Course Name: Physics

Course Code: BTBFS 101 **Credits: 4 (L-T-P: 4-0-0)**

Course Objectives

- To demonstrate skills in scientific inquiry, problem solving and laboratory techniques
- To have understanding of places in the physical universe
- To acquire a broad base of knowledge in physics.
- To gain understanding of physical laws of nature.

Course Outcomes

- Formulation of hypothesis and processing of evidence to FSL
- Understanding the importance of physical evidences in Forensic Physics
- Analysis of different types of physical evidences like glass, paint and soil found in the crime scene
- Understanding the tools and tool marks analysis in FSL

Course Contents

Unit I: Mechanics

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

Unit II: Thermal Physics

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

Unit III : Electromagnetism

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

Unit IV: Waves and Oscillations

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

Unit V: Atomic Physics

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

Suggested Readings

Basic physics: a self teaching guide – II edition – Carl F Kauhn

Handbook of Physics –

New simplified physics – S L Arora

A Master Resource book in Physics – D B Singh

Course Name: Crime & Society

Course Code: BTBFS 103 **Credits: 4 (L-T-P: 4-0-0)**

Course Objectives

- To understand the importance of criminology.
- To understand the causes of criminal behavior.
- To understand the significance of criminal profiling to mitigate crime.
- To understand the consequences of crime in society.
- To understand the elements of criminal justice system.

Course Outcomes

- Understanding of the correlation of crime and society
- Understanding of the importance of society in crime causation

Course Contents

Unit I : **Basics of Criminology**

Definition, aims and scope. Theories of criminal behavior – classical, positivist, sociological. Criminal anthropology.Criminal profiling. Understanding modus operandi. Investigative strategy. Role of media.

Unit II : **Crime**

Elements, nature, causes and consequences of crime. Deviant behavior. Hate crimes, organized crimes and public disorder, domestic violence and workplace violence.White collar crimes Victimology. Juvenile delinquency. Social change and crime. Psychological Disorders and Criminality. Situational crime prevention.

Unit III: Criminal Justice System :

Broad components of criminal justice system. Policing styles and principles. Police's power of investigation.Filing of criminal charges. Community policing. Policing a heterogeneous society. Correctional measures and rehabilitation of offenders. Human rights and criminal justice system in India.

Unit IV :

- To review past criminal cases and elucidate which theory best explains the criminal behavior of the accused.
- To review crime cases where criminal profiling assisted the police to apprehend the accused.
- To cite examples of crime cases in which the media acted as a pressure group.
- To evaluate the post-trauma stress amongst victims of racial discrimination.
- To correlate deviant behavior of the accused with criminality (take a specific example).
- To evaluate victimology in a heinous crime.

Unit V :

- To examine a case of juvenile delinquency and suggest remedial measures.
- To evaluate how rising standards of living affect crime rate.
- To review the recommendations on modernization of police stations and evaluate how far these have been carried out in different police stations.
- To visit a 'Model Police Station' and examine the amenities vis-à-vis conventional police stations.
- To examine steps being taken for rehabilitation of former convicts and suggest

improvements.

- To prepare a report on interrogation cells and suggest improvements.

Note: Unit IV and V has to be conducted as practical's.

Suggested Readings

S.H. James and J.J. Nordby, *Forensic Science: An Introduction to Scientific and Investigative Techniques*, 2nd Edition, CRC Press, Boca Raton (2005).
D.E. Zulawski and D.E. Wicklander, *Practical Aspects of Interview and Interrogation*, CRC Press, Boca Raton (2002).
R. Saferstein, *Criminalistics*, 8th Edition, Prentice Hall, New Jersey (2004).
J.L. Jackson and E. Barkley, *Offender Profiling: Theory, Research and Practice*, Wiley, Chichester (1997).
R. Gupta, *Sexual Harassment at Workplace*, LexisNexis, Gurgaon (2014).

Course Name: Forensic Anthropology

Course code: BSCFS 105 **Credits: 4 (L-T-P: 4-0-0)**

Course Objectives

- To develop skills in different techniques of facial reconstruction and their forensic importance.
- To understand the significance of somatoscopy and somatometry.

Course Outcomes

- Understanding the importance of forensic anthropology in personal identification of persons.
- Understanding the different techniques and technologies for facial reconstruction

Course Contents

Unit I: Significance of Forensic Anthropology

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

Unit II: Personal Identification – Somatoscopy and Somatometry

Somatoscopy – observation of hair on head, forehead, eyes, root of nose, nasal bridge, nasal tip, chin, Darwin's tubercle, ear lobes, supra-orbital ridges, physiognomic ear breadth, circumference of head. Scar marks and occupational marks.
Somatometry – measurements of head, face, nose, cheek, ear, hand and foot, body weight, height.
Indices - cephalic index, nasal index, cranial index, upper facial index.

Unit III: Facial Reconstruction

Portrait Parle/ Bertillon system. Photofit/identi kit. Facial superimposition techniques. Craniofacial super imposition techniques – photographic super imposition, videosuperimposition, Roentgenographic superimposition. 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.

Practicals

1. To determine of age from skull and teeth.

2. To determine of sex from skull.
3. To determine sex from pelvis.
4. To study identification and description of bones and their measurements.
5. To investigate the differences between animal and human bones.
6. To perform somatometric measurements on living subjects.
7. To carry out craniometric measurements of human skull.
8. To estimate stature from long bone length.
9. To conduct portrait parley using photofit identification kit.

