BISHOP HEBER COLLEGE (AUTONOMOUS)
TIRUCHIRAPPALLI – 620017
TAMILNADU, INDIA

COURSE OUTCOMES

DEPARTMENT OF ENVIRONMENTAL SCIENCE

STRUCTURE OF THE SYLLABUS

PROGRAM NAME	COURSE	COURSE CODE	COURSE NAME
B Sc Environmental Science	Core I	U20ES101	Fundamentals of Environmental Sciences
B Sc Environmental Science	Allied I	U20ESBY1	Environmental Botany
B Sc Environmental Science	Allied Prac.I	U20ESBP1	Environmental Botany Lab
B Sc Environmental Science	PS – Internship I	U20ES1F1	Explore Your Environment – Flora, Fauna & Environment Assessment
B Sc Environmental Science	Core II	U20ES202	Fundamentals of Ecology
B Sc Environmental Science	Core Prac. I	U20ES2P1	Basic Field Ecology
B Sc Environmental Science	Allied II	U20ESZY2	Environmental Zoology
B Sc Environmental Science	Allied Prac. II	U20ESZP1	Environmental Zoology Lab
B Sc Environmental Science	PS-Internship II	U20ES2F2	Environmental Monitoring and Assessment
B Sc Environmental Science	Core III	U20ES303	Environmental Microbiology and Biotechnology
B Sc Environmental Science	Core Prac. II	U20ES3P2	Practical in Environmental Microbiology and Biotechnology
B Sc Environmental Science	Allied Chemistry– I	U19ESCY3	Allied Chemistry

B Sc Environmental Science	PS-Internship III	U20ES3F3	Environmental Audit – Domestic / Campus
B Sc Environmental Science	SBEC I	U20ES3S1	Field Environmental Geology and Mapping
B Sc Environmental Science	Core IV	U20ES404	Environmental Pollution
B Sc Environmental Science	Core V	U20ES405	Statistics for Environmental Sciences
B Sc Environmental Science	Allied IV	U20ESCY4	Chemistry for Environmental Sciences
B Sc Environmental Science	Allied Prac. III	U20ESCP3	Allied Chemistry Practical
B Sc Environmental Science	PS-Internship IV	U20ES4F4	Green Initiatives in Industrial Processes and Pollution Control
B Sc Environmental Science	Core VI	U20ES506	Biodiversity and Conservation
B Sc Environmental Science	Core VII	U20ES507	Tools and Techniques for Environmental sciences
B Sc Environmental Science	Core Prac. III	U20ES5P3	Water Quality analysis
B Sc Environmental Science	Elective I	U20ES5:1	Concepts of Energy and Resources
B Sc Environmental Science	Elective II	U20ES5:2	Waste Management
B Sc Environmental Science	PS-Internship V	U20ES5F5	Ecosystem and Biodiversity
B Sc Environmental Science	SBEC II	U20ES5S2	Field Application of 4R Strategies

B Sc Environmental Science	SBEC III	U20ES5S3	Environmental Education and Awareness
B Sc Environmental Science	Core VIII	U20ES608	Research Methodology and Computational Skills for Environmental Sciences
B Sc Environmental Science	Core IX	U20ES609	Environmental Management and Sustainable Development
B Sc Environmental Science	Core X	U20ES610	Environmental Legislation and Environmental Impact Assessment
B Sc Environmental Science	Core Prac. IV	U20ES6P4	Air and Soil Analysis
B Sc Environmental Science	Elective III	U20ES6:3	Basic Principles of Remote Sensing and GIS
B Sc Environmental Science	Group Project	U20ES6PJ	Project Work

Core I - FUNDAMENTALS OF ENVIRONMENTAL SCIENCES

Semester: I **Code: U20ES101**

Credits: 4 **Hours/Week: 5**

On completion of this course, the students will be able to:

CO No.	Course Outcomes	K-Level	Unit
CO1	Recognize the physical environment encompassing atmosphere, hydrosphere, lithosphere and biosphere.	K1	I
CO2	Relate the variations in radiation-balance and temperature with latitude and seasonal changes of the earth	K2	II
CO3	Categorize the spheres of atmosphere based on their physical attributes and processes	K2	II
CO4	Illustrate the hydrological cycle, ocean currents and lithosphere	K2	III,IV
CO5	Justify the variations in biomes based on atmospheric, hydrological and geological differences	K5	V
CO6	Classify the living organisms based on their geographical distribution based on climatic, edaphic, and hydrological factors	K2	V

ALLIED I: ENVIRONMENTAL BOTANY

Semester: I **Code: U20ESBY1**
Credits: 3 **Hours/Week: 4**

On the completion of this course, the students will be able to:

CO No.	Course Outcomes	K-Level	Unit
CO1	Interpret the basics of Plant diversity	**K2**	1
CO2	Describe the concept of Plant morphology and its Modifications	**K2**	II
CO3	Explain various aspects of inflorescence and plant taxonomy	**K2**	II
CO4	Discus the basic concepts of plant Anatomy and plant Embryology	**K2**	III
C05	Analyze the various concepts of Plant physiology	**K4**	IV
CO6	Describe the various plant diseases and also plant as ecological indicator.	**K4**	V

Allied Practical I: ENVIRONMENTAL BOTANY LAB

Semester: I **Code: U20ESBP1**
Credits: 2 **Hours/Week: 3**

On completion of the course, the students will be able to:

CO No.	Course Outcomes	K-level	Unit
CO1	Compare and Interpret the different group of Species diversity. (Plant diversity – Algae, Fungi, Bryophytes, Pteridophyte and Gymnosperms)	**K 4**	**I**
CO2	Distinguish the various habitat in Plants and their Taxonomical form.	**K 4**	**II**
CO3	Discuss the different anatomical structures of various mature plant groups.	**K 4**	**III**
CO4	Examine the different types of Plant functions	**K4**	**IV**
CO5	Importance of Plant pathology (White rust, Citrus canker and Tobacco) Plant specimens for the ecological indicators	**K 2**	**V**
CO6	Understand the importance of plant conservation	**K2**	**I,IV**

Practice School I - EXPLORE YOUR ENVIRONMENT – FLORA, FAUNA AND ENVIRONMENT ASSESSMENT

Semester: I **Code: U20ES1F1**
Credits: 2 **Hours/Week: 2**

On completion of this course, the students will be able to:

CO No.	Course Outcome	K-Level	Unit
CO1	Develop the skill to map an area	**K3**	**1**
CO2	Prepare the list and describe some flora including trees, shrubs, herbs and grasses and vines	**K1**	**2 & 3**
CO3	Assess the fauna of the campus including butterflies, reptiles, birds and mammals	**K5**	**4**
CO4	Assess the fauna of the neighborhood including butterflies, reptiles, birds and mammals	**K5**	**5**
CO5	Create Peoples Biodiversity Register	**K6**	**6**
CO6	Demonstrate Participatory Rural Appraisal	**K2**	**7**

