS Publisher, 2011.
Introduction to spectroscopy, Donald L Pavia, Gary M. Lampman, and George S.

VIDEO LECTURES:

1. https://youtu.be/5zh76-Q8tAk
2. https://youtu.be/qeRBcSM6Nvg
3. https://youtu.be/H-y5MxKnTiQ
4. https://youtu.be/aMkcU1XvtcU
5. https://youtu.be/rzf7usaAuyY

WEB RESOURCES

1. https://www.youtube.com/watch?v=qeRBcSM6Nvg
2. https://www.biointeractive.org/classroom-resources/csi-wildlife
3. https://www.tracenetwork.org/practical-resources
4. https://www.wildlifeforensicscience.org/documents
5. https://www.izw-berlin.de/en/wildlife-forensics.html

PROGRAM ELECTIVE

Course Code	Course Title	L	T	P	S	C
22BS102084	**FORENSIC ENTOMOLOGY**	**3**	**-**	**1**	**-**	**3.5**

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course introduces forensic entomology, focusing on insect life cycles, evidence collection, and analysis to estimate postmortem intervals. It covers practical techniques and applications in criminal investigations

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

CO1	Explain the principles of forensic entomology and identify key insect species of forensic importance by understanding their biology, taxonomy, and life cycles.
CO2	Analyze postmortem changes and insect succession on carrion to estimate the postmortem interval (PMI) using entomological evidence in various environmental contexts.
CO3	Apply modern techniques in forensic entomology to enhance the precision of forensic investigations.
CO4	Preserve and interpret entomological evidence to accurately estimate time of death and analyze insect developmental stages associated with decomposing remains.
CO5	Demonstrate the procedures for laboratory rearing of forensic insects and understand the role of forensic entomologists

CO-PO-PSO Mapping Table:

Learning Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	1	-	-	3
CO2	3	2	-	-	-	-	-	-	1	-	-	3
CO3	2	3	-	-	1	-	-	-	-	-	-	2
CO4	3	-	-	-	-	-	-	-	-	-	-	2
CO5	3	-	-	-	-	-	-	-	1	-	-	3
Course Correlation Mapping	3	2	-	-	1	-	3	2	1	-	-	3

Correlation Levels: **3: High;** **2: Medium;** **1: Low**

COURSE CONTENT

Module 1: INTRODUCTION TO ENTOMOLOGY (09 Periods)

Intro to Forensic Entomology Life cycle and stages of insects of forensic Use, General Entomology (Biology & Taxonomy), Insects of Forensic Importance Collection of Entomological Evidence,

Module 2: POSTMORTEM CHANGES IN ENTOMOLOGY (09 Periods)

Chemical Attraction, Biology of the Maggot Mass, Temperature Tolerances, Medico legal Forensic Entomology, Postmortem Decomposition, Insect Succession in a Natural Environment, Factor that Influence Insect Succession on Carrion, Estimating Postmortem Interval, Insect, Development and Forensic Entomology.

Module 3: MODERN TECHNIQUES IN ENTOMOLOGY (09 Periods)

Soil Environment Entomotoxicology, Medical Entomology, Entomological Alteration of Bloodstain Evidence, Molecular Methods for Forensic Entomology.

Module 4: PRESERVATION AND ANALYSIS OF ENTOMOLOGICAL EVIDENCE (08 Periods)

Preservation and Analysis of entomological evidence, Metamorphosis of entomological insects and time interval, Estimation of time of death with entomological evidence

Module 5: LABORATORY REARING OF FORENSIC INSECTS (10 Periods)

Laboratory Rearing of Forensic Insects Urban/Stored Product Forensic Entomology, The Role of Aquatic Insects in Forensic Investigations, The Forensic Entomologis.t as Expert Witness.

Total Periods: 45

EXPERIENTIAL LEARNING

LIST OF EXERCISES: Minimum 10 exercises have to be done

1. Identify images or specimens of common forensic insects (e.g., blowflies, flesh flies, beetles)
2. create posters showing the life cycle stages of a forensic insect and label development times.
3. observe and collect harmless insects (using nets or jars). Students record insect types and habitats.
4. To study the methods to collect insects at crime scene (sweep netting, pup-tent traps, soil sampling)
5. Study how substrate (sand, soil, sawdust, hard surfaces) affects larval burrowing depth/time to pupariation.
6. Place raw meat in a sealed jar (with ventilation holes). Observe fly egg laying, maggot formation, and pupation over several days.
7. Provide sample data (e.g., insect development time and temperature logs), and guide students to estimate time of death using tables or charts
8. to preserve an insect in alcohol or pin it for a collection using basic materials.

RESOURCES

TEXT BOOKS:

1 Jason H. Byrd & James L. Castner , Forensic Entomology: The Utility of Arthropods in Legal Investigations, 2nd Edition (CRC Press, 2010)

2 Bernard Greenberg & John C. Kunich , Entomology and the Law: Flies as Forensic Indicators, 1st Edition (Cambridge University Press, 2002).

REFERENCE BOOKS:

1 Dorothy Gennard, Forensic Entomology: An Introduction, 2nd Edition (Wiley-Blackwell, 2012)

2 Kenneth G.V. Smith, , A Manual of Forensic Entomology **:** Classic Text (British Museum/Natural History, 1986)

VIDEO LECTURES:

1. https://www.classcentral.com/course/youtube-entomology-2019-keynote-presentation-222667
2. https://www.youtube.com/watch?v=pAlLkYSEfC4
3. https://www.youtube.com/watch?v=eYYCWGRTmcg
4. https://www.youtube.com/watch?v=ZN7euA1fS4Y
5. https://archive.nptel.ac.in/courses/104/106/104106122/

WEB RESOURCES:

1. https://in.okfn.org/files/2013/07/An-Introductory-Course-of-Quantitative-Chemical-Analysis.pdf
2. https://bionmr.unl.edu/courses/chem221/lectures/chapter-00-01.ppt
3. https://learn.k20center.ou.edu/lesson/4659?utm_source=chatgpt.com
4. https://www.sciencedirect.com/topics/biochemistry-genetics-and-molecular-biology/column-chromatography
5. https://www.google.co.in/books/edition/Handbook_of_Spectroscopy/RkgGVFlck6QC?hl=en&gbpv=1&dq=spectroscopy&printsec=frontcover

PROGRAM ELECTIVE

Course Code	Course Title	L	T	P	S	C
22BS101087	VARIOUS DIVISIONS IN FORENSIC SCIENCE	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on Quantitative analysis, Treatment of analytical data, Chromatography, Spectrophotometry and Atomic and molecular spectroscopy.

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

CO1	Understand the types of volumetric analysis and steps involved in gravimetric analysis.
CO2	Familiar with the types of analytical errors and can able to minimize them
CO3	Analyze and solve problems associated with water, and address the societal, health and safety issues related to quality of water
CO4	Apply chromatography techniques for separation of compounds.
CO5	Demonstrate the basic knowledge of instrumental methods and their applications in the structural analysis of materials
CO6	Work independently and in teams to solve problems with effective communications.

CO-PO-PSO Mapping Table:

Learning Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	1	-	-	3
CO2	3	2	-	-	-	-	-	-	1	-	-	3
CO3	2	3	-	-	1	-	-	-	-	-	-	2
CO4	3	-	-	-	-	-	-	-	-	-	-	2
CO5	3	-	-	-	-	-	-	-	1	-	-	3
CO6	1	2	-	-	-	-	3	2	1	-	-	1
Course Correlation Mapping	3	2	-	-	1	-	3	2	1	-	-	3

Correlation Levels: **3: High;** **2: Medium;** **1: Low**

COURSE CONTENT

Module1: PHYSICS DIVISION (09 Periods)

(A) Physics Section: Glass Fracture studies, Glass pieces and fragments, Paint flakes, chips and smears, Footprints, shoe prints, Tyre impressions, Tool marks
(B) Ballistics Section: Firearms, Parts of Firearms, Cartridges, Cartridge cases, Bullets/ Pellets wads & Clothes and other materials affected by firing.
(C) Forensic Engineering: Road/ Train/ Vehicular Accidents Materials, Building Materials such as bricks, Cement, Mortar, Steel, etc

Module2: **CHEMISTRY DIVISION (09 Periods)**

(A) Chemistry Section: Explosives, its remnants, Residues, components etc. Arson and Fire residues, Suspected Petrol, Diesel and other Motor oils, Unknown substances in the form of solids liquids or gases, Suspected cosmetics, Toiletry, cement, metals Jewellery, ornaments, Alloys etc, Acid burn cases.
(B) Narcotics Section: Suspected powders, Liquids, Plant products, Toddy, Liquor and their adulteration
(C) Toxicology Section: Viscera, Body fluids, Suspected poisonous substances in plant materials, food, syringes, needles, Tablets, powders etc Bones, Ash, Skin, Vomit, Exhumed remnants.

Module 3: BIOLOGY DIVISION (09 Periods)

(A) Biology Section: Examination of Hair, Fibres, Diatoms, plants materials, Cigarettes butts, Insects, Flies, Maggots, Human tissues and animal origins etc
(B) Serology Section: Blood, Semen, Saliva, Other body fluids,
(C) DNA Fingerprinting Laboratory: Liquid blood, blood stains, & swabs, semen, Seminal stains, tissues, Bones, Hairs, Teeth, Saliva, Skeletal remains etc. Samples of Animal & Plants origins

Module 4: GENERAL DIVISION (08 Periods)

(A) Questioned Documents Section: Examination of Handwriting, Signatures, Erasures, obliterations, Alterations, Overwriting, secret writing, Type writing, printed matter, photocopies, Ink & Paper.
(B) Polygraph Section: Persons viz, Suspects, Witnesses or complainants
(C) Computer Forensic Section: Software, Hardware, Computer peripherals & products, Computer data, Text, Images, Audio & Video files on Storage Media.

Module 5: ALLIED INSTITUTES (10 Periods)

CCMB Centre for Cellular and Molecular Biology, CFPB- Central Finger print Bureau, IICT- Indian Institute of Chemical Technology, NIN- National institute of Nutrition and NIA- National Institute Agency etc

Total Periods: 45

EXPERIENTIAL LEARNING

1. Each student group selects a division (e.g., DNA fingerprinting or polygraphy) and creates an educational model or chart.

RESOURCES

TEXT BOOKS:

1. Houck, M. M., & Siegel, J. A.
   Fundamentals of Forensic Science, 3rd Ed., Academic Press, 2015.
2. Saferstein, R.
   Criminalistics: An Introduction to Forensic Science, 11th Ed., Pearson, 201
3. James, S. H., Nordby, J. J., & Bell, S.
   Forensic Science: An Introduction to Scientific and Investigative Techniques, 4th Ed., CRC Press, 2014.
4. Skoog, D. A., West, D. M., Holler, F. J., & Crouch, S. R.
   Fundamentals of Analytical Chemistry, Cengage Learning, 9th Ed., 2013. (Useful for spectrophotometry, chromatography)
5. Ellen, D.
   The Scientific Examination of Documents, CRC Press, 2005.