Suggested Readings

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

Course name: Introduction To Forensic Science

Course Code: BSCFS 107 **Credits: 4 (L-T-P: 4-0-0)**

Course Objectives

- To grasp the fundamental principles and functions of forensic science.
- To understand the divisions in a forensic science laboratory.
- To acquire knowledge about working of the forensic establishments in India and abroad.

Course Outcomes

- Understanding of the importance of forensic science to human society.
- Understanding the different tools and techniques used in forensic science for effective report writing

Course Contents

Unit I: History of Development of Forensic Science in India

Functions of forensic science. Historical aspects of forensic science - Definitions and concepts in forensic science. Scope of forensic science. Need of forensic science. Basic principles of forensic science - Frye case and Daubert standard.

Unit II: Tools and Techniques in Forensic Science

Branches of forensic science. Forensic science in international perspectives, including set up of INTERPOL and FBI. Duties of forensic scientists. Code of conduct for forensic scientists. Qualifications of forensic scientists. Data depiction. Report writing.

Unit III: Organizational set up of Forensic Science Laboratories in India

Hierarchical set up of Central Forensic Science Laboratories, State Forensic Science Laboratories, Government Examiners of Questioned Documents, Fingerprint Bureaus, National Crime Records Bureau, Police & Detective Training Schools, Bureau of Police Research & Development, Directorate of Forensic Science and Mobile Crime Laboratories. Police Academies. Police dogs. Services of crime laboratories. Basic services and optional services.

Unit IV

- To study the history of crime cases from forensic science perspective.
- To cite examples of crime cases in which apprehensions arose because of Daubert standards.
- 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.
- 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.
- To write report on different type of crime cases.

Unit V

- To review how the Central Fingerprint Bureau, New Delhi, coordinates the working of State Fingerprint Bureaus.
- To examine the hierarchical set up of different forensic science establishments and suggest improvements.
- 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.
- To compare and contrast the role of a Police Academy and a Police Training School.
- To compare the code of conduct prescribed by different establishments for forensic scientists.

Note: Unit IV and V has to be conducted as practical's.

Suggested Readings

B.B. Nanda and R.K. Tiwari, *Forensic Science in India: A Vision for the Twenty First Century*, Select Publishers, New Delhi (2001).

M.K. Bhasin and S. Nath, *Role of Forensic Science in the New Millennium*, University of Delhi, Delhi (2002).

S.H. James and J.J. Nordby, *Forensic Science: An Introduction to Scientific and Investigative Techniques*, 2nd Edition, CRC Press, Boca Raton (2005).

W.G. Eckert and R.K. Wright in *Introduction to Forensic Sciences*, 2nd Edition, W.G. Eckert (ED.), CRC Press, Boca Raton (1997).

R. Saferstein, *Criminalistics*, 8th Edition, Prentice Hall, New Jersey (2004).

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

Course name: Basic Forensic Lab

Course Code: BSCFS 109 **Credits: 2 (L-T-P: 0-0-3)**

1. Etiquette Inside Lab room.
2. How to maintain Lab records
3. Basic Lab Equipment's
4. To Identify the class & individual characteristics of fingerprints by plain and rolling method
5. To determine the blood group and Rh factor of individual
6. Preservation of evidences by druggist fold.

Course name: Communicative English

Course Code: EN105 **Credits: 4 (L-T-P: 4-0-0)**

Course name: **भाषा और संस्कृति**

Course Code: HN105 /BTBFS111 **Credits: 4 (L-T-P: 3-1-0)**

पाठ्यक्रम का उद्देश्य (Course Objective)-

- भाषा के संघटक तत्वों से परिचित कराना
- भाषा और संस्कृति के अंतर्संबंधों की पहचान विकसित करना
- भाषा के विभिन्न रूपों से परिचय कराना, भाषा और जेंडर पर समझ बनाना
- वैश्विक परिदृश्य में भाषा के स्वरुप और उसकी प्रकृति की समझ विकसित करना

पाठ्यक्रम अध्ययन के परिणाम (Course Learning Outcomes)-

- भाषा के संघटक तत्वों से परिचित हो सकेंगे
- भाषा और संस्कृति के अंतर्संबंधों की पहचान विकसित हो सकेगी
- भाषा के विभिन्न रूपों का परिचय प्राप्त हो सकेगा. भाषा और जेंडर की समझ बनेगी
- वैश्विक परिदृश्य में भाषा के स्वरुप और उसकी प्रकृति को समझ पायेंगे

1. **भाषा: स्वरुप, प्रकृति और प्रकार्य**
   - (i) भाषा के संघटक तत्व
   - (ii) भाषा और सम्प्रेषण
   - (iii) भाषा प्रयोग: सामान्य व असामान्य
   - (iv) भाषा और बोली
2. **भाषा और समाज**
   - (i) बहुभाषी समाज और भाषा के प्रश्न
   - (ii) भाषा और लिंग-भेद (जेंडर)
   - (iii) भाषा, जातीयता और अस्मिता
3. **संस्कृति और भाषा**
   - (i) सांस्कृतिक अवधारणा के रूप में भाषा
   - (ii) संस्कृति और भाषा का अंतर्संबंध
   - (iii) जन-संस्कृति, लोकप्रिय संस्कृति और भाषा
   - (iv) भाषा और वैश्वीकरण