COURSE: ENVIRONMENTAL STUIDES

Semester: I **Code: U20EST11/ U20EST12**
Credits: 2 **Hours/Week: 2**

On completion of this course the students will be able to:

CO No.	Course Outcomes	K-Level	Unit
CO1	Outline the importance for the Environmental studies	K2	I
CO2	Extend their understanding about various resources	K4	II
CO3	Recall the ecosystems and how they are interacting	K4	III
CO4	Classify how the diverse organisms are distributed across various geographical, physiological realms	K5	IV
CO5	Identify the causes, analyze the impacts of various environmental pollutions	K5	V
CO6	Summarize the concept of sustainability and relate various current environmental issues	K5	VI
CO7	Analyze how the environmental problems of recent times are related to population	K4	VII
CO8	Create documents on environmental resources, ecosystems etc.	K6	VIII

Core II - FUNDAMENTALS OF ECOLOGY

Semester: II **Code: U20ES202**
Credits: 4 **Hours/Week: 5**

On completion of this course, the students will be able to:

CO No.	Course Outcome	K-Level	Unit
CO1	To describe, recognize and relate the components of ecosystem.	K1	I
CO2	To explain and illustrate the structure, function and concepts of an ecosystem	K2	II
CO3	To summarize and theorize the attributes and concepts of an ecosystem	K3	III
CO4	To distinguish, categorize and conclude the concepts of habitat ecology	K4	IV
CO5	To execute the ecological tools in the field	K3	V
CO6	To analyze and interpret the data.	K4	V

Core Practical I -BASIC FIELD ECOLOGY

Semester: II **Code: U20ES2P1**
Credits: 3 **Hours/Week: 4**

On completion of this course, the students will be able to:

CO No.	Course Outcome	K-Level	Experiments
CO1	Identify the plant species, record and memorize the herbal vegetation	**K1**	**1 & 5**
CO2	Analyze and interpret the data	**K4**	**2**
CO3	Assess and interpret the herbal plants by quantitative methods	**K2**	**2**
CO4	Estimate the species diversity of plants	**K4**	**3**
CO5	Measure the height and girth of trees	**K4**	**4**
CO6	Identify the butterflies	**K4**	**6 & 7**

Allied – II ENVIRONMENTAL ZOOLOGY

Semester: II **Course Code: U20ESZY2**
Credits: 3 **Hours/Week: 4**

On Completion of this course, the students will be able to:

CO No.	Course Outcome	K-Level	Unit
CO1	Explain the salient features of Kingdom Animalia and the levels of organization at cellular, tissue and organ grade level of organization	K6	I
CO2	Classify the major Phylum Invertebrata and Chordata with its distinctive characters and suitable examples	K3	II
CO3	Compare the major process of mechanism of migration and flight adaptations in animals.	K4	III
CO4	Explain the types of animal behaviour and distinguishing between stereotyped and Acquired behaviour in animals	K4	IV
CO5	Discuss the process of communication in birds and mammals	K6	V
CO6	Compare the external morphology of invertebrates and chordates	K4	II

Allied Practical – II: ENVIRONMENTAL ZOOLOGY LAB

Semester: II **Course Code: U20EZP1**
Credits: 2 **Hours/Week: 3**

At the end of this course, the students will be able to:

CO No.	Course Outcomes	K-Level	Experiment
CO1	Conversant with organ systems of Earthworm and cockroach.	K4	I
CO2	Mount body setae of Earthworm and observe under the microscope.	K5	II
CO3	Study and distinguish various mouthparts of insects with its functions.	K5	II
CO4	Analyze the process of Biological rhythms and communication in bees.	K4	III
CO5	Interpret the various adaptation in animals	K4	III
CO6	Study the biological significance of the given spotters	K4	III

Practice School II - ENVIRONMENTAL MONITORING AND ASSESSMENT
Semester: II **Code: U20ES2F2**
Credits: 2 **Hours/Week: 2**

On completion of this course, the students will be able to:

CO No.	Course Outcome	Level	Activities
CO1	Observe and collect data on Micro-Meteorological parameters	K2	1
CO2	Conduct environmental monitoring with regard to air, noise, water and land environment	K2	2
CO3	Develop the skills on assess the overall environmental setting of a developmental activity	K2	3
CO4	Apply standard methods for examination of environmental parameters	K2	
CO5	Identify the different types of Soil.	K2	4
CO6	Describe the geological and geo-referencing techniques	K3	5

Core III – ENVIRONMENTAL MICROBIOLOGY AND BIOTECHNOLOGY
Semester: III **Code: U21ES303**
Credits: 4 **Hours/Week: 5**

On completion of the course, the students will be able to:

CO No.	Course Outcome	K-Level	Unit
CO1	Illustrate the microbial growth curve and kinetics	K2	I
CO2	Distinguish the various types of microbial growth and methods of microbial growth estimation	K2	II
CO3	Recall the microbial ecology and relate their interactions	K1	III
CO4	Explain the principles in bioprocess technology	K2	IV
CO5	Identify the primary and secondary metabolites	K1	IV
CO6	Determine the biotechnologically intracellular products and Importance of molecular techniques in environmental management	K3	V

Core Practical II - PRACTICAL IN ENVIRONMENTAL MICROBIOLOGY AND BIOTECHNOLOGY

Semester: III **Code: U20ES3P2**
Credits: 3 **Hours/Week: 3**

On completion of the course, the students will be able to:

CO No.	Course Outcome	K-Level	Unit
CO1	Demonstrate the principles of Microscope	K2	1
CO2	Explain the techniques of gram staining of Bacteria and Methylene Blue Reductase Test	K2	2, 3
CO3	Acquire the expertise in Identification of Fungi and Isolation of Fungi from Soil	K2	4, 5
CO4	Estimate Coliform Group of Bacteria with the help of MPN Technique	K4	6, 7
CO5	Demonstrate the Gel Electrophoresis and PCR	K2	8
CO6	Describe the Blood Serum Separation and Blood Grouping	K2	9,10

Allied III: ALLIED CHEMISTRY I

Semester: III **Code: U19ESCY3**
Credits: 3 **Hours/Week: 4**

After the completion of this course the students will be able to:

CO No.	Outcomes	level	Unit
CO1	Distinguish the geometry and shape of molecules using VSEPR theory	K4	I
CO2	Illustrate the mechanism for different basic organic reactions	K3	II
CO3	Compare the different concepts of acids and bases	K2	III
CO4	Explain the kinetics of chemical reactions	K3	IV
CO5	Summarize the applications of catalytic reactions	K2	IV
CO6	Identify different applications of colloids in day-to-day life	K2	V