REFERENCE BOOKS:

1. W.J. Tilstone, Fisher's Techniques of Crime Scene Investigation, CRC Press, Boca Raton, 2013.
2. An Introduction to Scientific and Investigative Techniques, CRC Press,2014
3. Criminalistics: An Introduction to Forensic Science, Pearson Education,11th Edition, 2015

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=kAOyRUvOgWg
2. https://www.youtube.com/watch?v=NE55TyJqxZY
3. https://www.youtube.com/watch?v=THdVgJeavIY

WEB RESOURCES:

1. https://www.nfsu.ac.in/
2. https://nij.ojp.gov/topics/forensics
3. https://www.sciencedirect.com/journal/forensic-science-international

PROGRAM ELECTIVE

Course Code	Course Title	L	T	P	S	C
22BS101085	FUNDAMENTALS OF COMPUTERS	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on Quantitative analysis, Treatment of analytical data, Chromatography, Spectrophotometry and Atomic and molecular spectroscopy**.**

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

CO1	Understand basic computer functionality, types, components, input devices, and basic software operations like file and folder management.
CO2	Navigate and utilize computer networks, including internet tools, search engines social networks.
CO3	Identify and manage computer hardware components and configure system settings.
CO4	Assemble, disassemble, and upgrade computers, BIOS/UEFI and hardware components.
CO5	Perform preventive maintenance and troubleshoot hardware and software issues for reliable computer performance.

CO-PO-PSO Mapping Table:

Learning Outcomes	Program Outcomes									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	1	-	-	3
CO2	3	2	-	-	-	-	-	-	1	-	-	3
CO3	2	3	-	-	1	-	-	-	-	-	-	2
CO4	3	-	-	-	-	-	-	-	-	-	-	2
CO5	3	-	-	-	-	-	-	-	1	-	-	3
Course Correlation Mapping	3	2	-	-	1	-	3	2	1	-	-	3

Correlation Levels: **3: High;** **2: Medium;** **1: Low**

COURSE CONTENT

Module 1: INTRODUCTION TO COMPUTER (09 Periods)

Basic Computer Knowledge Computer organizations, types of computers, Components of computer, Input Devices Key board, mouse, touch pad and other pointing Devices, Desktop Icons and control panel objects, Operatingsystem types , Creating Files and Folders, Exploring the folders, files, and programs, Editing a document files

Module 2: INTRODUCTION TO COMPUTER NETWORKS (09 Periods)

Introduction to Computer Networks:Computer networks, Intranet, Surfing the Internet, ISPs and connection types, Search, Email, Virtual communities, Social Networks, Tools on the web

Module 3: COMPONENTS OF COMPUTER AND PRINTERS (09 Periods)

Introduction to the Computer Hardware, Power Supplies, Motherboards, Internal PC Components, External Ports and Cables, Input and Output Devices, Select Computer Components, Safe Lab Procedures, Procedures to Protect Equipment and Data, Proper Use of Tools, Software Tools, Antistatic Wrist Strap, Printers, Installing and Configuring Printers, Configuring Options and Default Settings, Optimizing Printer Performance, Sharing Printers, Print Servers, Maintaining and Troubleshooting Printers, Troubleshooting Printer Issues, Common Problems and Solution

Module 4: COMPUTER ASSEMBLY (08 Periods)

Assemble the Computer, Computer Disassembly, Install the Motherboard, Install Drives, Install Cables, Install the Adapter Cards, Install the Adapter Cards, BIOS Beep Codes and Setup, BIOS and UEFI Configuration, Upgrade and Configure a Computer, Storage Devices, Peripheral Devices

Module 5: PREVENTIVE MAINTENANCE AND TROUBLESHOOTING (10 Periods)

Preventive Maintenance and the Troubleshooting Process, PC Preventive Maintenance, Benefits of Preventive Maintenance, Preventive Maintenance Tasks, Clean the Case and Internal Components, Inspect Internal Components, Identify the Problem Probable Cause Test the Theory to Determine, Plan of Action to Resolve the Problem and Implement the Solution

EXPERIENTIAL LEARNING

List of Experiments

1. Basic Computer Knowledge
2. Introduction to Computer Networks
3. Components of Computer and Printers
4. Computer Assembly
5. Preventive Maintenance and Troubleshooting

RESOURCES

TEXT BOOKS:

1 P.K. Sinha & Priti Sinha, Computer Fundamentals, 6th Edition (BPB Publications, 2010).

2 V. Rajaraman, Fundamentals of Computers, 6th Edition (PHI Learning, 2014).

REFERENCE BOOKS:

1 Jean Andrews, A+ Guide to Hardware: Managing, Maintaining, and Troubleshooting, 8th Edition (Cengage Learning, 2016).

2 Doug Lowe, Networking All-in-One For Dummies, 7th Edition (Wiley, 2018).

VIDEO LECTURES:

1. https://youtu.be/y2kg3MOk1sY
2. https://youtu.be/9SIjoeE93lo

WEB RESOURCES:

1. https://edu.gcfglobal.org/en/computerbasics/
2. https://www.geeksforgeeks.org/computer-network-tutorials/
3. https://www.pcguide.com/
4. https://www.logicalincrements.com/
5. https://www.lifewire.com/basic-computer-troubleshooting-3506852

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
22ME101702	**HUMAN RESOURCE MANAGEMENT**	**3**	**-**	**-**	**-**	**3**

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION:

Concepts of HRM; Environmental Scanning; Human Resource Planning; Job analysis; Job design; Job evaluation; Recruitment; Selection; Placement; Orientation; Training and Development; Performance appraisal; Merit rating; Compensation; Industrial relations; Trade unions; Industrial disputes; Ethical issues; Employee safety.

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

CO1 Demonstrate the knowledge on the principles, processes and practices of human resource management.

CO2 Analyze the key issues related to administering the human elements such as motivation, recruitment, training and development, compensation, appraisal, and career development.

CO3 Provide solutions to plan and manage human resource functions effectively within organization.

CO4 Apply HRM concepts and techniques in strategic planning to improve organizational effectiveness.

CO5 Evaluate HRM related social, cultural and safe responsibilities and issues in a global context.

CO-PO Mapping Table

Course Outcomes	Program Outcomes								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	2	1	1	-	1	-	-	-
CO2	3	3	1	1	-	1	-	-	-
CO3	3	2	3	1	-	-	-	-	-
CO4	2	1	1	1	3	1	-	-	-
CO5	3	1	1	1	1	1	2	3	-
Course Correlation Mapping	3	2	1	1	2	1	2	3	-

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: INTRODUCTION TO HRM & HRP (09 Periods)

Introduction to Human Resource Management (HRM): Objectives, Scope and significance of HRM, Functions of HRM, Prospects in HRM, Environmental scanning.

Human Resource Planning (HRP): Introduction, Nature and importance of HRP, Factors affecting HRP, The planning process, Human resource planning and the Government, Requisites for successful HRP, Barriers to HRP.

Module 2: RECRUITMENT AND PLACEMENT (09 Periods)

Job Analysis – Nature and process of job analysis, Methods of collecting job data, Potential problems with job analysis, Requisites for job analysis; Job Design - Factors, Job design approaches, Contemporary issues; Job evaluation - Process, Methods; Recruitment - Nature, Purposes and importance, Factors governing recruitment, Recruitment process, Evaluation and control; Selection – Nature, Process, Barriers to effective selection, Evaluation of selection process, Placement; Separation.

Module 3: HUMAN RESOURCE DEVELOPMENT AND COMPENSATION (09 Periods)

Orientation - Orientation programme, Requisites of an effective programme, Evaluation of orientation programme, Problems of orientation; Training and development – Nature, Inputs, Training process, Methods, Impediments to effective training, Management development, Career development, Talent management; Performance Appraisal - Nature, Appraisal process, Challenges of performance appraisal; Merit rating; Compensation - Philosophy, Components, Theories, Factors influencing employee compensation, Challenges, Wage and salary administration.

Module 4: INDUSTRIAL RELATIONS AND TRADE UNIONS (09 Periods)

Industrial Relations (IR): Nature of IR, Importance of Peaceful IR; Approaches to IR - Unitary Approach, Pluralistic approach, Marxist approach; Parties to IR; IR strategy; Industrial Disputes - Nature, Causes, and Settlement.

Trade unions: Nature of trade unions, Strategic choices before unions, Union tactics, Trade union movement in India, Trends in trade union movement, Managing unions; Indian Factories Act; Employee's compensation Act; Industrial disputes Act.

Module 5: ETHICAL ISSUES AND SAFETY ADMINISTRATION (09 Periods)

Managing Ethical Issues in HRM: Nature of ethics, Sources of business ethics, Myths about ethics, Ethical dilemmas, HR ethical issues, Managing ethics, Improving ethical decision making.

Employee Safety: Safety, Need for safety, Types of accidents, Safety programme, ISO safety standards.

Total Periods: 45

EXPERIENTIAL LEARNING

1. What are the challenges that are faced by HR in effective performance management including performance appraisal in MNCs? Discuss in detail in the contemporary of HRM.
2. Evaluate employee relations in a comparative perspective across few countries of your choice. Describe in brief by taking a case study.
3. Visit an organization or industry and Evaluate HRM related social, cultural, ethical and environmental responsibilities and issues in a global context.

(Note: Course instructor may change the activities and the same shall be reflected in course handout)

RESOURCES

TEXT BOOKS:

1. Aswathappa K, Human Resource Management, Tata McGraw Hill Private Limited, 8th edition, 2017.
2. Garry Dessler and BijuVarkkey, Human Resource Management, Pearson India, 16th Edition, 2020.

REFERENCE BOOKS:

1. Raymond A. Noe, John R. Hollenbeck, HRM: Gaining a Competitive Advantage, TMH, 7th edition, 2010.
2. Bohlander George W, Snell Scott, Principles of Human Resource Management,Cengage Learning, 16th edition, 2016.
3. Edwin B. Flippo, Personnel Management, McGraw-Hill International editions, 6th edition, 1984.

VIDEO LECTURES:

1. https://nptel.ac.in/courses/122105020
2. https://onlinecourses.nptel.ac.in/noc20_mg15/preview
3. https://www.digimat.in/nptel/courses/video/122105020/L01.html

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
22ME101703	MANAGEMENT SCIENCE	3	-	-	-	3

Pre-Requisite -
Anti-Requisite -
Co-Requisite -

COURSE DESCRIPTION:
Concepts of Management; Concepts Related to ethics and social responsibility; Human Resource Management; Operations Management; Statistical Process Control; Inventory Management; Marketing; Project Management; Project Crashing.

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

CO1 Demonstrate the concepts of management, its functions and processes used in optimum resource utilization within the context of ethics and social responsibility.
CO2 Apply the concepts of HRM for selection and management of human resources.
CO3 Analyze different operations management problems using quality management tools to produce effective, efficient and adoptable products/services
CO4 Identify different marketing strategies to maximize enterprise profitability and customer satisfaction within the realistic constraints
CO5 Develop network models in time-cost trade-off for effective project management.