सहायक ग्रन्थ सूची

रविन्द्रनाथ श्रीवास्तव, 1995, हिंदी भाषा: संरचना के विविध आयाम , राजकमल प्रकाशन नई दिल्ली
रामविलास शर्मा, 2002, भाषा और समाज, राजकमल प्रकाशन नई दिल्ली
हजारीप्रसाद द्विवेदी, 1998, भाषा, साहित्य और देश, भारतीय ज्ञानपीठ, नई दिल्ली
रविन्द्रनाथ श्रीवास्तव, 1994, हिंदी भाषा का समाजशास्त्र, राधाकृष्ण प्रकाशन, नई दिल्ली
विमलेशकांति वर्मा और डॉ. मालती, 2007, भाषा, साहित्य और संस्कृति, ओरिएंट लॉगमैन, नई दिल्ली

गजानन माधव मुक्तिबोध, 2009, भारत इतिहास और संस्कृति, राजकमल प्रकाशन नई दिल्ली
रामधारी सिंह दिनकर, 2013,संस्कृति के चार अध्याय, लोकभारती प्रकाशन, इलाहबाद
डॉ. आभा गुप्ता ठाकुर(अनुवादक), 2016, संस्कृति का ताना-बाना, वाणी प्रकाशन, नई दिल्ली

Course name: IT and It's Applications Lab – I

Course Code: BTIT101/BTBFS111 **Credits: 2 (L-T-P: 0-0-3)**

Course Objectives

- To Understand the Windows.
- To understand working using MS Office.
- To get acquainted of databases

Course Outcomes

- Learning of computational skills and applications
- Learning of using various databases

Course Contents

Experiments:

Exercise 1: To make visiting card in MS word.
Exercise 2: Document formatting and page layout in MS word.
Exercise 3: Student admission letter mail merge.
Exercise 4: Calculations within Table in Microsoft Word.
Exercise 5: DNA quantification and total yield calculation in MS word.
Exercise 6: To create Table of contents of given sample text in MS word.
Exercise 7: Searching for Biotechnology Articles Using NCBI PubMed etc.
Exercise 8: To organize and manage research references using Mendeley reference manager tool.
Exercise 9: To retrieve information of nucleotide sequence of interest from NCBI database.
Exercise 10: To retrieve sequences of multiple proteins with given accession number
Exercise 11: To retrieve nucleotide sequences of the given gene from the NCBI database.

Suggested Readings :
Internet and shared latest Material.

Course name: Social and Emotional well being

Course Code: PM 105/BTVAC 101 **Credits: 2(L-T-P: 2-0-0)**

Course Objectives

- To understand the concepts of social and emotional well-being, including their importance and impact on overall health.
- To recognize the factors that influence social and emotional well-being, including cultural, social, and environmental factors.
- To understand one's own social and emotional strengths and weaknesses, and develop strategies for personal growth and improvement.
- To develop effective communication and interpersonal skills to build and maintain healthy relationships.
- To learn techniques for managing stress, anxiety, and other emotions to promote overall well-being.
- To develop coping skills and strategies to deal with adversity, trauma, and change.

Course Outcomes

- Understanding of the role of social and emotional well-being in overall health and well-being.
- Recognizing how cultural, social, and environmental factors influence social and emotional well-being.
- Showing the ability to communicate effectively and build healthy relationships with others.
- Capabilities of using techniques such as mindfulness, deep breathing, and physical activity to manage stress and regulate emotions.
- Understanding of how to deal with adversity, trauma, and change, and develop strategies for promoting resilience.

Course Content

Unit –I: Introduction

- Wellbeing: Psychological well being
- Theoretical Conceptualization of well being: Seligman PERMA model, McCallum and Price model of holistic wellbeing, Campion and Nurse's Dynamic Model, McCallum and Price's positive social ecology model
- Need of social wellbeing and Emotional wellbeing

Unit II: Stress and Wellbeing

- Stress: Definition and nature
- Theories of stress: Cannon's fight-or-flight theory, Taylor et al.'s Tend-and Befriend Theory, Selye's General Adaptation Syndrome, Lazarus' Cognitive Appraisal Model
- Stress and its effects: Physiological effects, emotional effects and social effects
- Social Justice and Social well being

Unit III: Social Wellbeing

- Social wellbeing: concept, definition and historical background
- Dimensions of Social Wellbeing: social integration, social acceptance, social contribution, social actualization, social coherence.
- Happiness and Social well being
- Social Justice and Social well being

Unit IV: Emotional Wellbeing

- Positive and negative Emotions
- Self awareness, self regulation, self motivation, empathy, social skills
- Emotion- focused coping: adaptive and maladaptive coping

Suggested Readings

- Carter, S and Cecily, A. (2019). "Wellbeing in Educational Context", Chapter-2. University of Southern Queensland.
- Baumgardner, S. R., & Crothers, M. K. (2009). Positive Psychology. Pearson Education, India.
- Thin, N. (2020). "A research agenda for Social Wellbeing" Social Wellbeing - United States Institute of Peace. https://www.usip.org
- Keyes, C.M, (1998). "Social Well-Being". Social Psychology Quarterly, 61 (2) 121-140.
- Diener, R. B. & Ed Diener, (2016). Together: The Science of Social Psychology, Universities of Utah. Publisher: Noba.
- Knox, P. L. (1975). Social Well-being: A Spatial Perspective. Paper Back publication.
- Snyder, C. R., Lopez, S. J., & Pedrotti, J. T. (2010). Positive Psychology: The scientific and Practical explorations of human strengths. 2nd ed. Sage Publications, India.