Practice School III - ENVIRONMENTAL AUDIT – DOMESTIC/CAMPUS
Semester: III **Code: U20ES3F3**
Credits: 2 **Hours/Week: 2**

On completion of this course, the students will be able to:

CO No.	Course Outcomes	K-Level	Activities
CO1	Formulate the methodology for study of the domestic / campus environment.	K2	1-4
CO2	Develop skill to audit water utility	K3	1
CO3	Develop skill to audit domestic energy usage	K3	2
CO4	Develop skill to audit waste in a domestic environment	K3	3
CO5	Develop skill to calculate domestic carbon footprint	K3	4
CO6	Assess the environmental audit in a domestic / campus environment.	K6	1-4

SBEC 1 - FIELD ENVIRONMENTAL GEOLOGY AND MAPPING
Semester: III **Code: U20ES3S1**
Credits: 2 **Hours/Week: 2**

On completion of this course, the students will be able to:

CO No.	Course Outcome	K-Level	Unit
CO1	Acquire the expertise in Topographical Map on different themes.	K1	I
CO2	Demonstrate the 3D representation of the earth's surface.	K2	II
CO3	Describe the Satellite Images interpretation	K2	III
CO4	Explain the Identification of Minerals and the risk of mining industry	K2	IV
CO5	Apply the EIA procedure identification near the mine.	K2	IV
CO6	Outline the Groundwater Targeting / Fluctuation Survey.	K5	V

NMEC I - GLOBAL WARMING AND CLIMATE CHANGE

Semester: III **Course Code: U17ES3E1**

Credits: 2 **Hours/Week: 2**

On completion of this course, the students will be able to:

CO No.	Course Outcome	Level	Unit
CO1	Explain the importance of ozone layer and causes of its depletion	K2	I
CO2	Explain Green House Effect and global warming	K2	
CO3	Prove the global warming through the Trends in temperature changes and in CO2 and other GHGs	K2	II
CO4	Describe the effects of Global Warming such as melting of polar ice and sea level rise	K2	III
CO5	Elaborate the implications of Climate Change (environmental, and socio-economic perspectives)	K2	IV
CO6	Discuss the International Initiatives in combating global warming	K2	V

Core IV - ENVIRONMENTAL POLLUTION

Semester: IV **Code: U20ES404**

Credits: 4 **Hours/Week: 4**

On completion of this course, the students will be able to:

CO No.	Course Outcome	K-Level	Unit
CO1	List out different types of pollution.	K1	I
CO2	Classify the different types of pollutants.	K2	II
CO3	Identify the types of pollutants with regard to air, water and soil.	K3	II,IV
CO4	Analyze the impacts of pollution on Environment	K4	III
CO5	Relate the disaster to the types of Pollution.	K2	V
CO6	Explain the pollutants and its impacts	K2	V

Core V - STATISTICS FOR ENVIRONMENTAL SCIENCES

Semester: IV **Code: U20ES405**

Credits: 4 **Hours/Week: 4**

On completion of the course, the students will be able to:

CO No.	Course Outcomes	K-Level	Unit
CO1	Define statistics and explain its applications.	K1	I
CO2	Articulate a data collection	K3	II
CO3	Summarize the data and present it.	K2	II & III
CO4	Measure of central tendency and dispersion	K3	II & IV
CO5	Apply correlation and regression analysis.	K4	III
CO6	Explain the concepts of Probability and its rules	K2	V

Allied IV- CHEMISTRY FOR ENVIRONMENTALISTS

Semester: IV **Code: U19ESCY4**

Credits: 3 **Hours/Wee: 4**

On completion of the course, the students will be able to:

CO	Course Outcomes	K-level	Unit
CO1	Analyze the constituents of atmosphere and chemistry of various atmospheric reactions	K4	I
CO2	Apply the concepts of water quality parameters and treatment processes	K3	II
CO3	Identify the types of errors in experimental data	K2	III
CO4	Apply the principles of volumetric estimation	K3	IV
C05	Explain principles of chromatographic and colorimetric techniques	K2	IV
CO6	Illustrate the mechanism of organic reactions	K3	V

Allied Practical III: ALLIED CHEMISTRY PRACTICAL

Semester: II **Code: U19ESCP3**

Credits: 3 **Hours/Week: 3**

On completion of the course, the students will be able to:

CO	Course Outcomes	K-level	Unit
CO1	Relate the basic principles and types of volumetric analysis	K2	I-III
CO2	Infer the redox reaction concept	K3	
CO3	Estimate the strength of the given solution	K3	
CO4	Apply complexation concept to check water quality in various Industries, and laboratories	K3	
CO5	Identify organic compounds and quantifying	K5	
CO6	Classify the primary standard solutions and to prepare standard solutions in different concentration units	K3	

Practice School IV –
GREEN INIATIVES IN INDUSTRIAL PROCESSES AND POLLUTION CONTROL

Semester: IV **Code: U20ES4F4**

Credits: 2 **Hours/Week: 2**

On completion of this course, the students will be able to:

CO No.	Course Outcome	K-Level	Activities
CO1	List the different types of industries	K2	I
CO2	Explain the common waste management facility / STP / ETP	K2	II
CO3	Describe the Green Energy technologies and Green Buildings	K2	III
CO4	Summarize EMS in Industries; EMP of the organization; Environmental Compliance	K4	IV
CO5	Discuss the options for waste management practices.	K4	
CO6	Acquire interpersonal skills, communication skills, leadership qualities etc.	K4	

NMEC II: ENVIRONMENTAL SAFETY, HEALTH AND MANAGEMENT

Semester: IV **Code: U17ES4E2**

Credits: 2 **Total Hours: 30**

On completion of the course, the students will be able to:

CO	Course Outcomes	K-level	Unit
CO1	Compare the communicable disease and management of public hygiene.	K2	I
CO2	Relate the occupational health and Its hazards.	K3	II
CO3	Match the Occupational diseases and its prevention, control.	K5	III
CO4	Evaluate the Industrial Safety & Management System	K5	III,IV
CO5	Discuss on Industrial Safety Standards and Regulations	K2	IV
CO6	Discuss the Accident, Prevention & Its Control strategies	K2	V

Core VI - BIODIVERSITY AND CONSERVATION

Semester: V **Code: U20ES506**

Credits: 4 **Hours/Week: 5**

On completion of this course, the students will be able to:

CO No.	Course Outcomes	K-Level	Unit
CO1	Define biodiversity and its different levels	K1	I
CO2	Compare the Bio geographical classification of India	K2	II, III
CO3	Plan the Strategies of Conservation	K3	II, IV
CO4	Explain the importance of traditional knowledge and sacred groves.	K2	IV
CO5	List Sustainable wildlife management	K4	V
CO6	formulate the Laws and policies pertaining to conservation	K6	V

