Semester-III

ENVIRONMENTAL IMPACT ASSESSMENT [As per Choice Based Credit System (CBCS) scheme]			
Course Code	MCWE311	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	03:00:00	SEE Marks	50
Total Hours of Pedagogy	50 hrs of teaching	Total Marks	100
Credits	03	Exam Hours	03

Course Learning objectives:

- To know about objectives and scope of EIA
- To understand various Methodologies/Techniques of EIA-checklist
- To Assess and Predict Impacts of ecological attributes
- To study various mitigation measure

Module-1	
Introduction to EIA, Development Activity and Ecological Factor, Need for EIA Studies, Step-by-step procedures for conducting EIA, EIS, FONSI, Limitations of EIA, Environmental Setting, Objectives and Scope, Contents of EIA, Transnational effects of projects, Problems of EIA in developing countries	
Teaching-Learning Process	Black-Board Teaching, Power Point Presentation, Illustrative Videos, Group works, Assignments
Module-2	
EIA Methodologies/Techniques of EIA:- checklist, matrix, network analysis, environmental index, overlay, simulation method and cost benefit analysis technique.	
Teaching-Learning Process	Power Point Presentation, Group works, Solving Numerical, Assignments
Module-3	
Assessment and Prediction of Impacts of ecological attributes and mitigation measures - Air, Surface-Water, Noise, Soil and Groundwater and Biological Environment	
Teaching-Learning Process	Black-Board Teaching, Power Point Presentation, Illustrative Videos, Case Studies, Group works, , Assignments
Module-4	
Assessment and Prediction of Impacts of ecological attributes and mitigation measures - Cultural and Socio- economic Environment, Rapid and Comprehensive EIA, EIA Regulations in India. Public Participation: Advantages, Limitations, Role of Public Participation n EIA	
Teaching-Learning Process	Black-Board Teaching, Power Point Presentation, Group works, Flipped classroom, Assignments
Module-5	
Case Studies: EIA for Water resource developmental projects, Highway projects, Nuclear-Power plant projects, Mining project (Coal, Iron ore), Thermal power plant project, Pharmaceutical industries, and Textile industries.	
Teaching-Learning Process	Power Point Presentation , Class seminars, Group works, Flipped classroom, Assignments

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

1. Two Unit Tests each of **25 Marks**
2. Two assignments each of **25 Marks** or **one Skill Development Activity of 50 marks** to attain the COs and POs

The sum of two tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

1. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
2. The question paper will have ten full questions carrying equal marks.
3. Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
4. Each full question will have a sub-question covering all the topics under a module.
5. The students will have to answer five full questions, selecting one full question from each module

Suggested Learning Resources:

Text Books

1. L. W. Canter, Environmental Impact Assessment, 2nd Ed., McGraw-Hill, 1996
2. Y. Anjaneyulu, ValliManickam. ―Environmental Impact Assessment Methodologies, CRC Press, 2011

Reference Books

1. Jain R.K. Urban L.V. and Stacey G.S. ―Environmental Impact Analysis: A New Dimension in Decision Making, 2nd Ed., Van Nostrand Reinhold Co. New York. 1981.
2. R. Therivel, John Glasson, Andrew Chadwick, Introduction to Environmental Impact Assessment (Natural and Built Environment), Routledge, 2005

Web links and Video Lectures (e-Resources):

- MoEF, CC Govt. of India: http://environmentclearance.nic.in/
- NPTEL Materials: https://onlinecourses.nptel.ac.in/noc22_ar07/preview
- Swayam Material: https://onlinecourses.swayam2.ac.in/nou21_bt02/preview

Skill Development Activities Suggested

- Flipped classroom activity
- Group works
- Solving Numerical
- Case study analysis

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
1.	Know the importance of EIA, objectives and scope of EIA	L2
2.	Understand various Methodologies/Techniques required for Impact Identification and Analysis	L3, L4 and L5
3.	Assess and Predict the Impacts on various ecological attributes	L3, L4 and L5
4.	Understand the techniques to implement different mitigation measures	L3, L4 and L5

Mapping of COS and POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1			X					
CO2			X	X		X		X
CO3	X	X	X	X	X	X	X	X
CO4			X	X	X		X	X

CLIMATE CHANGE

Course Code	MCWE312	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	03:00:00	SEE Marks	50
Total Hours of Pedagogy	50 hr of teaching	Total Marks	100
Credits	03	Exam Hours	03

Course Learning objectives:

1. To understand the interacting components climate systems.
2. To analysis observations of current and past changes of earth climate system.
3. To know the about the construction, evaluation and application of climate models.
4. To study projections of future climate change and possible impact.