Course name: Human Values and Buddhist Ethics

Course Code: BS 101 **Credits: 2(L-T-P: 2-0-0)**

Course Objectives

- To understand Buddhist principles: Familiarize yourself with the fundamental principles of Buddhism, including the Four Noble Truths and the Eightfold Path.
- To analyze ethical concepts: Examine key Buddhist ethical concepts, such as ahimsa (non-violence), compassion, and mindfulness.
- To apply Buddhist ethics to real-life situations: Develop the ability to apply Buddhist ethical principles to everyday life, including personal and professional decision-making.
- To evaluate human values in Buddhist context: Assess the significance of human values such as empathy, kindness, and generosity in the context of Buddhist teachings.
- To develop critical thinking and reflection: Cultivate critical thinking and reflection skills to evaluate the relevance and application of Buddhist ethics in modern society.

Course Outcomes

- Understand of the core teachings of Buddhism, including the Four Noble Truths and the Eightfold Path.
- Development of the ability to analyze the ethical implications of Buddhist teachings
- Applying Buddhist ethical principles to personal and professional life.
- Ability to avaluate the relevance of Buddhist ethics in modern society
- Showing the ability to think critically and reflectively about the application of Buddhist ethics in various contexts.

Course Content

Unit 1:

Life of Gautam Buddha Origin of Buddhism Buddhist Ethics

Buddhist Literature (Pāli Canonical Literature)

Unit 2:

Basic Tenets of Buddhism: Cattāri-Ariya-Saccāni (The Four Noble Truths), Ariyo-Aṭṭhaṅgiko-Maggo (The Eightfold Path or The Middle Path) Brahma-Vihāra-Bhāvanā (Four Sublime States), Pañcasīla (The Five Precepts)

Unit 3:

Socially Engaged Buddhism, Ten Wholesome Deeds (Dasa Kusala Kamma) Ten Unwholesome Deeds (Dasa Akusala Kamma)

Unit 4:

Buddhist View on Environmental Crisis, Buddhist View on Human Rights, Buddhist Economic Theory

Suggested Readings:

- Ambedkar, Bhim Rao, *The Buddha and His Dhamma*, Nagpur: Buddha Bhoomi Prakashan, 1997.
- Bapat, P. V., *2500 Years of Buddhism*, Delhi: Publications Division, Ministry of Information and Broadcasting, Goverment of India, 1997.
- Bhikkhu Dr. Beligalle Dhammajoti, *Buddhism & Modern World*, Taiwan: The Corporate Body of the Buddha Educational Foundation, 2011.
- Bhikshu Dharmarakshita, *Pāli Sāhitya Kā Itihās*, Varanasi: Gyanamandala Limited, 1988.
- Bhikshu Dharmarakshita, *Sukhī Grihastha Ke Liye Buddha Upadesh*, New Delhi: Samyaka Prakashana, 2011.
- *Buddhist Dictionary - Manual of Buddhist Terms and Doctrines* (Ed.) Nyanaponika, Taiwan: The Corporate Body of the Buddha Educational Foundation, 2012.
- Chan Khoon San, *Buddhism Course*, Kuala Lumpur: Majujaya Indah Sdn. Bhd., 2012.
- Dharmkirti, *Buddha Ka Nitishashtra*, New Delhi: Samyaka Prakashana, 2012.
- Dharmkirti, *Buddha Ka Samajadarshana*, New Delhi: Samyaka Prakashana, 2012.
- K.Sri Dhammananada, *Gems of Buddhist Wisdom*, Malaysia: Buddhist Missionary Society, 1996.
- K.Sri Dhammananda, *Meditation the Only Way*, Taiwan: The Corporate Body of the Buddha Educational Foundation, 2006.
- K.Sri Dhammananda, *What Buddhists Believe*, Taiwan: The Corporate Body of the Buddha Educational Foundation, 2006.
- Keown, D., *The Nature of Buddhist Ethics*, London: Macmillan, 1992.
- Law, Bimala Churn, *A History of Pāli Literature*, Delhi: Indological Book House, 1983.
- Misra, G.S.P., *Development of Buddhist Ethics*, New Delhi: Munshi Ram Manohar Lal Private Limited, 1984.
- Nārada Thera, *A Manual of Buddhism*, Taiwan: The Corporate Body of the Buddha Educational Foundation, 2005.
- Narada, *The Buddha and His Teachings*, Taiwan: The Corporate Body of the Buddha Educational Foundation, 2005.
- Narasu, P.Lakshmi, *The Essence of Buddhism*, Madras: Asian Educational Services, 1993.
- Paul Carus, *The Gospel of Buddha*, Nagpur: Kashinath Meshram, Buddha Bhoomi Prakashan, 1997.
- Pyinnyāthīha, *The Triple Gem and The Way to Social Harmony*, Taipei: The Corporate Body of the Buddha Educational Foundation, 2002.
- Rahula, Walpola, *What The Buddha Taught*, Taiwan: The Corporate Body of the Buddha Educational Foundation, 2003.
- Samdhong Rinpoche, *The Social Philosophy of Buddhism*, Varanasi: The Central Institute of Higher Tibetan Studies, 1972.
- Sankrityana, Rahula, *Bauddha Darshana*, Allahabad: Kitab Mahal, 1992.
- Sarao, K.T.S. & Arvind Kumar Singh (Eds.), *A Text Book of the History of Theravada Buddhism*, Delhi: Department of Buddhist Studies, Delhi University, 2006.
- Sarao, K.T.S., *Origin and Nature of Ancient Indian Buddhism*, New Delhi: Munshiram Manoharlal, 2009.
- Sayagyi U Ko Lay, *Guide to Tipitaka*, Taiwan: The Corporate Body of the Buddha Educational Foundation, 2002.
- Shakya, Gyanaditya, *Bauddha Dharma Darshana Mein Brahma-Vihāra-Bhāvanā,* Ahmadabad: Reliable Publishing House, 2013.
- Shakya, Rajendra Prasad, *Bauddha Darshan*, Madhya Pradesh Hindi Academy, Bhopal, 2001.
- Singh, Anand, *Business Ethics and Indian Value System*, Himalayana Publication, Delhi, 2010.
- *The Dhammapada* (Ed. & Tr.) K. Sri Dhammananda, Taiwan: The Corporate Body of the Buddha Educational Foundation, 2006.
- Thera Piyadassi, *The Buddha's Ancient Path*, Taiwan: The Corporate Body of the Buddha Educational Foundation, 2003.
- Upadhayaya, Bharat Singh, *Pāli Sāhitya Kā Itihās*, Prayag: Hindi Sahitya Sammelan, 2005.
- Upadhyaya, Baladeva, *Bauddha Dharma Darshan Mimamsa*, Varanasi: Chaukhamba Vidya Bhawan, 19