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO1	3	1	1		1	1	1	1			1	
CO2	3	2	1		1						1	
CO3	3	3	1	1	1						1	
CO4	3	2	1		1	1					1	
CO5	3	3	3	1	1	1					2	
Course Correlation Mapping	3	2	1	1	1	1	1	1			1	

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: MANAGERIAL FUNCTION AND PROCESS (10 Periods)
Concept and foundations of management, Evolution of management thought; Managerial functions – Planning, Organizing, Directing and Controlling; Decision-making; Role of manager, managerial skills; Managing in a global environment, Flexible systems management; Social responsibility and managerial ethics; Process and customer orientation; Managerial processes on direct and indirect value chain.

Module 2: HUMAN RESOURCE MANAGEMENT (08 Periods)
Human Resource challenges; Human Resource Management functions; Human Resource Planning; Job analysis; Job evaluation, Recruitment and selection; Training and Development; Promotion and transfer; Performance management; Compensation management and benefits; Employee morale and productivity; Human Resource Information System.

Module 3: OPERATIONS MANAGEMENT (10 Periods)

Fundamentals of Operations Management, Services as a part of operations management; Facilities location and layout; Line balancing; Quality management – Statistical Process Control, Total Quality Management, Six sigma; Role and importance of materials management, Value analysis, Make or Buy decision, Inventory control, Materials Requirement Planning, Enterprise Resource Planning, Supply Chain Management.

Module 4: MARKETING MANAGEMENT (08 Periods)

Concept, evolution and scope; Marketing strategy formulation and components of marketing plan; Segmenting and targeting the market; Positioning and differentiating the market offering, Analyzing competition; Product strategy; Pricing strategies; Designing and managing marketing channels; Integrated marketing communications.

Module 5: PROJECT MANAGEMENT (09 Periods)

Project management concepts; Project planning – Work Breakdown Structure, Gantt chart; Project scheduling – Critical Path Method, Program Evaluation and Review Technique, Crashing the project for time-cost trade off; Resource Levelling.

Total Periods: 45

EXPERIENTIAL LEARNING

1. Find the social responsibilities in the context of management theoretically and practically in an organization? Explain them by taking a real case study in any organization (preferably in your organization).
2. Gaining market share should be one of management's primary goals because of its effect on operations and profitability. Comment. What Strategies Do Companies Employ to Increase Market Share?
3. A Gantt chart is a visualization that helps in scheduling, managing, and monitoring specific tasks and resources in a project. Prepare a gantt chart for Online food ordering system.

(Note: It's an indicative one. Course instructor may change the activities and the same shall be reflected in course handout)

RESOURCES

TEXT BOOKS:

1. MartandT. Telsang, Industrial Engineering and Production Management, S. Chand, 3rd Edition, 2018.
2. Koontz and Weihrich, Essentials of Management, TMH, New Delhi, 11th Edition, 2020.

REFERENCE BOOKS:

1. O.P. Khanna, Industrial Engineering and Management, Dhanpat Rai and Sons, 2018.
2. N.D. Vohra, Quantitative Techniques in Management, TMH, New Delhi, 5th Edition, 2014.
3. L.M. Prasad, Principles and practice of Management, S. Chand and Sons, 2019.

VIDEO LECTURES:

1. https://archive.nptel.ac.in/courses/122/106/122106032/
2. https://www.digimat.in/nptel/courses/video/122102007/L01.html

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
22ME101704	MANAGING INNOVATION AND ENTERPRENEURSHIP	3	-	-	-	3

Pre-Requisite -
Anti-Requisite -
Co-Requisite -

COURSE DESCRIPTION: Evolution of entrepreneurship from economic theory Managerial and entrepreneurial competencies; Concepts of Shifting Composition of the Economy Purposeful Innovation & Sources of Innovative Opportunity; The Innovation Process; Innovative Strategies; Entrepreneurial Motivation; Entrepreneurs versus inventors; Ethics and International Entrepreneurship; Strategic Issues in International Entrepreneurship; Problem solving Innovation and Diversification

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

CO1 Demonstrate the principles of innovation process for establishing Industrial ventures.
CO2 Identify and analyze the gaps in an organization for innovation in the context of developed economies
CO3 Develop a comprehensive and well-planned business structure for a new venture.
CO4 Demonstrate knowledge on intellectual property rights, patents, trademarks, copyrights, trade secrets and commercialization of intellectual property.
CO5 Apply ethics in constructive innovation framework and problem solving.

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO1	PO2	PO 3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO1 1	PO1 2
CO1	3	1	1		1	1	1	1			1	
CO2	3	2	1		1						1	
CO3	3	3	1	1	1						1	
CO4	3	2	1	1	1	1					1	
CO5	3	3	3	1	1	1					2	
Course Correlation Mapping	3	2	1	1	1	1	1	1			1	

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: CREATIVITY AND INNOVATION (09 Periods)

Introduction, Levels of innovation, Purposeful innovation and the sources of innovative opportunity, The innovation process, Innovative strategies, Strategies that aim at introducing and innovation, Dynamics of ideation and creativity – Inbound, Outbound; Context and process of new product development, Theories of outsourcing.

Module 2: PARADIGMS OF INNOVATION (09 Periods)

Systems approach to innovation, Innovation in the context of developed economies and

Emerging economies, Examining reverse innovation and itsapplication,Performancegap,Infrastructuregap,Sustainabilitygap,Regulatory gap, Preference gap, organizational factors effecting innovation at firm level.

Module 3: SOUCES OF FINANCE AND VENTURE CAPITAL (09 Periods)

Importance of finance, Comparison of venture capital with conventional development capital, Strategies of venture funding, Investment phases, Investment process, Advantages and disadvantages of venture capital, Venture capital developments in India.

Module 4: INTELLECTUAL PROPERTY INNOVATION AND ENTREPRENEURSHIP (09 Periods)

Introduction to Entrepreneurship, Evolution of entrepreneurship from economic theory, Managerial and entrepreneurial competencies, Entrepreneurial growth and development, Concepts, Ethics and Nature of International Entrepreneurship, Intellectual property – forms of IP, Patents, Trademarks, Design registration, Copy rights, Geographical indications, Patent process in India.

Module 5: OPEN INNOVATION FRAME WORK & PROBLEM SOLVING (09 Periods)

Concept of open innovation approach, Difference between open innovations and Cloud innovation approaches, Limitations and Opportunities of open innovation frame work, Global context of strategic alliance, Role of strategic alliance, Problem Identification and Problem Solving, Innovation and Diversification

Total Periods:45

EXPERIENTIAL LEARNING

1. Identify the Innovative Marketing Strategies for Startups
2. Identify the Coca-cola Company Intellectual Property Rights

(Note: It's an indicative one. Course instructor may change the activities and the same shall be reflected in course handout)

CASE STUDIES/ARTICELS:

Contemporary relevant case studies/ Articles will be provided by the course instructor at the beginning.

1. Tesla Inc.: Disrupting the Automobile Industry
   This case study examines how Tesla Inc. disrupted the traditional automobile industry through its innovative electric vehicles and sustainable energy solutions. It discusses the sources of innovative opportunity that Tesla leverages, the ideation and creativity dynamics involved in new product development, and the strategies that the company uses to introduce and market its innovations.
2. Google Inc.: Innovation in Developed Economies
   This case study explores how Google Inc. became a global leader in the technology industry through its innovative search engine, advertising, and cloud computing solutions. It highlights the performance gap that Google addressed, the regulatory and sustainability gaps that it leveraged, and the impact of its innovation strategies on the company's growth and profitability.

3. Flipkart: From Startup to Unicorn
   This case study examines how Flipkart, an Indian e-commerce company, secured venture capital funding to become one of the largest online marketplaces in India. It discusses the importance of finance in entrepreneurship, the advantages and disadvantages of venture capital, and the strategies that Flipkart used to attract venture funding.

4. Patanjali Ayurved: Building a Brand through Intellectual Property
   This case study explores how Patanjali Ayurved, an Indian consumer goods company, built a strong brand through its intellectual property strategies. It discusses the forms of IP that Patanjali leverages, the patent process in India, and the impact of IP on the company's growth and profitability.

5. Procter & Gamble: Innovation through Open Innovation
   This case study analyzes how Procter & Gamble, a global consumer goods company, leveraged open innovation to achieve unprecedented success in product development and marketing. It discusses the difference between open and cloud innovation approaches, the limitations and opportunities of open innovation, and the role of strategic alliances in global innovation.

RESOURCES

TEXT BOOKS:

1. Vinnie Jauhari, Sudhanshu Bhushan, Innovation Management, Oxford University Press, 1st Edition, 2014.
2. Drucker, P.F., Innovation and Entrepreneurship, Taylor & Francis, 2nd Edition, 2007.

REFERENCE BOOKS:

1. Robert D Hisrich, Claudine Kearney, Managing Innovation and Entrepreneurship, Sage Publications, 1st Edition, 2014.
2. V.K. Narayanan, Managing Technology and Innovation for Competitive Advantage, Pearson India, 1st Edition, 2002.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=wWsl48VLfVY
2. https://www.youtube.com/watch?v=dDpQ9ALKX0U
3. https://www.youtube.com/watch?v=Eu_hkxkJGTg

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
22LG101701	BUSINESS COMMUNICATION AND CAREER SKILLS	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: Nature and Scope of Communication, Corporate Communication, Writing Business Messages & Documents, Careers & Résumés, and Interviews.

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

CO1 Demonstrate knowledge of professional communication by analyzing and applying the styles and strategies of business communication in Communication Networks, Interpersonal, and Informal communication.

CO2 Analyze the limitations of communication by applying and demonstrating corporate and cross-cultural communication strategies effectively in a business context and Crisis Management situations.

CO3 Apply appropriate strategies and techniques in writing business messages, business letters, and résumé for effective professional communication and career building.

CO4 Demonstrate appropriate communication techniques and answering strategies by analyzing the expectations during presentations and interviews.

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	-	-	2	-	-	-	-	3	-	-
CO2	1	2	-	-	2	-	-	-	-	3	1	-
CO3	1	-	-	-	2	-	-	-	-	3	-	-
CO4	1	2	-	-	2	-	-	-	-	3	-	-
Course Correlation Mapping	2	2	-	-	2	-	-	-	-	3	1	-

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: NATURE AND SCOPE OF COMMUNICATION (9 Periods)

Introduction – Communication Basics – Functions of Communication – Communication Networks – Interpersonal Communication – Informal Communication – Communication Barriers – Roles of a Manager.

Module 2: CORPORATE COMMUNICATION (9 Periods)

Introduction – Corporate Communication – Cross-Cultural Communication; Concept & Styles – Corporate Communication Strategy – Corporate Citizenship – Crisis Communication: Case Study.

Module 3: WRITING BUSINESS MESSAGES & DOCUMENTS (9 Periods)

Introduction – Importance of Written Business Communication – Types of Business Messages – Five Main Stages of Writing Business Messages – Business Letter Writing – Kinds of Business Letters – Common Components of Business Letters – Strategies for Writing the Body of a Letter.

Module 4: CAREERS AND RÉSUMÉS (9 Periods)

Introduction – Career Building – Résumé Formats: Traditional, Electronic and Video Résumé – Sending Résumés – Follow-up Letters – Business Presentations and Speeches: Planning –Structuring – Organizing – Delivery.