Core Practical III - WATER QUALITY ANALYSIS

Semester: V **Code: U20ES5P3**

Credits: 3 **Hours/Week: 4**

On completion of this course, the students will be able to:

CO No.	Course Outcome	Level	Experiments
CO1	List the water pollution problems	K1	1-11
CO2	Analyze the water samples with the various physico-chemical parameters	K1	
CO3	Label the water samples from the various sources	K4	
CO4	Compare the results with the standards	K4	
CO5	Identify the pollution indicators	K3	
CO6	Recommend preventive and alternate practices to reduce pollution	K5	

Core VII - TOOLS AND TECHNIQUES FOR ENVIRONMENTAL SCIENCES

Semester: V **Code: U20ES507**

Credits: 4 **Hours/Week: 5**

On completion of this course the students will be able to:

CO No.	Course Outcome	K-Level	Unit
CO1	Explain the monitoring of micro-meteorological and environment parameters	K2	I
CO2	Explain the water quality monitoring and sampling techniques	K2	II
CO3	Identify the Impact of developmental activities	K1	III
CO4	Identify the Environmental / Baseline /Setting and Identification of impacts	K1	IV
CO5	Analyze the impacts of a mining/industrial/developmental activity	K4	IV
CO6	Predict the impacts and prepare Environmental Impact Statement	K3	V

Elective I - CONCEPTS OF ENERGY AND RESOURCES

Semester: V **Code: U20ES5:1**

Credits: 4 **Hours/Week: 5**

On completion of this course the students will be able to:

CO No.	Course Outcome	K-Level	Unit
CO1	Acquire basic knowledge on energy concepts and Categorizes the energy sources	K3	I
CO2	Explain the thermodynamic Concepts	K2	II
CO3	Realize the importance of carrier and conversion forms of energy	K2	II
CO4	Describe the harnessing methods of Solar, wind, tidal and geothermal energy	K4	III
CO5	Demonstrate the energy from biomass. Relate and criticize the nuclear power generation	K3	IV
CO6	Evaluate the usage of energy	K6	V

Elective II- WASTE MANAGEMENT

Semester: V **Code: U20ES5:2**

Credits: 4 **Hours/Week: 5**

On completion of this course, the students will be able to:

CO No.	Course Outcome	K-Level	Unit
CO1	Recall the sources and types of waste & their characteristics	K1	I
CO2	Compare waste transportation & disposal methods, sanitary land filling Techniques	K2	II
CO3	Explain solid waste disposal techniques.	K3	III
CO4	Discuss the ethical and socio-economic issues related to Rag Pickers	K5	IV
CO5	Recommend the 4 ‘R’s – Reduction, Reuse, Recycle and Recovery strategies	K5	V
CO6	Apply various lab-scale applications to the field wherever required in waste management	K3	V

Practice School V- ECOSYSTEM AND BIODIVERSITY

Semester: V **Code: U20ES5F5**

Credits: 2 **Hours/Week: 2**

On completion of this course, the students will be able to:

CO No.	Course Outcome	K-Level	Activities
CO1	Develop the field knowledge on the forest and ecosystem	**K3**	**1**
CO2	Compare the different ecosystem	**K2**	**2**
CO3	Identify the agricultural crops and analyze them	**K5**	**3**
CO4	Develop a report on the forest biodiversity	**K3**	**4**
CO5	Compare both the in-situ and ex-situ management practices	**K4**	**5**
CO6	List out the different sanctuaries and reserves in India	**K4**	**5**

SBEC II - FIELD APPLICATIONS OF 4 R STRATEGIES

Semester: V **Code: U20ES5S2**

Credits: 2 **Hours/Week: 2**

On completion of this course, the students will be able to:

CO No.	Course Outcome	Level	Unit
CO1	Recall about waste & its characteristics, Global & Indian scenario of wastes	**K1**	**I**
CO2	Give example of reduce and reuse at the different sources	**K2**	**II**
CO3	Relate Recycle and Recovery of wastes	**K2**	**II**
CO4	Explain the aerobic methods	**K2**	**III,IV**
CO5	Prepare waste into compost	**K5**	**V**
CO6	Illustrate the Vermicomposting technologies	**K2**	**V**
CO7	Analyze the cost-benefit and marketing	**K4**	**V**
CO8	Appraise the energy recovery process from the wastes	**K5**	**V**
CO9	Demonstrate the Biogas production through anaerobic digestion	**K2**	**V**

SBEC III - ENVIRONMENTAL EDUCATION AND AWARENESS

Semester: V **Code: U20ES5S3**

Credits: 2 **Hours/Week: 2**

On completion of this course, the students will be able to:

CO No.	Course Outcome	K-Level	Unit
CO1	Recall The history of environmental education	K1	I
CO2	List and analyze the different environmental organizations	K2	I
CO3	Summarize the concept of environmental education	K2	I
CO4	Categorize the different forms of education	K4	II
CO5	Plan and design the environmental education programs for various target groups	K5	II, IV,V
CO6	Execute and review the environmental education programs for various target groups	K6	III,IV,V

Core VIII - RESEARCH METHODOLOGY AND COMPUTATIONAL SKILLS FOR ENVIRONMENTAL SCIENCES

Semester: VI **Code: U20ES608**

Credits: 4 **Hours/Week: 5**

On completion of the course, the students will be able to:

CO No.	Course Outcome	K-Level	Unit
CO1	Define data and list the sources	K1	I
CO2	Explain the sampling design and Techniques	K1	II
CO3	Outline research methods	K4	III
CO4	Categorize the data Processing and Analysis	K2	IV
CO5	Illustrate the basic analytical tools	K2	IV
CO6	Prepare Report and Article writing	K3	V
CO7	Interpret data presentation	K3	V

Core IX - ENVIRONMENTAL MANAGEMENT AND SUSTAINABLE DEVELOPMENT

Semester: VI **Code: U21ES609**
Credits: 4 **Hours/Week: 5**

On completion of this course, the students will be able to:

CO No.	Course Outcome	K-Level	Unit
CO1	Analyze global consumption patterns of natural resources	K2	I
CO2	Explain the Sustainable Water Management and Land Management Strategies	K3	II
CO3	Apply the Sustainable Agriculture practices	K6	III
CO4	Apply the Sustainable Land resources management	K6	III
CO5	Justify the Forest Management through Social Forestry and Joint Forest Management	K5	IV
CO6	Explain the Disaster Management Strategies	K6	V

Core X – ENVIRONMENTAL LEGISLATIONS AND ENVIRONMENTAL IMPACT ASSESSMENT

Semester: VI **Code: U20ES610**
Credits: 4 **Hours/Week: 5**

On completion of this course, the students will be able to:

CO No.	Course Outcome	K-Level	Unit
CO1	Recognize the processes and scope of Environmental Impact Assessment	K3	I
CO2	Discuss about various processes of Environmental Impact Assessment and Risk identification.	K3	II
CO3	Relate global and national legislative efforts towards environmental protection.	K6	III
CO4	Describe the history and outcomes of various government and non-governmental efforts towards environmental protection.	K5	IV
CO5	List and mark sanction and enforcement bodies of environmental laws.	K6	V
CO6	Relate the Legislation and EIA	K6	V

Core Practical IV - AIR AND SOIL ANALYSIS

Semester: VI **Code: U20ES6P4**

Credits: 3 **Hours/Week: 5**

On completion of this course, the students will be able to:

CO No.	Course Outcome	Level	Experiment
CO1	Explain the collection, handling and preservation of the environmental samples	**K2**	**I**
CO2	Assess the PM_{10} in the ambient air	**K5**	**I**
CO3	Demonstrate SO_2 and NO_x in the ambient air	**K2**	**I**
CO4	Measure the ambient noise level.	**K5**	**I**
CO5	Analyze the physico- chemical parameters of soil	**K4**	**II**
CO6	Compare the results with the standards	**K5**	**II**

Elective III - BASIC PRINCIPLES OF REMOTE SENSING AND GIS

Semester: VI **Code: U20ES6:3**

Credits: 4 **Hours/Week: 5**

On completion of this course, the students will be able to:

CO No.	Course Outcome	K-Level	Unit
CO1	Define remote sensing and explain Principles of EMR	**K1**	**I**
CO2	Describe the components of EM Spectrum Interpret the interaction of EMR with Atmosphere, vegetation, soil and water	**K4**	**I**
CO3	Explain the satellite platforms and sensors	**K4**	**II**
CO4	Specify the resolution and its types.	**K5**	**III**
CO5	Develop the skills on geographic co-ordinate system and maps	**K4**	**IV**
CO6	Apply the techniques of GIS	**K4**	**V**

NMEC OFFERED BY THE DEPARTMENT

NMEC I - GLOBAL WARMING AND CLIMATE CHANGE

Semester: **Code: U20ES3E1**
Credits: 2 **Hours/Week: 2**

On completion of this course, the students will be able to:

CO No.	Course Outcome	K-Level	Unit
CO1	Explain the importance of ozone layer and causes of its depletion	K2	I
CO2	Explain Green House Effect and global warming	K2	
CO3	Prove the global warming through the Trends in temperature changes and in CO2 and other GHGs	K2	II
CO4	Describe the effects of Global Warming such as melting of polar ice and sea level rise	K2	III
CO5	Elaborate the implications of Climate Change (environmental, and socio-economic perspectives)	K2	IV
CO6	Discuss the International Initiatives in combating global warming	K2	V

NMEC II - ENVIRONMENTAL SAFETY, HEALTH AND MANAGEMENT

Semester: IV **Code: U20ES4E2**
Credits: 2 **Hours/Week: 2**

On completion of this course, the students will be able to:

CO No.	Course Outcome	K-Level	Unit
CO1	Compare the communicable disease and management of public hygiene.	K2	I
CO2	Relate the occupational health and Its hazards.	K3	II
CO3	Match the Occupational diseases and its prevention, control.	K5	III
CO4	Evaluate the Industrial Safety & Management System	K5	III,IV
CO5	Discuss on Industrial Safety Standards and Regulations	K2	IV
CO6	Discuss the Accident, Prevention & Its Control strategies	K2	V

COURSE: ENVIRONMENTAL STUIDES

Semester: I **Code: U20EST11**

Credits: 1 **Hours/Week: 30**

On completion of this course the students will be able to:

CO No.	Course Outcome	K-Level	Unit
CO1	Outline the importance for the Environmental studies	**K2**	**I**
CO2	Extend their understanding about various resources	**K4**	**II**
CO3	Recall the ecosystems and how they are interacting	**K4**	**III**
CO4	Classify how the diverse organisms are distributed across various geographical, physiological realms	**K5**	**IV**
CO5	Identify the causes, analyze the impacts of various environmental pollutions	**K5**	**V**
CO6	Summarize the concept of sustainability and relate various current environmental issues	**K5**	**VI**
CO7	Analyze how the environmental problems of recent times are related to population	**K4**	**VII**
CO8	Create documents on environmental resources, ecosystems etc.	**K6**	**VIII**

PROGRAM NAME	COURSE	COURSE CODE	COURSE NAME
M Sc Environmental Science	Core I	P20ES101	Environmental Meteorology
M Sc Environmental Science	Core II	P20ES102	Ecology
M Sc Environmental Science	Core III	P20ES103	Environmental Chemistry
M Sc Environmental Science	Core IV	P20ES104	Environmental Biotechnology and Toxicology
M Sc Environmental Science	Core Practical I	P20ES1P1	Field Ecology
M Sc Environmental Science	Elective I	P20ES1:1	Environmental Standards and legislation
M Sc Environmental Science	Core V	P20ES205	Environmental Pollution
M Sc Environmental Science	Core VI	P20ES206	Research Methodology
M Sc Environmental Science	Core VII	P20ES207	Mathematical Modelling in Environmental Sciences
M Sc Environmental Science	Core Practical II	P20ES2P2	Practical in Environmental Biotechnology and Toxicology
M Sc Environmental Science	Core Practical III	P20ES2P3	Mathematical Modelling in Environmental Sciences
M Sc Environmental Science	Elective II	P20ES2:2	Biodiversity Conservation and Ecological Restoration
M Sc Environmental Science	Elective III	P20ES2:3	Energy resources
M Sc Environmental Science	Core VIII	P20ES308	Sustainable Development
M Sc Environmental Science	Core IX	P20ES309	Environmental Engineering and Pollution Control
M Sc Environmental Science	Core X	P20ES310	Environmental Impact Assessment
M Sc Environmental Science	Core XI	P20ES311	Instrumentation for Environmental Sciences
M Sc Environmental Science	Core Practical IV	P20ES3P4	Water Pollution and its Control Engineering, Soil Pollution and GIS Applications
M Sc Environmental Science	Elective IV	P202ES3:4	Remote Sensing and GIS for Environmental Sciences

M Sc Environmental Science	Core Practical V	P20ES4P5	Air Pollution and its control Engineering and GIS Applications
M Sc Environmental Science	Elective V	P20ES4F1	Internship and Field Work

Core I: ENVIRONMENTAL METEOROLOGY

Semester: I **Code: P20ES101**
Credits: 4 **Hours/Week: 5**

On completion of the course, the students will be able to:

CO No.	Outcomes	K-level	Unit
CO1	Explain about atmosphere, hydrosphere, lithosphere and biosphere and establish the significance of their interrelationships	K4	I
CO2	Relate the weather with atmospheric pressure and winds and atmospheric circulation	K4	II
CO3	Illustrate the interrelationships between Atmosphere and Hydrosphere and appreciate harmony existing between each other.	K5	III
CO4	Interpret the importance of atmosphere and its processes in determining weather and climate.	K5	III
CO5	Examine the teleconnections of Southern Oscillation phenomena	K2	IV
CO6	Demonstrate the Climate Change Phenomenon and distinguish the natural and anthropogenic forcing mechanisms of climate change	K4	V