Module-1

Weather

Weather and Climate, The Climate System, Processes, Temporal Variations, Statistical properties of Climate, Spatial Scales on Climate Variations.

Observations

Atmosphere, Cryosphere, Ocean, Carbon Cycle.

Teaching-Learning Process	Black-Board Teaching, Power Point Presentation, video lecture.

Module-2

Paleoclimate

Methods, The Last Two Millennia, The Holocene, The Ice Ages, Milankovitch Theory.

Theory

Electromagnetic Radiation: Interaction of electromagnetic radiation with matter, The Greenhouse Effect, Earth's Energy Budget, Radioactive Forcing, Feedback Processes, and Climate Sensitivity.

Teaching-Learning Process	Black-Board Teaching, Power Point Presentation, Analysis of historical data.

Module-3

Biogeochemical cycles:

a) The Natural Carbon Cycle, b) Anthropogenic Carbon, c) Carbonate Chemistry and Ocean Acidification.

d) Processes:

i) Atmospheric Circulation, ii) The Hydrologic Cycle, iii) Ocean Circulation.

Teaching-Learning Process	Black board, Power Point Presentation, Video lecture.

Module-4

Models: a) Construction: boundary conditions, initial conditions, zero-dimensional (OD) Energy Balance Model (EBM),one-dimensional EBM (1D-EBM). Three-dimensional GCMs, regional climate models.

b) Evaluation.

c) Applications: Pale climate model studies, Detection and attribution studies.

Teaching-Learning Process	Black board, Power Point Presentation, Analysis of the scenarios using MTLAB programming.

Module-5

Impacts:

a) Projections: Uncertainties, b) Ecosystems: Vegetation models, Wildfires, Ocean ecosystems, c) Long-Term Changes, d) Regional Changes, e) Extremes, f) Impacts on Humans.

Economics

Economics and the climate change challenge: Understanding incentives and policies.

Teaching-Learning Process	Black board, Power Point Presentation, Video lecture.

Assessment Details (both CIE and SEE)

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Continuous Internal Evaluation:

1 Two Unit Tests each of **25 Marks**
2 Two assignments each of **25 Marks** or **one Skill Development Activity of 50 marks**

to attain the COs and POs

The sum of two tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

1. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
2. The question paper will have ten full questions carrying equal marks.
3. Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
4. Each full question will have a sub-question covering all the topics under a module.
5. The students will have to answer five full questions, selecting one full question from each module

Suggested Learning Resources:

Text Books:

1. Barry R.G., and Chorley R.L., "Atmosphere, Weather and Climate", 4th Edition, ELBS Publication.
2. Bolin B., (Ed.), "Carbon Cycle Modelling", John Wiley and Sons Publications.
3. Introduction to Climate Science by Andreas Schmittner (online Edition)

Reference Books:

1. Srivatsava A.K., "Global Warming", APH Publications.
2. Wyman R.L., (Ed.), , "Global Climate Change and Life on Earth", Chapman and Hall Publications.
3. Yadav, Chander and Bhan, "Global Warming: India's Response and Strategy", RPH Publications.

Web links and Video Lectures (e-Resources):

- https://onlinecourses.swayam2.ac.in/nou21_ge37/preview
- www.youtube.com/watch?v=KBKD6zDXckk

Skill Development Activities Suggested

- Analysing the climate data for a study area.

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
1.	Understand the interacting components climate systems.	L1,L2, L3
2.	Analysis observations of current and past changes of earth climate system.	L3,L4
3.	Know the about the construction, evaluation and application of climate models.	L4,L5
4.	Study projections of future climate change and possible impacts.	L4,L5

Mapping of COS and Pos

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	X				X			X
CO2		X	X	X		X	X	X
CO3	X		X	X	X	X		
CO4			X	X	X		X	X

INDUSTRIAL WASTE WATER MANAGEMENT AND AUDIT			
Course Code	**MCWE313**	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	03:00:00	SEE Marks	50
Total Hours of Pedagogy	50 hours teaching	Total Marks	100
Credits	03	Exam Hours	03

Course Learning objectives:

- The course provides a strong base of different industrial waste processes, effluent flow and Characteristics.
- Approaches to waste minimization, strength and volume reduction.
- Exposes the student to the areas of toxicity and treatability studies.
- Makes the student to understand the need for process flow sheets with waste streams of different industries.