Module 5: INTERVIEWS (9 Periods)

Introduction – General Preparation for an Interview – Success in an Interview – Important Non-verbal Aspects – Types of Interviews – Styles of Interviewing – Types of Interviewing –Online Recruitment Process.

Total Periods: 45

EXPERIENTIAL LEARNING

1. People often get confused in identifying or using English vocabulary on most occasions. Prepare a list of confusing words and find methods to overcome the difficulties in using those words to uplift the career of professionals.
2. Organizations and institutions use modern technology in communicating with their colleagues, clients, and stakeholders. Make a PowerPoint presentation on the modern communication system of any organization and its role in the success of the organization and its career.
3. As a student in the modern technological world, organizing or attending webinars is inevitable. Analyze the pros and cons of video conferencing by organizing webinars and preparing a report.
4. Form a team and act as a team leader. Prepare a performance appraisal report of the team using visual aids to support the presentation.
5. Make a detailed study on social networking and its impact on modern business and Career.

(Note: It's an indicative one. The course instructor may change the activities and the same shall be reflected in course handout.)

RESOURCES

TEXT BOOKS:

1. Meenakshi Raman, Prakash Singh, Business Communication, Oxford University Press, New Delhi, 2nd edition, 2012.
2. Neera Jain, Sharma Mukherji, Effective Business Communication, Tata Mc Graw–Hill

REFERENCE BOOKS:

1. Courtland L. Bovee et al., Business Communication Today, Pearson, New Delhi, 2011.
2. Krizan, Effective Business Communication, Cengage Learning, New Delhi, 2010.

VIDEO LECTURES:

1. https://nptel.ac.in/courses/110105052
2. https://edurev.in/courses/14522_Business-Communication-The-Ultimate-Guide

WEB RESOURCES:

1. http://www.career.vt.edu/interviewing/TelephoneInterviews.html
2. http://job-search-search.com/interviewing/behavioral_interviews
3. https://goo.gl/laEHOY (dealing with complaints)
4. http://www.adm.uwaterloo.ca/infocecs/CRC/manual/resumes.html
5. https://goo.gl/FEMGXS
6. http://www.resumania.com/arcindex.html

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
22MG101701	ENTREPRENEURSHIP FOR MICRO, SMALL AND MEDIUM ENTERPRISES	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: To understand the setting up and management of MSMEs and initiatives of Government and other institutions support for growth and development of MSMEs

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

CO1 Understand the basic of SME and challenges of MSMEs

CO2 Explain the opportunities to Set-Up SSI/SME Units and role of rural & women entrepreneurship.

CO3 Illustrate roles of various institutions supporting MSMEs.

CO4 Understand Management of MSME, NPA & sickness units

CO5 Evaluate role of Government in Promoting Entrepreneurship

CO-PO Mapping Table:

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	2	1	-	-	-	-	-	-	-	-
CO2	1	1	2	-	-		2		1			-
CO3	2	2	1	-	-	-	-	1	-	-	2	
CO4	3	1	2	-	-	-	-	-	-	-	-	2
CO5	2	2	1	-	-	1	-	-	-	-	-	1
Course Correlation Mapping	2	2	2	2	1	1	2	1	1	-	2	2

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: INTRODUCTION (07 Periods)

Concept & Definition, Role of Business in the modern Indian Economy SMEs in India, Employment and export opportunities in MSMEs. Issues and challenges of MSMEs

Module 2: MSME SETTING (09 Periods)

Identifying the Business opportunity, Business opportunities in various sectors, formalities for setting up an enterprise - Location of Enterprise – steps in setting up an enterprise – Environmental aspects in setting up, Incentives and subsidies.

Module 3: MSMES SUPPORTING INSTITUTIONS (09 Periods)

Forms of Financial support, Long term and Short term financial support, Sources of Financial support, Development Financial Institutions, Investment Institutions, Central level institutions, State level institutions, Other agencies, Commercial Bank – Appraisal of Bank for loans

Module 4: MANAGEMENT OF MSME (10 Periods)

Management of Product Line; Communication with clients – Credit Monitoring System - Management of NPAs - Restructuring, Revival and Rehabilitation of MSME, Problems of entrepreneurs – sickness in SMI – Reasons and remedies –– Evaluating entrepreneurial performance

Module 5: ENTREPRENEURSHIP PROMOTION (10 Periods)

MSME policy in India, Agencies for Policy Formulation and Implementation: District Industries Centers (DIC), Small Industries Service Institute (SISI), Entrepreneurship Development Institute of India (EDII), National Institute of Entrepreneurship & Small Business Development (NIESBUD), National Entrepreneurship Development Board (NEDB)

Total Periods: 45

EXPERIENTIAL LEARNING

6. Present a case study on MSMEs Business Strategies.
7. Collect the data about nearby MSMEs and Present their structures in a PPT
8. Discuss in the group MSMEs opportunities in terms of Orientation and Develop mentation.

(Note: It's an indicative one. The course instructor may change the activities and the same shall be reflected in course handout.)

RESOURCES

TEXT BOOKS:

3. Vasant Desai, Small Scale Industries and Entrepreneurship, Himalaya Publishing House, 2003..
4. Poornima M Charanthimath, Entrepreneurship Development Small Business Enterprises, Pearson, 2006.

REFERENCE BOOKS:

10. Suman Kalyan Chaudhury, Micro Small and Medium Enterprises in India Hardcover, Raj Publications, 2013.
11. Aneet Monika Agarwal, Small and medium enterprises in transitional economies, challenges and opportunities, DEEP and DEEP Publications
12. Paul Burns & Jim Dew Hunt, Small Business Entrepreneurship, Palgrave Macmillan publishers, 2010.

VIDEO LECTURES:

1. https://sdgs.un.org/topics/capacity-development/msmes
2. https://blog.tatanexarc.com/msme/msme-schemes-in-india-for-new-entrepreneurs-and-start-ups/

WEB RESOURCES:

4. ncert.nic.in/textbook/pdf/kebs109.pdf
5. https://www.jetir.org/papers/JETIR1805251.pdf

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
22SS101704	INDIAN HISTORY	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: Introduction; Ancient India; Classical and Medieval era; Modern India; India after independence.

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

CO1 Demonstrate contextual knowledge in the evolution of ancient and medieval Indian History and acquire an awareness of societal and cultural transformation.

CO2 Analyze the situations before and after Independence and assess the societal reforms implemented in India after Independence.

CO3 Practice culture transformations and appreciate its influence to adapt themselves in global scenarios.

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	-	1	-	-	-	-	-	-
CO2	1	2	-	-	-	1	-	-	-	-	-	-
CO3	1	1	-	-	-	2	-	-	-	-	-	-
Course Correlation Mapping	2	1	-	-	-	2	-	-	-	-	-	-

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: INTRODUCTION TO INDIAN HISTORY **(08 Periods)**

Elements of Indian History; History Sources: Archaeology, Numismatics, Epigraphy & Archival research; Methods used in History; History & historiography; Sociological concepts-structure, system, organization, social institutions, Culture and social stratification (caste, class, gender, power), State& Civil Society.

Module 2: ANCIENT INDIA **(09 Periods)**

Mohenjo-Daro civilization; Harappa civilization; Mauryan Empire.

Module 3: CLASSICAL & MEDIEVAL ERA **(12 Periods)**

Classic Era (200 BC - 1200 AD); Hindu - Islamic Era (1200 - 1800 AD).

Module 4: MODERN INDIA **(06 Periods)**

Age of Colonialism (17th - 19th centuries); First war of Indian Independence; Freedom Struggle (1857-1947)

Module 5: INDIA AFTER INDEPENDENCE (1947 -) **(10 Periods)**

The Evolution of the Constitution and Main Provisions; Consolidation of India as a Nation; Politics in the States; Indian economy; Modernization and globalization, Secularism and communalism, Nature of development, Processes of social exclusion and Inclusion, Changing Nature of Work and Organization.

Total Periods: 45

EXPERIENTIAL LEARNING

1. Prepare a write-up on how to safeguard ancient monuments.
2. Analyze the most famous historically important place you visited.
3. Prepare a presentation on the ancient Seven Wonders of the World with their significance and how they are destroyed.
4. Prepare a presentation on "Wars of the past not only destroyed people and their livelihood but also the people's tradition and culture."
5. Prepare a poster on " Continents that No Longer Exist" with causes

(Note: It's an indicative one. Course Instructor may change activities and shall be reflected in course Handout)

RESOURCES

TEXT BOOKS:

1. K. Krishna Reddy, Indian History, Tata McGraw-Hill, 21st reprint, 2017.

REFERENCE BOOKS:

1. Guha, Ramachandra, India after Gandhi, Pan Macmillan, 2007.
2. Romila Thapar, Early India**,** Penguin India, New Delhi 2002.

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
22SS101706	WOMEN EMPOWERMENT	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: Concept & Framework, Status of Women, Women's Right to Work, International Women's Decade, and Women Entrepreneurship.

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

CO1 Demonstrate the knowledge of the characteristics and achievements of empowered women and women's empowerment techniques by analyzing women's legal and political status.

CO2 Apply the knowledge of women's rights by analyzing various societal issues and obstacles in different fields, including science and technology.

CO3 Demonstrate the knowledge of the significance of women's participation in policy debates, National conferences, and common forums for equality and development by identifying and analyzing issues.

CO4 Analyze the concept of women's entrepreneurship, government schemes, and entrepreneurial challenges and opportunities.

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	-	-	1	3	-	1	–	–	-	-
CO2	3	1	-	-	-	2	-	-	-	–	-	-
CO3	3	1	-	-	-	2	-	-	-	3	-	-
CO4	3	1	-	-	-	-	-	-	-	-	2	-
Course Correlation Mapping	3	1	-	-	1	3	-	1	–	3	2	-

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: CONCEPT & FRAMEWORK **(09 Periods)**

Introduction– Empowered Women's Characteristics – Achievements of Women's Empowerment **Concept of Empowerment:** Meaning & Concept – Generalizations about Empowerment – Empowerment Propositions – Choices women can make for empowerment – Women's participation in decision making, development process & in Governance. **Framework for Empowerment** – Five levels of equality – Tenets of Empowerment– Elements – Phases and aspects – Techniques – Categories and Models – Approaches.

Module 2: STATUS OF WOMEN **(09 Periods)**

Legal Status: Present Scenario – Call for Social Change – Significant Trends – Legal & Schemes – Personal Law – Joint Family – Criminal Law – Shift towards Dowry – Deterrent Punishment – Criminal Law (II Amendment) – Discrimination in Employment.

Political Status: Present Scenario – Political Participation & its NatureSocio–economic Characteristics – Political Mobilization: Mass Media – Campaign Exposure – Group Orientation – Awareness of issues and participation – Progress & Future Thrust.

Module 3: WOMEN'S RIGHT TO WORK **(09 Periods)**

Introduction – Present Scenario – Changes in Policy & Programme – National Plan of Action– Women's Cells and Bureau – Increase in the work participation rate – Discrimination in the labour market – Women in unorganized sector – Issues and Obstacles– Women in Education – Women in Science & Technology – Case Study: Linking Education to Women's Access to resources.