Core II: ECOLOGY

Semester: I **Code: P20ES102**
Credits: 4 **Hours/Week: 5**

On completion of the course, the students will be able to:

CO No.	Outcomes	K-level	Unit
CO1	Describe the concept, principles and dynamics of ecosystem	K2	I
CO2	Summarize and theorize the attributes and concepts of an ecosystem	K3	II
CO3	Explain and relate the adaptabilities of the biotics	K4	III
CO4	Analyze and relate the biotic interactions	K3	IV
CO5	Execute the ecological tools in the field and analyse and interpret the data.	K4	V
CO6	Appraise and conclude the obtained ecological information	K6	V

Core III: ENVIRONMENTAL CHEMISTRY

Semester: I **Code: P21ES103**
Credits: 4 **Hours/Week: 5**

On the successful completion of this course the students will be able to:

CO No.	Course Outcomes	K-level	Unit
CO1	Apply the basic concepts to prepare solutions in different concentration units used in chemical analysis.	K4	I
CO2	Categorize the importance of atmospheric industrial gases and rare gases and Compare thermochemical and photochemical reactions in the atmosphere.	K4	II
CO3	Determine water quality	K5	III
CO4	Estimate physico-chemical properties of soil and Evaluate the soil quality.	K5	IV
CO5	Explain various biochemical reactions involved in living organisms.	K4	V
CO6	Design green synthetic methods to improve sustainability	K5	V

Core IV: ENVIRONMENTAL BIOTECHNOLOGY AND TOXICOLOGY

Semester: I **Code: P21ES104**
Credits: 4 **Hours/Week: 5**

On completion of the course, the students will be able to:

CO No.	Course Outcomes	level	Unit
CO1	Describe the Importance of microbes and their role in environment.	K5	I
CO2	Analyze the basic concepts of biotechnology in solving environmental issues (in treatment of wastes, bioremediation etc.).	K4	II
CO3	Choose the applications of microbial technology in solving environmental issues.	K3	III
CO4	Determine suitable industrial application for pollution-less production	K3	III
CO5	Evaluate the toxicity of different substances on humans	K5	IV
CO6	Develop and devise bioremediation method / technique for removal of toxicant and clean the environment	K3	V

Core Practical I: FIELD ECOLOGY

Semester: I **Code: P20ES1P1**
Credits: 4 **Hours/Week: 5**

On completion of the course, the students will be able to:

CO No.	Outcomes	K-level	Unit
CO1	Identify and list some local flora and fauna	K1	I
CO2	Describe the features of local flora and fauna	K2	I, II
CO3	Quantitatively assess the plant diversity, Carbon sequestration potential and Primary productivity	K4	III
CO4	Analyse, appraise and interpret the data	K6	III
CO5	Identify, describe and relate the features and adaptations in relation to the habitat	K4	IV
CO6	Explain, analyze, document, appraise and conclude the obtained ecological information	K6	V

Elective I: ENVIRONMENTAL STANDARDS AND LEGISLATION

Semester: I **Code: P20ES1:1**
Credits: 4 **Hours/Week: 5**

On completion of this course, the students will be able to:

CO	Outcomes	K-level	Unit
CO1	State the Environmental Laws and the significance to avail them in relevance to practical situations	K3	I
CO2	State environmental legislation and various acts	K5	II
CO3	Recognize the moral grounds of utilization of resources and protecting the earth's Environment.	K5	III
CO4	Choose suitable strategies for sustainable development	K3	III
CO5	Recall the historical roadmap towards the conservation laws.	K5	IV
CO6	Classify the constitutional milieu for industrial and Environmental safety	K6	V

Core V: ENVIRONMENTAL POLLUTION

Semester: II **Code: P20ES205**
Credits: 5 **Hours/Week: 4**

On completion of this course, the students will be able to:

CO No.	Outcomes	K-level	Unit
CO1	Categorize various forms of pollution and contaminants of the environment	K4	I
CO2	Analyze the chemical reactions /processes taking place in the environmental pollution.	K4	II & III
CO3	Inspect the sources of various pollutants.	K4	II & IV
CO4	Assess Causes and effects of various pollutants.	K5	IV
CO5	Summarize various terminologies used in pollution assessment.	K2	V
CO6	Devise and develop mitigation measures by understanding the processes of pollution.	K3	V

Core VI: RESEARCH METHODOLOGY

Semester: II **Code: P20ES206**
Credits: 4 **Hours/Week: 5**

On completion of the course, the students will be able to:

CO	Outcomes	K-level	Unit
CO1	Express the basic principles of research methods and designs.	K2	I
CO2	Use different tools for data collection (both primary and secondary).	K3	II
CO3	Use appropriate citation methods	K3	II
CO4	Recognize the processes of sampling and handling different types of data.	K5	III
C05	Analyze the different kinds of data (qualitative and quantitative).	K3	IV
CO6	Summarize the steps, processes and tools in research processes like data collection, analysis and publishing the results.	K4	V

Core VII: MATHEMATICAL MODELS IN ENVIRONMENTAL SCIENCES

Semester: II **Code: P20ES207**

Credits: 4 **Hours/Week: 4**

On completion of the course, the students will be able to:

CO No.	Outcomes	K-level	Unit
CO1.	Examine the basic concepts of statistics and its role as an important tool in arriving at conclusions in the study of environment	**K4**	**I**
CO2.	Determine the integral and differential values using various methods	**K5**	**II**
CO3.	Identify the mathematical/Numerical applications in the natural environment.	**K3**	**I & II**
CO4.	Evaluate the hypotheses using various tests	**K5**	**III**
CO5.	Construct the mathematical models in understanding the dynamics of Ecosystems and pollution dispersion in the environment	**K6**	**IV**
CO6.	Develop the mathematical models by the existing models to suit the local conditions	**K6**	**V**

Core Practical II: PRACTICAL IN ENVIRONMENTALBIOTECHNOLOGYANDTOXICOLOGY

Semester: II **Code: P20ES2P2**

Credits: 3 **Hours/Week: 4**

On completion of this course the students will be able to:

CO	Outcomes	level	Experiment
CO1	Categorize and Perform the microbiological culture techniques using organisms collected from various environment.	**K4**	**1**
CO2	Apply the microbiological techniques in pollution redemption.	**K3**	**1-7**
CO3	Explain the State various biochemical tools for environmental assessment.	**K5**	**1-5**
CO4	Identify various instrumentation in biotechnological assays.	**K3**	**8**
CO5	Examine toxicological assays in determining the lethal concentrations/ doses of a toxicant.	**K4**	**8-11**
CO6	Perform statistical analyses from the laboratory experiments on toxicology.	**K5**	**12**