Course Name: Chemistry

Course Code: BTBFS 102 **Credits: 4 (L-T-P: 4-0-0)**

Learning Objectives

- Be able to demonstrate problem solving and critical thinking skills and also discuss forensic chemical principles

Learning outcomes

- Be able to apply modern methods of forensic analysis in a laboratory setting
- Be able to design appropriate experiments to achieve results in a safe and environmentally sensitive manner

Course Contents

Unit I: **Liquid state**

Free volume of liquid and density measurement, physical properties of liquid, Vapor pressure, surface tension surfactants, viscosity, molar refraction, optical activity structure of liquid. Solutions: Method of exploring concentration of solutions, binary liquids, vapor pressure, composite diagram of binary liquids and solutions, distillation, fractional distillations, vacuum distillations. Conductance, conductometry, electro motive force, potentiometery

Unit II : **Thermodynamics and kinetics**

Chemical, first law of thermodynamics, Internal energy, enthalpy second law of thermodynamics, entropy and its significance, free energy and work function , Rate of reaction, order of molecularity reaction, slow reaction and fast reaction, first order reaction, half life period of first order reaction, Activation energy, temperature dependence of activation energy, explosive reactions, Oscillatory reactions.

Unit III : Periodic Table

Study of modern periodic table, long form of periodic table, periodic properties, atomic radii, ionization potential, electron affinity electro negativity, metallic characters, non metallic characters and magnetic properties, comparative study of S and P block elements.

Unit IV: Analysis

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

Unit V: **IUPAC Nomenclature of Alkanes, Alkenes and Alkynes**

Empirical and molecular formulae, hybridization, nature of chemical bonding, polarization, hydrogen bonding, Vander walls forces, IUPAC nomenclature of alkanes, alkenes, haloalkanes, alcohol ether aldenydes, ketones, carboxylic acids, nitro compounds, nitrites including cyclic analogues and also aromatic compounds, naphthalene, anthrones and phenanthrones, reactive intermediates and related reactions.

Suggested Readings

Handbook of Chemistry – R P Singh
Basic concept of Chemistry – Peegassus
Basic organo metallic Chemistry – Anil elais
Basics concepts of Analytical Chemistry – S M Khopkar

Course Name: Forensic Chemistry

Course Code: BTBFS104 **Credits: 4 (L-T-P: 4-0-0)**

Learning Objectives

- To introduce students to this fascinating branch of science and familiarize them with important concepts like explosives/arson, drugs and their detection.

Learning outcomes

- By the end of the course, the students will be able to: various methods of explosive analysis in forensic science, collection and preservation of evidence from crime scene etc.

Course Contents

Unit I: Scope & significance of Forensic Chemistry
Scope & significance of Forensic Chemistry, Types of cases/exhibits received for analysis. Trap Cases: Collection, and Preliminary analysis of evidence in trap cases.

Unit II: Alcoholic Beverages
Types of alcohols, country made liquor, illicit liquor, denatured spirits, Indian made foreign alcoholic and non-alcoholic beverages. Dyes: Scope & Significance of dyes in crime investigation, analysis of ink by TLC and UV visible spectrophotometry.