Module 4: WOMEN'S PARTICIPATORY DEVELOPMENT **(09 Periods)**

Dynamics of social change – conscious participation – Information Explosion – Organized Articulation – National Conference – Common Forums – Participatory Development – New Issues Identified – Role of other Institutions.

Module 5: WOMEN ENTREPRENEURSHIP **(09 Periods)**

Introduction – Definition – Concept – Traits of women Entrepreneurs – Role of Women Entrepreneurs in India – Reasons for Women Entrepreneurship – Government schemes & Financial Institutions to develop Women Entrepreneurs – Key policy recommendations – Project Planning – Suggestions and measures to strengthen women entrepreneurship – Growth & Future challenges – Training and Opportunities – Case Study: Training Women as Hand–pump Mechanics– Case Study: Literacy for Empowering Craftswomen

Total Periods: 45

EXPERIENTIAL LEARNING

1. Prepare poster presentation on "impact of women's self-help groups on their empowerment and socio-economic development."
2. Prepare a comparative analysis chart on the status of women in various countries.
3. Prepare a presentation on women and cultural responsibilities in different societies.
4. Prepare a presentation on the women of the past, present and future in terms of responsibilities and duties.
5. Prepare a presentation on the great women entrepreneurs of India.

(Note: It's an indicative one. Course Instructor may change activities and shall be reflected in course Handout)

RESOURCES

TEXT BOOKS:

1. SahaySushama, Women and Empowerment, Discovery Publishing House, New Delhi, 2013.
2. NayakSarojini, Jeevan Nair, Women's Empowerment in India, Pointer Publishers, Jaipur, 2017.

REFERENCE BOOKS:

1. Baluchamy. S, Women's Empowerment of Women, Pointer Publishers, Jaipur, 2010.
2. Khobragade Grishma, Women's Empowerment: Challenges and Strategies Empowering Indian Women, Booksclinic Publishing, Chhattisgarh, 2020.

WEB RESOURCES:

1. https://www.economicsdiscussion.net/entrepreneurship/women–entrepreneurs–in–india
2. https://www.businessmanagementideas.com/entrepreneurship–2/women entrepreneurs

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
22CE101703	PLANNING FOR SUSTAINABLE DEVELOPMENT	3	-	-	-	3

Pre-Requisite --

Anti-Requisite --

Co-Requisite --

COURSE DESCRIPTION: This course provides a detailed discussion on sustainable development, environmental impact, sustainable policies, governance, theories and strategies, media and education for sustainability.

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

CO1 Compare sustainable development theories in national and global context to protect the society and environment.

CO2 Analyze the unforeseen environmental impacts on sustainable development to protect the society and environment.

CO3 Analyze policies and governance for sustainable development considering ethics, economics, society and environment.

CO4 Analyze systems and strategies for sustainable development using appropriate tools and techniques considering ethics, economics, society and environment.

CO5 Analyze the role of media and education in sustainable development using appropriate tools and techniques considering ethics, society and environment besides communicating effectively.

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	2	2	-	-	-	-	-
CO2	3	3	-	-	-	2	2	-	-	-	-	1
CO3	3	3	-	-	-	2	2	2	-	-	1	-
CO4	3	3	-	-	2	2	2	2	-	-	1	-
CO5	3	3	-	-	2	2	2	2	-	1	-	-
Course Correlation Mapping	3	3	-	-	2	2	2	2	-	1	1	1

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: SUSTAINABLE DEVELOPMENT **(09 Periods)**

Definition and concepts of sustainable development, Capitalization of sustainability- National and global context; Sustainable development goals, Emergence and evolution of sustainability and sustainable development, Theories of sustainability, Case studies.

Module 2: ENVIRONMENTAL IMPACT **(09 Periods)**

Climate change – Science, Knowledge and sustainability; Unforeseen environmental impacts on development, Challenges of sustainable development, Centrality of resources in sustainable development, Case studies.

Module 3: SUSTAINABLE POLICIES AND GOVERNANCE **(09 Periods)**

Governance - Democracy and Eco–welfare; Global civil society and world civil politics, Civic environmentalism, Policy responses to sustainable development, Economics of sustainability, Social responsibility in sustainability, National action, ISO 14001: Environmental management system.

Module 4: SUSTAINABLE SYSTEMS AND STRATAGIES **(09 Periods)**

Need for system innovation, Transition and co–evolution, Theories and methods for sustainable development, Strategies for eco–innovation, Ecological foot print analysis, Socio ecological indicators – Eco labels; Policy programmes for system innovation, Case studies.

Module 5: MEDIA AND EDUCATION FOR SUSTAINABILITY **(09 Periods)**

Role of emerging media, Remarkable design and communication art, Activism and the public interest, Education for sustainability, Participation in decision making, Critical thinking and reflection, Case studies.

Total Periods: 45

EXPERIENTIAL LEARNING

1. Submit a study report on the importance and implementation of United Nationals sustainable goals 17 among all the ratified nations.
2. Submit a study report on any one case study that the challenges being faced during the sustainable development goals implementation.
3. Submit a study report on the social responsibility in implementation of sustainability concept.
4. Prepare and submit a report on any two case studies that how the eco labels put on their products shall make the consumers feel satisfaction over the sustainable development.
5. Submit a report on the communication art and activism through media which makes the public interest that helps to contribute towards sustainable development.

RESOURCES

TEXT BOOKS:

1. John Blewitt, Understanding Sustainable Development, Earth Scan Publications Ltd., 2nd Edition, 2008.
2. Jennifer A. Elliot, An Introduction to Sustainable Development, Earth Scan Publications Ltd., 4th Edition, 2006.

REFERENCE BOOKS:

1. Peter Rogers, Kazi F Jalal and John A Boyd, An Introduction to Sustainable Development, Earth Scan Publications Ltd., 2006.
2. Simon Dresner, The Principles of Sustainability, Earth Scan Publications Ltd., 2nd Edition, 2008.
3. Peter Bartelmus, Environment Growth and Development: The Concepts and Strategies of Sustainability, Routledge, 3rd Edition, 2003.
4. Gabriel Moser, Enric Pol, Yvonne Bernard, MiriliaBonnes, Jose Antonio Corraliza and Maria Vittoria Giuliani, People Places and Sustainability, Hogrefe& Huber Publishers, 2nd Edition, 2003.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=a5i9RVyhBtc
2. https://www.youtube.com/watch?v=fH_iIVPTujE
3. https://www.youtube.com/watch?v=c2eNrFK5M8I
4. https://www.youtube.com/watch?v=qfOgdj4Okdw
5. https://www.youtube.com/watch?v=_qLqLJq2954

WEB RESOURCES:

1. https://civil.gecgudlavalleru.ac.in/images/admin/pdf/1594706742_III-II-OE-Planning-for-Sustainable-Development.pdf
2. https://www.academia.edu/26950843/Sustainable_Development_in_Practice_Case_Studies_for_Engineers_and_Scientists
3. https://www.academia.edu/24286208/The_Role_of_the_Professional_Engineer_and_Scientist_in_Sustainable_Development
4. https://byjusexamprep.com/liveData/f/2022/8/sustainable_development_goals_upsc_notes_43.pdf
5. https://sdgs.un.org/sites/default/files/2020-10/course%201_Peter_Tarr%20%20-%20%20Compatibility%20Mode.pdf

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
22CM101701	BANKING AND INSURANCE	3	-	-	-	3

Pre-Requisite

Anti-Requisite

Co-Requisite

COURSE DESCRIPTION: Introduction to Banking; Bank-Customer Relationship; Electronic Payment System and Business Models; Introduction to Risk and Insurance; Insurance Overview.

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

CO1 Demonstrate the importance of Banking and functions of the Reserve Bank of India and its role in the country's sustainable development.

CO2 Demonstrate the role, relationships, and operations between Banker and Customer.

CO3 Demonstrate the Online Banking system, various types of Electronic Payments, and Business models.

CO4 Demonstrate the concept of risk and principles, functions, and, types of Insurance companies.

CO5 Understand the principles of insurance and its functions.

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3							2				1
CO2	3							2				1
CO3	3							2				1
CO4	3							2			1	1
CO5	3							2			1	1
Course Correlation Mapping	3							2			1	1

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: INTRODUCTION TO BANKING (09 Periods)

Meaning - Importance of banking- Functions of banking - Reserve Bank of India: Functions – Role of RBI in sustainable development.

Module 2: BANK-CUSTOMER RELATIONSHIP (09 Periods)

Debtor-creditor relationship, deposit products or services, payment, and collection of cheques. Accounts – Types of accounts, the procedure for opening and closing an account - Loans and Advances- principles of lending.

Module 3 ELECTRONIC PAYMENT SYSTEM&BUSINESS MODELS (09 Periods)

Introduction to Online Banking - types of e-payment system, e-cash, NEFT, RTGS, Credit cards, Electronic Wallet and Debit cards. **Business models**- B2B, B2C, C2C, and B2G.

Module 4 INTRODUCTION TO RISK AND INSURANCE (09 Periods)

Insurance: Definition, Insurance as risk mitigation mechanism, elements of insurance. Concept of risk, risk Vs uncertainty.

Module 5 INSURANCE OVERVIEW (09 Periods)

Principles of insurance - insurance types - LIC & GIC – insurance functions, IRDA - Insurance Players in India.

Total Periods: 45

EXPERIENTIAL LEARNING

1. Make a PowerPoint presentation on the banking system in India.
2. Submit a report on the working of insurance companies.
3. Prepare a report on the functions of RBI & IRDA in India.
4. Submit a report on electronic banking facilities provided by Indian banks.

(Note: It's an indicative one. The course instructor may change the activities and the same shall be reflected in course handout.)

RESOURCES

TEXT BOOKS:

1. RanganadhaChary, A.V. and Paul, R.R., Banking and Financial system, Kalyani Publisher, New Delhi, 3rd edition, 2016.
2. Sharma, R.K., Shashi K. Gupta and Jagwant Singh, Banking and Insurance, Kalyani Publishers, New Delhi, 17th edition, 2014

REFERENCES BOOKS:

1. Indian Institute of Banking & Finance, Digital Banking, Taxman Publications Pvt. Ltd., 2016 edition, 2016.
2. Jyotsna Sethi and Nishwan Bhatia, Elements of Banking and Insurance, PHI Learning Pvt. Ltd., 2nd edition, 2012.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=a1_p8zhbAfE
2. https://www.youtube.com/watch?v=bxNw9VB5Y_0

WEB RESOURCES:

1. https://unacademy.com/content/railway-exam/study material/economics/importance-of-banking-sector-in-the-country/
2. https://www.geeksforgeeks.org/ life-insurance-meaning-elements-and-types-of-life-insurance-policies/

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
22CM101702	COST ACCOUNTING AND FINANCIAL MANAGEMENT	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: Cost accounting; cost sheet & preparation of cost sheet; standard costing & variance analysis; financial management & ratio analysis; introduction to investment**.**

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

CO1 Demonstrate the concepts of Cost Accounting and Management Accounting and the elements of costing.