Core Practical III: PRACTICAL IN MATHEMATICAL MODELS IN ENVIRONMENTAL SCIENCES

Semester: II **Code: P20ES2P3**
Credits: 2 **Hours/Week: 3**

On completion of this course the students will be able to:

CO No.	Outcomes	level	Experiment
CO1	Evaluate the measures of Central tendency and dispersion for the given data in Environmental sciences using appropriate statistical tool.	K5	1-2
CO2	Discover the Lines of Regression incorporating the Correlation Coefficient	K4	3-4
CO3	Classify and compare the types of distribution	K4	5-7
CO4	Formulate the hypothesis and perform hypotheses testing using Software	K6	8-12
CO5	Examine the maximum and minimum for a given function a by applying the concept of derivatives	K4	13-14
CO6	Demonstrate mathematical models in understanding the dynamics of Ecosystems and pollution dispersion.	K2	15-18

Elective II: BIODIVERSITY CONSERVATION AND ECOLOGICAL RESTORATION

Semester: II **Code: P20ES2:2**
Credits: 4 **Hours/Week: 4**

On completion of the course, the students will be able to:

CO	Outcomes	K-level	Unit
CO1	Recognize the values of biodiversity.	K1	I
CO2	Explain the concepts of biodiversity conservation.	K2	II
C03	Analyze environmental problems and develops skills for ecological restoration.	K4	III
CO4	Demonstrate managerial skills to manage various ecosystems.	K3	III - V
C05	Associate Sustainability with agriculture, forest and other environmental components	K2	IV
CO6	Integrate the knowledge and strategies for environmental management.	K6	V

Elective III: ENERGY RESOURCES

Semester: II **Code: P20ES2:3**
Credits: 4 **Hours/Week: 4**

On completion of this course, the students will be able to:

CO No.	Outcomes	K-level	Unit
CO1	Classify the energy sources (both renewable and non-renewable).	K2	I
CO2	Explain the physical basis of Energy, sources and applications.	K2	II
CO3	Analyze the pros and cons of alternative energy utilization.	K4	III
CO4	Review various techniques to avail non-polluting energy sources.	K2	IV
CO5	Apply the non-polluting energy sources in various fields	K3	V
CO6	Develop green energy technologies.	K6	V

Core VIII: SUSTAINABLE DEVELOPMENT

Semester: III **Code: P20ES308**
Credits: 4 **Hours/Week: 5**

On completion of this course, the students will be able to:

CO No.	Outcomes	K-level	Unit
CO1	Recognize the concepts of environmental sustainability.	K3	I
CO2	Discuss the components of environmental sustainability from regional to global level.	K3	II
CO3	Identify various indices to evaluate the sustainability.	K4	III
CO4	Analyze environmental problems and develops skills to resolve for sustainable development.	K5	III
CO5	Develop sustainability indices	K6	IV
CO6	Report various trans-boundary environmental issues through reviewing and analyzing.	K6	V

Core IX: ENVIRONMENTAL ENGINEERING AND POLLUTION CONTROL

Semester: III **Code: P20ES309**

Credits: 4 **Hours/Week: 5**

On completion of the course, the students will be able to:

CO No.	Outcomes	level	Unit
CO1	Define the concepts of water distribution systems, sewer networks and working principles.	K3	I
CO2	Assess the pollution concentration incorporating meteorological factors through computer modelling	K3	II
CO3	Choose right methods of sampling and analysis for air pollution monitoring	K4	III
CO4	Apply the basic engineering principles in controlling the air / noise pollution.	K5	III
CO5	Design the appropriate water/waste water treatment methods, air noise pollution control techniques solid waste disposal methods	K6	IV
CO6	Plan and organize solid waste collection, and 3-R strategies	K5	V

Core X: ENVIRONMENTAL IMPACT ASSESSMENT

Semester: III **Code: P20ES310**

Credits: 4 **Hours/Week: 5**

On completion of this course, the students will be able to:

CO No.	Outcomes	K-level	Unit
CO1	State the basic concepts of Environmental Impact Assessment	K5	I
CO2	Discuss the recent developments of Environmental Impact Assessment	K6	II
CO3	Interpret various methods of Environmental Impact Assessment	K6	III
CO4	Appraise the methods of preparation of Environmental Impact Assessment reports	K5	IV
CO5	Perform a health risk analysis	K5	V
CO6	Organize risk assessment, Life Cycle Analysis and Cost-Benefit analysis	K5	V

Core XI: INSTRUMENTATION FOR ENVIRONMENTAL SCIENCES

Semester: III **Code: P20ES311**

Credits: 4 **Hours/Week: 5**

On completion of this course the students will be able to:

CO No.	Outcomes	level	Unit
CO1	Explain the basic principles of various instruments used in environmental monitoring/sampling and analysis.	K2	I
CO2	Summarize instruments available for physical/chemical and biological assessment.	K2	II
CO3	Apply the sampling and sample processing techniques.	K3	III
CO4	Choose the suitable instruments for environmental assessment.	K3	IV
CO5	Examine environmental samples with higher-end instruments	K4	IV
CO6	Evaluate using the different advanced analytical tools in environmental management.	K4	V

Core Practical IV: WATER POLLUTION AND ITS CONTROL ENGINEERING, SOIL POLLUTION AND GIS APPLICATIONS

Semester: III **Code: P20ES3P4**

Credits: 4 **Hours/Week: 5**

On completion of the course, the students will be able to:

CO No.	Outcomes	K-level	Unit
CO1	Inspect the characteristics of water	K4	I
CO2	Test the demand parameters of water	K6	II
CO3	Measure the suitability of water for domestic and irrigation purposes.	K5	III
CO4	Develop water treatment units	K6	III
CO5	Appraise the quality of soil and the extent of pollution.	K5	IV
CO6	Apply GIS in water pollution and soil pollution.	K3	V

Elective IV: REMOTE SENSING AND GIS FOR ENVIRONMENTAL SCIENCES

Semester: III **Code: P20ES3:4**

Credits: 4 **Hours/Week: 5**

On completion of the course, the students will be able to:

CO No.	Outcomes	K-level	Unit
CO1	Explain the principles and applications of remote sensing in environmental management	**K2**	**I**
CO2	Explain the principles and applications of Geographic Information System	**K2**	**II**
CO3	(GIS) technologies in environmental management	**K4**	**III**
CO4	Recognize the application of GIS in Land use/cover management.	**K6**	**III**
CO5	Discuss the applications of GIS in mapping of ground water potential zones.	**K6**	**IV**
CO6	Develop GIS maps of environmental resources, pollution and disasters for environmental management and Disaster management	**K6**	**V**