Unit III: Petroleum products and their adulterations
Chemical composition of various fractions of Petroleum Products, Analysis of petrol, kerosene, diesel. Fire/Arson and Explosives Fire: Introduction to Fire & Arson, origin of fire, Chemistry of Fire, Fire tetrahedron, Firefighting operations, preservation of fire scene, collection of evidences, Seat of fire, cause of fire, motives, Analysis of fire debris, Case studies related to fire and Arson.

Unit IV: **Explosive and Explosion**
Explosive and Explosion: Scope & significance of explosive analysis in forensic science, Types of explosives, deflagration and detonation, explosive trains, collection, preservation and forwarding of exhibits, preliminary analysis of explosives. Dos and Don'ts. Case studies related to explosives. Drugs of abuse: Classification, including designer drugs. Ill effects of drugs of abuse, Preliminary and conformatory tests.

Suggested Readings

Saferstein, R. (1990) Criminalistics, Prentice Hall, New York.
Basic Principles of Forensic Chemistry by JaVed I. Khan • Thomas J. Kennedy Donnell R. Christian, Jr.
Clarke's Analysis of Drugs and Poisons 3rd Ed.

Course Name: Scene of Crime Management

Course Code: BTBFS106 **Credits: 4 (L-T-P: 4-0-0)**

Learning Objectives

- After studying this paper the students will know – a. The methods of securing, searching and documenting crime scenes.

Learning outcomes

- The art of collecting, packaging and preserving different types of physical and trace evidence at crime scenes. The legal importance of chain of custody. The tools and techniques for analysis of different types of crime scene evidence.

Course Contents

Unit I :**Crime Scene Management**

Types of crime scenes – indoor and outdoor. Securing and isolating the crime scene. Crime scene search methods. Safety measures at crime scenes. Legal considerations at crime scenes. Documentation of crime scenes – photography, videography, sketching and recording notes. Duties of first responders at crime scenes. Coordination between police personnel and forensic scientists at crime scenes. The evaluation of 5Ws (who?, what?, when?, where?, why?) and 1H (how?). Crime scene logs.

Unit II : Basics of Investigation

Objectives of Criminal Investigation. Characteristics and role of Investigating officer, Management: - Information Management, Technology Management, Man-Power Management & Logistic Management. Legal procedures in Investigation. Investigation procedures in traditional, contemporary and special crimes. Case Laws on Registration of FIR, charge sheet, recording of statements, arrest, confession, summons and warrants.

Unit III: Crime scene Management

Crime scene Management, Responsibilities of First responding officer, Crime scene – Types, search methods, photography and sketching. Pattern Evidence in Reconstruction (Bloodstain Pattern Analysis for Reconstruction, Glass Fracture Patterns, Fire Burn Patterns, Tire and Skid Mark Patterns).

Unit IV: Types of physical clues and various crime scenes

Types of physical clues and various crime scenes, Procedures in locating, handling, collecting, packing and forwarding of physical clues. Crime Scene Evidence Classification of crime scene evidence – physical and trace evidence. Locard principle. Collection, labeling, sealing of evidence. Hazardous evidence. Writing a Reconstruction Report. IPC (1860), Cr. P.C (1973) and IEA (1872)

Suggested Readings

M. Byrd, Crime Scene Evidence: A Guide to the Recovery and Collection of Physical Evidence, CRC Press, Boca Raton (2001).

T.J. Gardener and T.M. Anderson, Criminal Evidence, 4th Ed., Wadsworth, Belmont (2001).

S.H. James and J.J. Nordby, Forensic Science: An Introduction to Scientific and Investigative Techniques, 2nd Edition, CRC Press, Boca Raton (2005).

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

Course Name: Criminal Laws

Course Code: BTBFS 108 **Credits: 4 (L-T-P: 4-0-0)**

Learning Objectives:

- To know and understand elements of Criminal Procedure Code related to forensic science.

Learning outcomes

- Acts and provisions of the Constitution of India related to forensic science. Acts governing socio-economic crimes. Acts governing environmental crimes.

Course Contents

Unit I: Law to Combat Crime Classification

Law to Combat Crime Classification – civil, criminal cases. Essential elements of criminal law. Constitution and hierarchy of criminal courts. Criminal Procedure Code. Cognizable and non-cognizable offences. Bailable and non-bailable offences. Sentences which the court of Chief Judicial Magistrate may pass. Summary trials – Section 260(2). Judgements in abridged forms – Section 355. Indian Penal Code pertaining to offences against persons – Sections 121A, 299, 300, 302, 304A, 304B, 307, 309, 319, 320, 324, 326, 351, 354, 359, 362. Sections 375 & 377 and their amendments. Indian Penal Code pertaining to offences against property Sections – 378, 383, 390, 391, 405, 415, 420, 441, 463, 489A, 497, 499, 503, 511. Indian Evidence Act – Evidence and rules of relevancy in brief. Expert witness. Cross examination and re-examination of witnesses. Sections 32, 45, 46, 47, 57, 58, 60, 73, 135, 136, 137, 138, 141. Section 293 in the code of criminal procedure.