CO2 Determine the Cost of Production for pricing decisions.

CO3 Apply the Standard Costing and Variance techniques for the control of the cost of production

CO4 Analyze the Profitability and financial condition of an organization using Ratios.

CO5 Apply Capital Budgeting techniques for making investment decisions in an organization.

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3				2			1				
CO2	3				2			1			1	
CO3	3				2			1			1	
CO4	3				2			1			1	
CO5	3				2			1				
Course Correlation Mapping	3				2			1			1	

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: COST ACCOUNTING **(09 Periods)**

Meaning of Cost and Cost Accounting, Objectives, Scope, Advantages, and Disadvantages – Cost Accounting Vs Management Accounting – Elements of Costing – Installation of costing system – Material Control, Labor Control, Overhead Control.

Module 2: COST SHEET & PREPARATION OF COST SHEET **(09 Periods)**

Analysis of Cost – Preparation of cost sheet, estimate, tender, and quotation (Simple problems) – Importance of Costing while pricing the products

Module 3 STANDARD COSTING & VARIANCE ANALYSIS **(09 Periods)**

Introduction to Standard Costing & Variances – Variance Analysis: Material variances, Labor variances (Simple Problems).

Module 4 FINANCIAL MANAGEMENT & RATIO ANALYSIS **(09 Periods)**

Meaning, Objectives - Nature and Scope, Importance of FM – Ratio Analysis**:** Types of Ratios: Solvency Ratios, Liquidity Ratios, Turnover Ratios, and Profitability Ratios - Financial Statement Analysis through Ratios (Simple Problems).

Module 5 INTRODUCTION TO INVESTMENT **(09 Periods)**

Investment - Meaning and Definition- concept of risk and returns - Capital budgeting techniques – Security Analysis and Portfolio Management (Basic concepts).

Total Periods: 45

EXPERIENTIAL LEARNING

1. Prepare a report on the role of cost accountants in the growth of a company.
2. To visit the manufacturing unit to observe how they used various techniques for analyzing the financial health of a company.
3. Prepare a report on factors influencing the form of business organization.
4. Prepare the cost sheet with practical examples of any two manufacturing companies.

(Note: It's an indicative one. The course instructor may change the activities and the same shall be reflected in course handout.)

RESOURCES

TEXT BOOKS:

1. S.P. Jain and K.L. Narang: Cost Accounting, Kalyani Publishers, Ludhiana, 10th edition, 2016.
2. I.M. Pandey, Financial Management, Vikas Publishing House Pvt. Ltd., 14th edition, 2016.

REFERENCE BOOKS:

1. The Institute of Company Secretaries of India, Cost and Management Study Material, New Delhi.
2. CA Saravana Prasath, Cost Accounting and Financial management, Wolters Kluwer India Pvt. Ltd., New Delhi, 2018.

VIDEO LECTURES:

1 https://www.youtube.com/watch?v=ESqO8sFgQa0&list=PLLhSIFfDZcUVE2kzOhEubO9rkvUOAgZbz

2 https://www.youtube.com/watch?v=tzasFmP1CpAhttps://www.youtube.com/watch?v=tzasFmP1CpA

WEB RESOURCES:

1 https://www.tutorialspoint.com/accounting_basics/management_versus_cost_accounting.htm

2 https://www.netsuite.com/portal/resource/articles/financial-management/financial-management.shtml

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
22SS101702	GENDER AND ENVIRONMENT	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: Gender and the environment relationship, Gendered Roles in the Family & Community, Gender and sustainable development, Gender in environmental justice, Gender & Environmental Security.

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

CO1 Apply the knowledge of gender & environmental connections by analyzing key issues and topics within global environmental politics in environmental decision-making.

CO2 Demonstrate knowledge of the concepts of gender and sustainable development through debates and policy documents.

CO3 Analyze the concept of environmental security and justice by identifying the sources of insecurity.

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	-	-	-	3	3	-	-	-	-	-
CO2	3	-	-	-	-	2	3	1	-	2	-	-
CO3	3	1	-	-	-	3	3	-	-	-	-	2
Course Correlation Mapping	3	1	-	-	-	3	3	1	-	2	-	2

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: GENDER AND ENVIRONMENT RELATIONSHIP (09 Periods)

Introduction – Gender and Environment – Development of gender roles – Society, gender & environment – Understanding environmental politics – Gender-environment connections– Eco-feminism – Cultural eco-feminism – Social eco-feminism – Feminist political ecology

Module 2: GENDERED ROLES IN THE FAMILY & COMMUNITY (09 Periods)

Organization of the household – Domestic division of labour – Food: growing, harvesting, shopping, preparing, and cooking

Gender & Power – Planning – Politics – NGO – Gendering of environmental protest – Environmental decision-making

Module 3: GENDER AND SUSTAINABLE DEVELOPMENT **(09 Periods)**

Concept of sustainability & its achievement – Concept of sustainable development – Ecological Modernization – Gender & sustainability debates – Gender & sustainable development debates - Gender in policy documents – Gender, poverty & equity in sustainable development

Module 4: GENDER IN ENVIRONMENTAL JUSTICE **(09 Periods)**

Normative Concerns (Fairness, Inequality & Justice) –Making sense of Environmental justice – Ecological debt, Transnational harm, & human rights – Ecological justice – Gender &Environmental Justice – Gender, Vulnerability & risk – Women in environmental justice movements – Knowledge & participation – Gender, sustainability & justice as guiding concepts.

Module 5: GENDER AND ENVIRONMENTAL SECURITY **(09 Periods)**

Connections between security & the environment – **Gender, environment & security:** Sustainability as security – poverty & insecurity – Insecurity as injustice – Competing ways of thinking security – Reflecting on sources of insecurity – **Case Study** – Food Security - **Case Study** – The impacts of natural disasters

Total Periods: 45

EXPERIENTIAL LEARNING

1. Prepare a poster presentation on the impact of globalization on family structure and society.
2. Prepare a presentation on the family setup of different countries and their peculiar customs.
3. Prepare poster presentation on "Ancient hominin walked like a human but climbed like an ape."
4. Find out the problems of present society and being part of future generations how you may help to strengthen environmental security.

(Note: It's an indicative one. Course Instructor may change activities and shall be reflected in course Handout)

RESOURCES

TEXT BOOKS:

1. Nicole Detraz, Gender and the Environment, Polity Press, Cambridge, UK. 2017
2. Susan Buckingham- Hatfield, Gender and Environment, Routledge, London. 2000

REFERENCE BOOKS:

1. Promillakapur ed., Empowering Indian Women, Publication Division, Government of India, New Delhi. 2000.
2. Ronnie Vernooy, Ed., Social and Gender Analysis Natural Resource Management: Learning Studies and Lessons from Asia, Sage, New Delhi. 2006
3. Swarup Hemlata and Rajput, Pam, Gender Dimensions of Environmental and Development Debate: The Indian Experience, In Sturat S. Nagel, (ed). India's Development and Public Policy. Ashgate, Burlington. 2000

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
22SS101703	INDIAN ECONOMY	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: Introduction; Elementary Economic Analysis; Economic Planning; Time Value of Money; Value Analysis/Value Engineering.

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

CO1 Understand the basic concepts of economics, economic analysis, economic planning and strata.

CO2 Demonstrate knowledge in capital budgeting, evaluation of engineering projects, depreciation policy and familiarize with the concepts of value analysis vs value engineering.

CO3 Analyze and apply financial information for the evaluation of finance.

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	2	-	-	-	-	-	-
CO2	3	-	-	-	-	2	-	-	-	-	-	2
CO3	3	-	-	-	-	2	-	-	-	-	-	2
Course Correlation Mapping	3	-	-	-	-	2	-	-	-	-	-	2

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: INTRODUCTION **(09 Periods)**

Economics-Flow in an Economy, Law of Supply and Demand; Micro and Macro Economics; Relationship between Science, Engineering, Technology and Economic Development; Concept of Engineering Economics-Types of Efficiency, Definition and Scope of Engineering Economics.

Module 2: ELEMENTARY ECONOMIC ANALYSIS **(09 Periods)**

Economic Analysis – Meaning, Significance, Simple Economic Analysis; Material Selection for a Product, Substitution of Raw Material; Design Selection for a Product; Material Selection-Process Planning, Process Modification.

Module 3: ECONOMIC PLANNING **(09 Periods)**

Introduction - Need For Planning in India, Five-year plans(1951-2012), NITI Aayog (from 2014 onwards); Inclusive Growth-Meaning, Significance, Need for inclusive growth in India, Strategy for more inclusive growth, Challenges and Prospects; Employment and Inclusive Growth in India, Role of engineers in sustaining inclusive growth.

Module 4: TIME VALUE OF MONEY **(12 Periods)**

Concepts and Application; Capital Budgeting-Traditional and Modern Methods; Simple and Compound Interest, Cash Flow Diagram, Principle of Economic Equivalence; Evaluation of Engineering Projects - Present Worth Method, Future Worth Method, Annual Worth Method, Internal Rate of Return Method, Cost-benefit Analysis in Public Projects; Depreciation Policy-Depreciation of Capital Assets, Causes of Depreciation, Straight Line Method and Declining Balance Method.

Module 5: VALUE ANALYSIS/VALUE ENGINEERING **(06 Periods)**

Introduction-Value Analysis, Value Engineering, Functions, Aims; Value Analysis vs Value Engineering; Value Engineering Procedure- Advantages, Application Areas.

Total Periods: 45

EXPERIENTIAL LEARNING

1. Prepare a poster presentation on the impact of globalization on family structure and society.
2. Prepare a presentation on family setups of different countries and their peculiar customs if any.
3. Prepare a poster presentation on "Ancient hominin walked like a human but climbed like an ape."
4. Find out the problems of present society and being part of future generations and how you may help to strengthen environmental security.

(Note: It's an indicative one. Course Instructor may change activities and shall be reflected in course Handout)

RESOURCES

TEXT BOOKS:

1. Panneerselvam. R., Engineering Economics, PHI Learning Private Limited, New Delhi, 2nd edition, 2013.
2. Jain. T. R., V. K. Ohri, O. P. Khanna., Economics for Engineers, VK Publication, 1st edition, 2015.

REFERENCE BOOKS:

1. DuttRudar & Sundhram K. P. M., Indian Economy, S. Chand, New Delhi, 62nd revised edition, 2010.
2. Misra, S. K. & V. K. Puri., Indian Economy: Its Development Experience, Himalaya Publishing House, Mumbai, 32nd edition, 2010.

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
22SS101705	INDIAN TRADITION AND CULTURE	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: Basic traits of Indian Culture; Humanistic Reforms under Jainism and Buddhism; Culture in the medieval period; Socio Religious reforms in Indian Culture; Reform movements for harmonious relations.

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

CO1 Demonstrate knowledge of Vedic and Upanishadic culture and society to consider human aspirations, values and theories.

CO2 Understand the contributions of Buddhism and Jainism to Indian culture.

CO3 Examine the cultural conditions and achievements of India under Mouryas and Guptas.