Core Practical V: AIR POLLUTION AND ITS CONTROL ENGINEERING AND GIS APPLICATIONS

Semester: IV **Code: P20ES4P5**

Credits: 4 **Hours/Week: 5**

On completion of the course, the students will be able to:

CO No.	Outcomes	K-level	Unit
CO1	Describe the principles of sampling and analytical techniques of air Pollution/noise pollution.	K1	I
CO2	Conduct air pollution / noise pollution sampling and analysis	K2	II
CO3	Interpret the results	K4	III
CO4	Relate meteorological parameters with air pollution	K6	III
CO5	Design the air pollution control devices.	K6	IV
CO6	Create GIS maps of air / noise pollution.	K6	V

Elective V: INTERNSHIP AND FIELD WORK

Semester: IV **Code: P20ES4F1**
Credits: 5 **Hours/Week: 10**

On completion of the course, the students will be able to:

CO No.	Outcomes	K-level	Unit
CO1	Conduct Environmental Audit for residences, institutions and industries.	K3	I
CO2	Explain the environmental pollution and control practices in various industries.	K2	II
CO3	Appraise and report the selected ecosystems and the ecological principles.	K5	III
CO4	Prepare Biodiversity Register.	K6	IV
CO5	Prepare Participatory Rural Appraisal.	K6	V
CO6	Create Environmental Education Strategies and executing them.	K6	VI

Extra Credit Course: ENVIRONMENTAL AUDIT

Semester: 3 **Code: PXES3:1**
Credits: 2

On completion of the course, the students will be able to:

CO	Outcomes	level	Unit
CO1	Identify the fundamental elements and Needs for Environmental Audit at Local and Global Levels.	K1	I
CO2	Assess and describe the Natural Resources – Air, Water, Soil, Space, Biodiversity (Greenbelt).	K5	II
CO3	List out the Facility Infrastructure, Energy, Transport, Aesthetics Internal and External sources.	K1	II
CO4	Compute the Process Environment, Economic management and Risk Assessment.	K3	III
CO5	Analyze the tools for auditing, Legal Implications and Environmental Education.	K5	IV
CO6	Categorize the Site Audit and Data Collection.	K4	V
CO7	Demonstrate Environmental Statement and Environmental Management Plant – Case Studies	K2	V

Extra Credit Course: ENVIRONMENTAL ECONOMICS
Semester: 3 **Code: PXES3:2**
Credits: 2

On completion of this course, the students will be able to:

CO No.	Outcomes	K-level	Unit
CO1	Define and Explain the Economics Paradigms, Perspectives from economics and ecology, Total economic, option and existence value.	K2	I
CO2	Relates the Environmental and resource economics, Explain Consumer choice theory and evaluation of market value, Measure depreciation of natural capital.	K6	II
CO3	Observe the Sustainable Development Goals (SDGs); Measuring Sustainable Development, Cost-Benefit Analysis and Green Economy, Green manufacturing, Green Finance and Green Tourism and Investing in Natural Capital.	K2	III
CO4	Describe the Ecological Indicators and footprint, global and regional trends. Illustrate the economic instruments- Taxation, Charges and subsidies, Marketable pollution permits.	K3	IV
CO5	Point out the Emission Standards and Effluent Charges, Transferable Pollution Credits, Voluntary Actions and Agreements.	K4	IV
CO6	Evaluate the Triple Bottom Line Accounting, Genuine Progress Indicator, GDP per capita Gross National Product, Gini coefficient and Corruption Perceptions Index.	K6	V

Extra Credit Course: OCCUPATIONAL HEALTH AND INDUSTRIAL SAFETY
Semester: 3 **Code: PXES3:3**
Credits: 2

On completion of this course, the students will be able to:

CO No.	Outcomes	level	Unit
CO1	Define and Explain the Safety Parameters, Safety Regulations and Factories Act.	K2	I
CO2	Relates the work place effect, Work Physiology and Performance evaluation of systems with man and environment.	K6	II
CO3	Match the Occupational diseases (Physical, Chemical, and Biological) and its prevention, control.	K5	III
CO4	Evaluate the Industrial Safety & Management System	K5	III,IV
CO5	Discuss on Industrial Safety Standards and Regulations	K6	IV
CO6	Discuss the Concepts of safety management systems, International safety certification, OHSA'S compliance.	K6	V

Extra Credit Course: FOREST MANAGEMENT

Semester: 3 **Code: PXES3:4**

Credits: 2

On completion of the course, the students will be able to:

CO No.	Outcomes	K-level	Unit
CO1	Define the forest ecology, types of forests, its resources and threats.	K1	I
CO2	Recognize the social, economic and environmental values of forest resources.	K1	II
CO3	Identify the threats to forest resources.	K2	III
CO4	Explain the Role of Afforestation and forest regeneration in absorption of CO_2.	K2	IV
CO5	Restate the forest policy, legislation and forest management strategies.	K2	V
CO6	Apply the management strategies towards forest conservation.	K3	V

Extra Credit Course: SOLID WASTE MANAGEMENT

Semester: 4 **Code: PXES4:1**

Credits: 2

On completion of this course, the students will be able to:

CO No.	Outcomes	K-level	Unit
CO1	Recognize the types of solid waste (both biodegradable and non-biodegradable).	K2	I
CO2	Apply the waste management technologies to solve environmental problems.	K5	II
CO3	Explain various waste disposal methods	K2	II
CO4	Explain methods of managing hazardous wastes.	K2	III
CO5	Discuss about management of biomedical and E-wastes.	K5	IV
CO6	Appraise the energy-producing technologies from biowastes.	K4	V

Extra Credit Course: GREEN SCIENCE AND TECHNOLOGY
Semester: 4 **Code: PXES4:2**
Credits: 2

On completion of the course, the students will be able to:

CO No.	Outcomes	K-level	Unit
CO1	Analyze the interrelationship between people, environment and economy	K1	I
CO2	Discuss about the green science and technology	K2	II
CO3	Describe green chemistry concepts.	K2	III
CO4	Apply the knowledge of green chemistry practices in effective management of wastes.	K2	IV
CO5	Choose suitable Green techniques / practices in industries / buildings, in production	K5	V
CO6	waste management, and energy production / conservation.	K5	V

Extra Credit Course: ECOTOURISM
Semester: 4 **Code: PXES4:3**
Credits: 2

On completion of the course, the students will be able to:

CO No.	Outcomes	K-level	Unit
CO1	Recognize the importance of ecotourism, its components, impacts and management.	K1	I
CO2	Relate the ecotourism and sustainability.	K2	II
CO3	Explain the land, people, flora and fauna and climatic variations	K2	III
CO4	Identify the environmental issues with tourism.	K2	IV
CO5	Review the eco certification, ecotels and eco-morals.	K2	V
CO6	Apply management practices towards sustainable ecotourism.	K3	V