Unit II: Constitution of India Preamble

Constitution of India Preamble, Fundamental Rights, Directive Principles of State Policy. – Articles 14, 15, 20, 21, 22, 51A. 3128

Unit III : Acts

Acts Pertaining to Socio-economic and Environmental Crimes Narcotic, Drugs and Psychotropic Substances Act. Essential Commodity Act. Drugs and Cosmetics Act. Explosive Substances Act. Arms Act. Dowry Prohibition Act. Prevention of Food Adulteration Act. Prevention of Corruption Act. Wildlife Protection Act. I.T. Act. Environment Protection Act. Untouchability Offences Act

Unit IV

- To prepare a schedule of five cognizable and five non-cognizable offences.
- To study the powers and limitations of the Court of Judicial Magistrate of First Class.
- To prepare a schedule of the offences which may be tried under Section 260(2) of Criminal Procedure Code.
- To study a crime case in which an accused was punished on charge of murder under Section 302.
- To study a crime case in which an accused was punished on charge of rape under Section 375.
- To cite example of a case in which the opinion of an expert was called for under Section 45 of the Indian Evidence Act.
- 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.

Unit V

- To cite a case under Article 14 of the Constitution of India wherein the Equality before Law was allegedly violated.

- To list the restrictions imposed on Right to Freedom of Worship under the Constitution of India.
- To prepare a schedule of persons convicted under Narcotics, Drugs and Psychotropic Act statistically analyze the age group to which they belonged.
- To study a case in which Drugs and Cosmetic Act was invoked.
- To study a case in which Explosive Substances Act was invoked.
- To study a case in which Arms Act was invoked. In light of Section 304B of the Indian Penal Code, cite a case involving dowry death.
- To study a case wherein the Untouchability Offences Act was invoked on the basis of Article 15 of the Constitution of India.

Note: Unit IV and V should be handles as practicals

Suggested Readings

D.A. Bronstein, Law for the Expert Witness, CRC Press, Boca Raton (1999).
Vipa P. Sarthi, Law of Evidence, 6th Edition, Eastern Book Co., Lucknow (2006).
A.S. Pillia, Criminal Law, 6th Edition, N.M. Tripathi Pvt Ltd., Mumbai (1983).
R.C. Nigam, Law of Crimes in India, Volume I, Asia Publishing House, New Delhi (1965).
(Chief Justice) M. Monir, Law of Evidence, 6th Edition, Universal Law Publishing Co. Pvt. Ltd., New Delhi (2002).

Course Name: Forensic Chemistry Lab

Course Code: BTBFS110 **Credits: 2 (L-T-P: 0-0-3)**

Learning Objectives:

- To know and understand elements of Criminal Procedure Code related to forensic science.

Learning outcomes

- Acts and provisions of the Constitution of India related to forensic science. Acts governing socio-economic crimes. Acts governing environmental crimes.

Course Contents

- Analysis of Phenolphthalein in trap cases.
- Analysis of forensically important cosmetics
- Analysis of Dyes, Pigments & Polymers
- Forensic analysis of oils and fats
- Analysis of chemical fertilizers, consumer items such as gold, silver, tobacco, tea, sugar and salts
- Analysis of Corrosive chemicals: Hydrochloric acid, sulphuric acid, and nitric acid and alkalis.
- Chemical analysis of liquors.
- Forensic Drug Testing • Presumptive Drug Testing by Color/spot test, Microcrystalline testing
- Analysis of Drugs by Thin Layer Chromatography, High Pressure Liquid
- Chromatography and Gas Chromatography-Mass Spectrometry
- Quantitative drug analysis by UV-Vis spectrophotometery
- Melting Point determination of some substances of forensic interest.
- Forensic investigation of arson scene of crime.
- Forensic analysis of arson related evidences.
- Characterization and analysis of adulteration of Petroleum products.
- Bomb scene investigation

- Systematic analytical approach to pre-blast and post-blast explosives

Suggested Readings

Course Name: Environmental Studies

Course Code: ES 101 **Credits: 4 (L-T-P: 4-0-0)**

Learning Objectives

- To impart knowledge on environment and environmental issues and challenges of local, national and global significance for achieving environmental security and sustainable living

Learning Outcomes

- To knowledge and awareness so generated will enhance ability of the learners for conservation of environment and natural resources for a healthy planet Earth, and happy living of the present and future generations.

Course Contents

Unit I: Introduction to Environmental Studies

Multidisciplinary nature of environmental studies; components of the Earth's environment- atmosphere, hydrosphere, lithosphere and biosphere, Scope and importance; Concept of sustainability and sustainable development

Unit II: Ecosystems

What is an ecosystem? Structure and function of ecosystem; Energy flow in an ecosystem: food chain, food web and ecological succession. Case studies of the following ecosystems : Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (pond, stream, lake, river, ocean, estuary)

Unit III : Natural Resources : Renewable and Non--- renewable Resource

Land resources and land-use changes; Land degradation, soil erosion and desertification, Deforestation: Causes and impacts due to mining and dam building on environment, forest, biodiversity and tribal population, Water : Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international and inter-state), Heating of Earth and circulation of air; air mass formation and precipitation, Energy resources: Renewable and non-renewable energy resources, use of alternate energy sources, growing energy needs, case studies

Unit IV: Biodiversity and Conservation

Levels of biological diversity : genetic, species and ecosystem diversity; Bio- geographic zones of India; Biodiversity patterns and global biodiversity hot spots, India as a mega-biodiversity nation; Endangered and endemic species of India, Threats to biodiversity: Habitat loss, poaching of wildlife, human-wildlife conflicts, biological invasion; Conservation of biodiversity: *In-situ* and *Ex-situ* conservation of biodiversity, Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and informational value