CO4 Analyze social religious reforms and reform movements.

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	1	-	-	-	-	-	-
CO2	3	-	-	-	-	1	-	-	-	-	-	2
CO3	2	-	-	-	-	3	-	-	-	-	-	-
CO4	2	-	-	-	-	3	-	-	-	-	-	2
Course Correlation Mapping	3	-	-	-	-	2	-	-	-	-	-	2

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: BASIC TRAITS OF INDIAN CULTURE (08 Periods)

Meaning and definition and various interpretations of culture - Culture and its features - The Vedic and Upanishad culture and society - Human aspirations and values in these societies - Chaturvidha purushardhas, Chaturashrma and Chaturvarna theory.

Module 2: HUMANISTIC REFORMS UNDER JAINISM AND BUDDHISM (09 Periods)

Salient features of Jainism - contributions of Jainism to Indian culture - Contributions of Aachaarya and Mahaapragya - Buddhism as a humanistic culture - The four noble truths of Buddhism - Contributions of Buddhism to Indian culture.

Module 3: CULTURE IN THE MEDIEVAL PERIOD **(09 Periods)**

Unifications of India under Mouryas and Guptas and their cultural achievements - Cultural conditions under satavahanas - Contributions to Pallavas and cholas to art and cultural achievements of Vijayanagara rulers

Module 4: SOCIO RELIGIOUS REFORMS IN INDIAN CULTURE **(09 Periods)**

Western impact on India - Introduction of Western education - social and cultural awakening and social reform movements of Rajaramohan Roy - Dayanandha Saraswathi - Anne Besant (theosophical society).

Module 5: REFORM MOVEMENTS FOR HARMONIOUS RELATIONS **(09 Periods)**

Vivekananda, Eswarchandravidyasagar and Veeresalingam - emancipation of women and struggle against caste - Rise of Indian nationalism - Mahatma Gandhi – Non-violence and satyagraha and eradication of untouchability.

Total Periods: 45

EXPERIENTIAL LEARNING

1. Identify different cultural festivals of Indian States and prepare a write-up on their uniqueness.
2. India has a rich history with numerous architectural wonders. Prepare a report on any three famous architectural wonders in India.
3. Explore the diverse flavors of Indian cuisine and prepare a poster on the different dishes and their distinctiveness.
4. India is a country of Unity in Diversity. Make a PowerPoint presentation on different traditional dresses of various cultural people.

(Note: It's an indicative one. Course Instructor may change activities and shall be reflected in course Handout)

RESOURCES

TEXT BOOKS:

1. Valluru Prabhakaraiah, Indian Heritage and Culture, Neelkamal Publications Pvt. Ltd. Delhi, 1/e, reprint 2015.

REFERENCE BOOKS:

1. L. P. Sharma, History of Ancient India, Konark Publishers, Pvt. Ltd. New Delhi, 2010.
2. L. P. Sharma, History of Medieval India, Konark Publishers, Pvt. Ltd. New Delhi, 2010.
3. The Cultural Heritage of India Vol-I, II, III, IV, V, The Ramakrishna Mission Institute of Culture, Calcutta

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
22SS101701	CONSTITUTION OF INDIA	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides and in-depth knowledge about Constitution of India's Preamble and its Philosophy; Union Legislature; Federalism in India; Judiciary and Public Services; Nation Building. The students can gain first-hand information and knowledge about these dynamics and accordingly act based on these sources in their professional and routine activities.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1: Demonstrate knowledge in the Parliamentary proceedings, Election Commission, Public Services and Foreign Policy of India.

CO2: Apply the reasoning informed by the various aspects of the Constitution and its provisions to assess societal issues and the consequent responsibilities relevant to the professional engineering practice.

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	-	-	3	2	-	-	-	-	-
CO2	2	-	-	-	-	3	-	3	-	-	-	-
Course Correlation Mapping	**2**	**-**	**-**	**-**	**-**	**3**	**2**	**3**	**-**	**-**	**-**	**-**

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: PREAMBLE AND ITS PHILOSOPHY **(9 Periods)**

Introduction to Indian Constitution; Evolution of Indian Constitution; preamble and its philosophy

Module 2: UNION LEGISLATURE **(9 Periods)**

The Parliament, Parliamentary Structure, Process of Legislation; President of India – Powers and Functions; Prime Minister and Council of Ministers; Constitution Amendment Procedure.

Module 3: FEDERALISM IN INDIA **(9 Periods)**

Centre-State Administrative Relationship; Governors – Powers and Functions; State Legislature - Composition and powers; Chief Ministers - Powers and Functions; The Election Commission – Powers and Functions.

Module 4: JUDICIARY AND PUBLIC SERVICES **(9 Periods)**

The Union Judiciary - Supreme Court and High Court; Fundamental Rights and Duties All India Services - Central Civil Services -State Services - Local Services.

Module 5: INTERNATIONAL PARTICIPATION **(9 Periods)**

Foreign Policy of India; International Institutions Influence: UNO, WTO, WHO, SAARC, International Summits: BRICS, NSS, UNEP – India's Role in International Negotiations; Environmentalism in India.

Total Periods: 45

EXPERIENTIAL LEARNING

1. Review newspapers and submit a report on critical analysis of Indian Civil Servants exercise of powers, in the awake of constitutionally assigned authority.
2. Visit your village Panchayat office or Municipality office and generate a report on your observations about maintained Constitutional symbolism.
3. Watch few videos on recent Indian Independence Day and Republic Day celebrations as marked in New Delhi and present a detailed report, by considering the following aspects:
    a) Comparatively analyze the speeches of the President of India and Prime Minister of India as delivered on these two occasions.
    b) Compare these two events relevance in terms of Indian Armed Forces presence.
    c) Observe, compare and analyse 'flag code' relevance as marked in these two events.
4. Watch a few videos on recent 'proceedings' of any state Legislative Assembly session and submit a detailed report.

(Note: It's an indicative one. The course instructor may change the activities and the same shall be reflected in course handout.)

RESOURCES

TEXT BOOKS:

1. Briji Kishore Sharma, Introduction to the Constitution of India, Prentice Hall of India, 2005

REFERENCE BOOKS:

1. Mahendra Pal Singh,V. N. Shukla's, Constitution of India, Eastern Book Company, 2011.
2. Pandey J. N., Constitutional Law of India, Central Law Agency, 1998

VIDEO LECTURES:

1. Doctrine of Basic Structure: https://www.youtube.com/watch?v=cvUf9ZeEe8Y
2. Significance of the Constitution: https://www.youtube.com/watch?v=vr1Dc_-ZKbQ

WEB RESOURCES:

1. The Constitution of India: https://www.youtube.com/watch?v=of2SoO8i8mM
2. Protection of Constitutional Democracy: https://www.youtube.com/watch?v=smJ99cdPrns

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
22CE201701	DISASTER MANAGEMENT	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion ondisaster prone areas in India, repercussions of disasters and hazards, disaster preparedness and management, risk assessment and disaster management.

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

CO1. Analyze the vulnerability of an area to natural and man-made disasters/hazards as per the guidelines to solve complex problems using appropriate techniques ensuring safety, environment and sustainability.

CO2. Analyze the causes and impacts of disasters using appropriate tools and techniques and suggest mitigation measures ensuring safety, environment and sustainability besides communicating effectively in graphical form.

CO3. Suggest the preparedness measures using appropriate tools and techniques and suggest mitigation measures ensuring safety, environment and sustainability.

CO4. Analyze the Risk Assessment using appropriate tools and techniques and suggest mitigation measures ensuring safety, environment and sustainability.

CO5. Design disaster management strategies to solve pre, during and post disaster problems using appropriate tools and techniques following the relevant guidelines and latest developments ensuring safety, environment and sustainability besides communicating effectively in graphical form.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	2	2	2	2	2	-	-	-	-
CO2	3	3	-	2	2	2	2	-	-	2	-	-
CO3	3	3	-	2	2	2	2	-	-	-	-	-
CO4	3	3	-	3	2	2	2	-	-	-	-	-
CO5	3	2	3	2	2	2	1	2	-	1	3	2
Course Correlation Mapping	3	3	3	3	2	2	2	2	-	2	3	2

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: DISASTER PRONE AREAS IN INDIA (09 Periods)

Introduction: Disaster: Definition, Factors and Significance; Difference Between Hazard and Disaster; Natural and Manmade Disasters: Difference, Nature, Types And Magnitude. **Disaster Prone Areas:** Study Of Seismic Zones; Areas Prone To Floods And Droughts, Landslides And Avalanches; Areas Prone To Cyclonic And Coastal Hazards With Special Reference To Tsunami; Post-Disaster Diseases And Epidemics.

Module 2: REPERCUSSIONS OF DISASTERS AND HAZARDS (09 Periods)

Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.

Module 3: DISASTER PREPAREDNESS AND MANAGEMENT (11 Periods)

Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And Community Preparedness.

Module 4: RISK ASSESSMENT (08 Periods)

Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co-Operation In Risk Assessment And Warning, People's Participation In Risk Assessment. Strategies for Survival.

Module 5: DISASTER MANAGEMENT (08 Periods)

Disaster management organization and methodology, Disaster management cycle, Disaster management in India – Typical cases and Cost–benefit analysis, Disaster management programs implemented by NGOs and Government of India, Usage of GIS and Remote sensing techniques in disaster management, Leadership and Coordination in Disaster management, Emerging trends in disaster management.

Total Periods: 45

EXPERIENTIAL LEARNING

1. Perform hazard assessment and vulnerability analysis for any nearby town/city and prepare a detailed report of possible impacts of various disasters on environment, infrastructure and development.
2. Prepare a detailed report on the causes and effects of Tsunami that was occurred in the year 2004. Also discuss various advancements in Tsunami warning systems.
3. Identify the major causes of urban floods in cities like Chennai, Hyderabad & Mumbai. Also list various mitigation strategies to reduce the impact of floods.
4. Prepare a detailed report on how various man-made activities are directly/indirectly related to the occurrence of landslides that occurred in recent days in India.
5. Visit AP State Disaster Response and Fire Services Department and record about various methods used by them in mitigating disasters and their management.

RESOURCES

TEXT BOOKS:

1. Sharma V. K., Disaster Management, Medtech Publishing, 2nd Edition, 2013.
2. Anand S. Arya, Anup Karanth, and Ankush Agarwal, Hazards, Disasters and Your Community: A Primer for Parliamentarians, GOI–UNDP Disaster Risk Management Programme, Government of India, National Disaster Management Division, Ministry of Home Affairs, New Delhi, Version 1.0, 2005

REFERENCE BOOKS:

1. Donald Hyndman and David Hyndman, Natural Hazardsand Disasters, Cengage Learning, USA, 5th Edition, 2015.
2. Disaster Management in India, A Status Report, Ministry of Home Affairs, Govt. of India, May 2011.
3. Rajendra Kumar Bhandari, Disaster Education and Management: A Joyride for Students, Teachers, and Disaster Managers, Springer India, 2014.
4. Singh R. B., Natural Hazards and Disaster Management, Rawat Publications, 2009.
5. R. Nishith, Singh AK, Disaster Management in India: Perspectives, issues and strategies, New Royal book Company.
6. Sahni, PardeepEt.Al. (Eds.), Disaster Mitigation Experiences And Reflections, Prentice Hall of India, New Delhi.
7. Goel S. L. ,Disaster Administration And Management Text And Case Studies, Deep &Deep Publication Pvt. Ltd., New Delhi

VIDEO LECTURES:

1. https://nptel.ac.in/courses/105104183
2. https://www.digimat.in/nptel/courses/video/124107010/L01.html

WEB RESOURCES:

1. https://egyankosh.ac.in/handle/123456789/25093
2. https://www.egyankosh.ac.in/handle/123456789/25912
3. https://www.nios.ac.in/media/documents/333courseE/12.pdf
4. https://ndmindia.mha.gov.in/images/public-awareness/Primer%20for%20Parliamentarians.pdf

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
22ME101701	GLOBAL STRATEGY AND TECHNOLOGY	3	-	-	-	3

Pre-Requisite -
Anti-Requisite -
Co-Requisite -

COURSE DESCRIPTION: Introduction to strategic management; Strategic management process; Principles of good strategy; Globalization strategies; Research and Development strategies; Technology Management and Transfer; Elements of Transfer Process; Corporate Governance in the Indian scenario.

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

CO1 Demonstrate the knowledge on strategic management, its approaches, and tools through ethical decision making.

CO2 Analyse the globalization challenges for scrupulous selection of globalization strategies.

CO3 Apply the R&D strategies and trends to enhance the technological breakthroughs for new products and applications.

CO4 Demonstrate the knowledge on technology management and transfer that strengthen the economy and accelerate the application of technology and resources.

CO5 Analyze the challenges of corporate governance in Indian scenario for the effective development of value-oriented organizations.

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO1	3	2	1	-	1	1	-	1	-	-	1	-
CO2	3	2	1	-	1	1	-	-	-	-	1	-
CO3	3	2	1	-	1	1	-	-	-	-	1	-
CO4	3	2	1	-	1	1	-	-	-	-	1	-
CO5	3	2	1	-	1	1	-	1	-	-	1	-
Course Correlation Mapping	**3**	**2**	**1**	**-**	**1**	**1**	**-**	**1**	**-**	**-**	**1**	**-**

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: STRATEGIC MANAGEMENT (09 Periods)

Introduction, Classes of decisions, Levels of strategy, Core competence, Strategic intent and stretch, Approaches to strategy making, Roles of different strategists, Strategic Management-Process, Benefits, Limitations; Ethics in strategic decision making, Principles of good strategy, Strategic Management in India; Common managerial strategy formulation tools.

Module 2: GLOBALIZATION (09 Periods)

Definition, Stages, Essential conditions for globalization, Globalization strategies, Competitive advantage of Nations and regions, Factors affecting Globalization, Globalization of Indian business.

Module 3: RESEARCH & DEVELOPMENT STRATEGIES (09 Periods)

Concept, Evolution of R and D Management, R and D as a business, R and D as competitive advantage, Elements of R and D strategies, Integration of R and D, Selection and implementation of R and D strategies, R and D trends and challenges.

Module 4: TECHNOLOGY MANAGEMENT AND TRANSFER (09 Periods)

Technology Management: Introduction, Technology-Definition, Components, Classification Features; Technology Management-Concept, Nature; Drivers of Management of Technology-Significance, Scope, Responding to technology challenges.

Technology Transfer: Introduction, Definition, Classification, Significance, Elements of process, Types of Technology Transfer, Package, Modes of Transfer, Routes, Channels and Effectiveness of Technology Transfer.

Module 5: CORPORATE GOVERNANCE: THE INDIAN SCENARIO (09 Periods)

Emergence of corporate governance in India-Landmarks, Models, Codes and status in India, Role and Responsibilities of Regulators, The Board of Directors; Corporate Governance- Specific issues in India, Family-owned Business, Corporate Governance and the Indian ethos.

Total Periods: 45

EXPERIENTIAL LEARNING

1. Case studies: Using real-world examples of global businesses and their technological strategies, students can examine the challenges and opportunities presented by different markets and technologies. This can involve analyzing data, conducting market research, and making decisions based on their findings.

2. Simulation games: Students can participate in simulation games that allow them to make decisions about global strategy and technology in a virtual environment. This can help them understand the complexities of international business, such as navigating different cultures, regulations, and economic systems.

3. Industry partnerships: Partnerships with technology companies and global businesses can provide students with hands-on experience in global strategy and technology. This can include internships, shadowing, or working on real projects with industry professionals.

4. Project-based learning: Students can work on real-world projects that require them to apply their knowledge of global strategy and technology. This can include developing a business plan for a new product or service, designing a marketing campaign for a global audience, or analyzing the impact of a new technology on a specific industry.

5. Field trips: Visiting international businesses or attending technology conferences can provide students with a first-hand look at global strategy and technology in action. This can help them understand the challenges and opportunities of different markets and technologies, as well as connect with industry professionals.

(Note: It's an indicative one. Course instructor may change the activities and the same shall be reflected in course handout)

CASE STUDIES:

1. Tesla: Can Elon Musk's electric car company succeed globally?
2. Uber: How the ride-sharing giant is expanding its global footprint.

3. Alibaba: How China's e-commerce giant is competing on the global stage.
4. Airbnb: How the home-sharing platform is disrupting the global hotel industry.
5. Netflix: How the streaming service is expanding globally and adapting to local markets.

ARTICLES:

1. "Digital Transformation: Why it Matters for Global Business" by Forbes
2. "How AI is Changing Global Business Strategy" by Harvard Business Review
3. "The Future of Globalization: Exploring the Role of Technology" by World Economic Forum
4. "Globalization 4.0: What it Means for Technology and Strategy" by McKinsey & Company
5. "How Technology is Transforming Global Supply Chains" by MIT Sloan Management Review

RESOURCES

TEXT BOOKS:

1. Francis Cherunilam, Strategic Management, Himalaya Publishing House, 3rdEdition, 2002.

2. C. S. G. Krishnamacharyulu and Lalitha Ramakrishnan, Management of Technology, Himalaya Publishing House, Second Edition, 2012.

REFERENCE BOOKS:

1. White and Bruton, The Management of Technology and Innovation: A Strategic Approach, Cengage Learning, 1stEdition, 2007.
2. S.K.Mandak, Ethics in Business and Corporate Governance, TMH, 2ndEdition, 2012.

VIDEO LECTURES:

1. https://www.digimat.in/nptel/courses/video/110106157/L01.html
2. https://www.digimat.in/nptel/courses/video/110106157/L43.html

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
22EE101704	GREEN TECHNOLOGIES	3	-	-	-	3

Pre-Requisite -
Anti-Requisite -
Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on green technology concepts, the role of industry and government in establishing green energy footprints and cleaner development mechanisms. It also presents energy-efficient and sustainable green production systems, concepts of energy ecosystems, and concepts of green buildings.

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

CO1. Understand the green technology concepts and the consequences of greenhouse gas emissions.
CO2. Acquire basic knowledge on cleaner development mechanism, the importance of re-use of materials, and the oxidation technology for wastewater.
CO3. Go beyond energy-efficient machinery, biofuels, and environmentally friendly materials.
CO4. Acquire basic knowledge on man-made ecosystems, sources, and control of pollution.
CO5. Understand the concepts and requirements for green buildings.

CO-PO Mapping Table

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	3	-	-	-	-	1
CO2	3	-	-	-	-	-	3	-	-	-	-	1
CO3	3	-	-	-	-	-	3	-	-	-	-	1
CO4	3	-	-	-	-	-	3	-	-	-	-	1
CO5	3	-	-	-	-	-	3	-	-	-	-	1
Course Correlation Mapping	3	-	-	-	-	-	3	-	-	-	-	1

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: INTRODUCTION TO GREEN TECHNOLOGY (09 Periods)

Green technology-definition, importance, factors affecting green technology. Global atmosphere- green house gases, global warming, acid rain, ozone depletion and photochemical smog. Role of industry, government and institutions; industrial ecology, role of industrial ecology in green technology.

Module 2: CLEANER DEVELOPMENT TECHNOLOGIES (08 Periods)

Cleaner development mechanisms, role of industry; reuse, reduce and recycle, raw material substitution; wealth from waste; carbon credits, carbon trading, carbon sequestration, eco labeling. Oxidation technology for wastewater treatment - cavitation, fenton chemistry, photocatalysis and hybrid processes.

Module 3: ENERGY EFFICIENT SYSTEMS AND PROCESSES (09 Periods)

Energy efficient motors, energy efficient lighting, control and selection of luminaries; bio-fuels, fuel cells- working, selection of fuels, Green manufacturing systems, selection of recyclable and environment friendly materials in manufacturing, design and implementation of sustainable green production systems.

Module 4: ENERGY ECOLOGY AND ENVIRONMENT (08 Periods)

Concept and theories of ecosystems - energy flow in major manmade ecosystems- agricultural, industrial and urban ecosystems - sources of pollution from energy technologies and its impact on atmosphere - air, water, soil, and environment - environmental laws on pollution control – innovation and sustainability: - eco-restoration / phyto-remediation, renewable energy technologies, industrial ecology and agro ecology.

Module 5: GREEN BUILDINGS (10 Periods)

Definition- Features and benefits, Fundamental planning decisions for energy efficient building- site selection, buildings forms and orientations, building fabrics and insulation, ventilation, passive solar features. Eco-friendly and cost effective materials, energy management. Rooftop solar photovoltaic system and solar tracking system, alternating roofing systems.

Total Periods: 45

EXPERIENTIAL LEARNING

1. The student shall prepare a report on the causes of global warming and should suggest possible remedies for reducing the global warming
2. The student shall prepare a report on the wastewater management system.
3. The student shall prepare a report on controlling pollution in the environment.
4. The student shall observe the various considerations in a greenhouse building and should prepare the report on the observations made and should suggest possible avenues for improvement.

(Note: It's an indicative one. Course instructor may change the activities and the same shall be reflected in course handout)

RESOURCES

TEXT BOOKS:

1. Khan B.H, Non conventional energy resources, Tata McGraw-Hill, New Delhi 2006.
2. Paul L. Bishop, Pollution prevention –Fundamentals and Practices, McGraw-Hill-international 2000.

REFERENCE BOOKS:

1. P. Aarne Veslind, Introduction to environmental engineering, Cenage Learning 2010.
2. Joseph A. Salvato, Environmental engineering, Wiley
3. Tom D Reynolds, Unit operations and processes in environmental engineering, PWS Publishing.
4. D. Y. Goswami, F. Kreith and J. F. Kreider, Principles of Solar Engineering, Taylor and Francis.
5. C. S. Solanki, Solar Photovoltaics: Fundamental Applications and Technologies, Prentice Hall.

WEB RESOURCES:

1. N. Vinutha bai, R. Ravindra, Energy efficient and green technology concepts, International Journal of Research in Engineering and Technology p 253-258, Volume: 03 Special Issue: 06, 2014, eISSN: 2319-1163 pISSN: 2321-7308.