Unit V: Environmental Pollution

Environmental pollution : Types, causes, effects and control; Air, water, soil and noise pollution, Nuclear hazards and human health risks, Solid waste management: Control measures of urban and industrial wastes, Pollution-related case studies

Unit VI: Environmental Policies and Practices (

Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture, Environment Laws: Environment Protection Act; Air (Prevention and Control of Pollution) Act; Water (Prevention and Control of Pollution) Act; Wildlife (Protection) Act; Forest (Conservation) Act; International agreements: Montreal and Kyoto protocols, and Convention on Biological Diversity (CBD), Nature reserves, tribal population and rights and human-wildlife conflicts in Indian context

Unit VII: Human Communities and the Environment

Human population growth: Impacts on environment, human health and welfare, Carbon foot print, Resettlement and rehabilitation of project-affected persons; case studies , Disaster management : Floods, earthquakes, cyclones and landslides, Environmental movements : *Chipko*, Silent valley, *Bishnois* of Rajasthan, Environmental ethics: Role of Indian and other religions and cultures in environmental conservation, Environmental communication and public awareness, case studies (e.g.,CNG vehicles in Delhi)

Unit VIII: Field Work

- Visit to an area to document environmental assets: river/ forest/ flora/fauna, etc.
- Visit to a local polluted site--- Urban/Rural/Industrial/Agricultural
- Study of common plants, insects, birds and basic principles of identification
- Study of simple ecosystems---pond, river, Delhi Ridge, etc.

Suggested Readings

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

Gadgil, M., and Guha, R. 1993. *This Fissured Land: An Ecological History of India*, University California Press, California.

Gleeson, B. and Low, N. (Eds.) 1999. *Global Ethics and Environment*, Routledge,London.

Gleick, P. H. 1993. *Water in Crisis*. Pacific Institute for Studies in Development, Environment and Security. Stockholm Environmental Institute, Oxford University Press, Oxford.

Groom, M.J., Meffe, G.K. and Carroll, C.R. 2002 *Principles of Conservation Biology,* Sinauer Associates, Sunderland.

Grumbine, R. E., and Pandit, M.K., 2013. Threats from India's Himalayan dams, *Science* 339: 36-37.

McCully, P.,1996. *Rivers No More: The Environmental Effects of Dams,* Zed Books, London.

McNeill, J. R, 2000. *Something New Under the Sun: An Environmental History of the Twentieth Century,* Norton, New York.

Odum, E.P., Odum, H.T. and Andrews, J., 1971, *Fundamentals of Ecology,* Saunders, Philadelphia.

Pepper, I.L., Gerba, C.P. and Brusseau, M.L. 2011, *Environmental and Pollution Science*, Academic Press, New York.

Rao, M.N. and Datta, A.K., 1987. *Waste Water Treatment,* Oxford and IBH Publishing Co. Pvt. Ltd, New Delhi.

Raven, P.H., Hassenzahl, D.M. and Berg, L.R., 2012. *Environment,* 8th Edition, John Wiley and Sons, New York.

Rosencranz, A., Divan, S., and Noble, M. L. 2001. *Environmental Law and Policy in India,* Oxford University Press, New Delhi.

Sengupta, R., 2003. *Ecology and Economics*: *An Approach to Sustainable Development*, Oxford University Press, New Delhi.

Singh, J.S., Singh, S.P. and Gupta, S.R., 2014, *Ecology, Environmental Science and Conservation,* S. Chand Publishing Co. P. Ltd., New Delhi.

Sodhi, N.S., Gibson, L. and Raven, P.H. (Eds). 2013. *Conservation Biology*: *Voices from the Tropics,* John Wiley and Sons, New York.

Thapar, V. 1998. *Land of the Tiger*: *A Natural History of the Indian Sub-continent,* University of California Press, California.
Warren, C. E.1971. *Biology and Water Pollution Control,* WB Saunders, Philadelphia. Wilson, E. O. 2006. *The Creation: An Appeal to Save Life on Earth,* Norton, New York.
World Commission on Environment and Development. 1987. *Our Common Future,* Oxford University Press, Oxford.

Course Name: IT and its applications-II Lab

Course Code: BTBFS112 **Credits: 2 (L-T-P: 0-0-2)**

Course Objectives

- To Understand the Windows and MS Office.
- To extract and use information from databases

Course Outcomes

- Learning of various ICT skills
- Learning of applications and usage of various databases and commands

Course Contents

- Computer shortcut keys in Microsoft Excel, Microsoft Word, and Microsoft PowerPoint.
- Formulas in Microsoft Word Table.
- Exercise on Logical function in Microsoft Excel (IF, Count, and CountIF).
- Exercise on Date and Time Calculations in Microsoft Excel.
- Draw chemical structure of biological molecules using Microsoft Word Chem4word add-in/Plugin.
- Draw Equations in Microsoft Word.
- Data Visualization using Charts in Microsoft Excel.
- Managing, Text, Images, and shapes in Microsoft PowerPoint.
- Searching for DNA/RNA sequences in NCBI.
- Searching for Chemical Compounds in PubChem.
- Unix/Linux commands Practice.

Suggested Readings

Internet and shared latest Material.