Module-1

Effects of Industrial Wastes on sewerage system and sewage treatment plants and receiving water bodies. Effects of waste additions on physical and chemical properties of soil.
Effluent standards and receiving water quality standards. Feasibility of combined Treatment of Industrial Raw Waste with Domestic Waste

(8hrs)

Teaching-Learning Process	Chalk and Talk, PowerPoint Presentation and Video Lecture

Module-2

Industrial Waste survey-Process flow charts, Sampling – Grab, Composite and integrated samples. Dissolved oxygen Sag Curve in Stream, Streeter– Phelps formulation, Numerical Problems on DO prediction.

(8hrs)

Teaching-Learning Process	Chalk and Talk, PowerPoint Presentation and Video Lecture.

Module-3

Pretreatment of Industrial Wastewater – Volume reduction, Strength reduction, Neutralization, Equalization and Proportion, Removal of Organic and inorganic dissolved solids.

(8hrs)

Teaching-Learning Process	Chalk and Talk, PowerPoint Presentation and Video Lecture

Module-4

Wastewater Treatment in specific industries: Distillery, Sugar, Pulp and paper, Cement, Textile, Dairy, Fertilizer, Pharmaceutical.
Design of complete treatment system & disposal for industries: Distillery, Diary, Textile, paper and pulp mill to meet P.C.B. norms.

(8hrs)

Teaching-Learning Process	Chalk and Talk, PowerPoint Presentation and Video Lecture

Module-5

Radio Active Wastes treatment- Low activity and high activity radiation, application of radioactive techniques for wastewater treatment. Biomonitoring, Bio-Remediation of contaminated soils Environmental Auditing: Introduction, Cost of Pollution, Environmental audit solutions, Criminal and Regulatory liabilities

(8hrs)

Teaching-Learning Process	Chalk and Talk, PowerPoint Presentation and Video Lecture

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4. Each full question will have a sub-question covering all the topics under a module.
5. The students will have to answer five full questions, selecting one full question from each module

Suggested Learning Resources:

Books

- Nemerow N.N., "Liquid Waste of industry theories, "Practices andTreatment. Addison Willey New York.
- Eckenf elder,"Industrial Water pollution Control"- Mc Grawhill Company, New Delhi American Chemical Society, Washington D.C. USA 7. Bioremediation books
- Azad N.S.,–"Industrial Wastewater Management Hand Book "McGraw Hill book Co., New york.
- Ross R.D."Industrial Waste Disposal", Reinhold Environmental Series–New York.
- Mahajan,"Pollution control in Process industries".TMH, NewDelhi.

Web links and Video Lectures (e-Resources):

- **https://archive.nptel.ac.in/content/storage2/courses/105105048/M1L1.pdf.**
- **https://link.springer.com/article/10.1007/s11104-005-4641-x.**
- **https://nptel.ac.in/courses/105105048**
- **https://nptel.ac.in/courses/105107207**

- https://nptel.ac.in/courses/105106056/
- https://nptel.ac.in/courses/120108004

Skill Development Activities Suggested

Visit to nearby industries and draw the wastewater treatment flow diagram of that Industry.

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Know the effect to find us trial waste water on water and land. Knowledge on monitoring and its protocol.	L1
CO2	Understand the self purification processes of the streams	L2
CO3	Understand the technical approaches to waste minimization and pre-Treatment of industrial wastewater.	L2
CO4	Understand the characteristics and treatment flows chemes for selected industries	L2
CO5	Know how to carry out environmental audit in and Bioremediation of soils.	L2

Mapping of COS and POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**1**	**1**	**-**	**-**	**2**	**3**	**2**	**1**	**2**	**2**	**2**
CO2	**3**	**3**	**2**	**2**	**1**	**3**	**2**	**2**	**1**	**2**	**3**	**1**
CO3	**3**	**3**	**2**	**2**	**1**	**2**	**3**	**2**	**2**	**2**	**2**	**2**
CO4	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**3**	**2**
CO5	**2**	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**2**	**2**	**1**	**3**

INDUSTRY/RESEARCH INTERNSHIP			
Course Code	24INT384	CIE Marks	100
Number of contact Hours	06 Weeks	SEE Marks	100
Credits	11	Exam Hours	03

Course objectives:

Internship provide students the opportunity of hands-on experience that include personal training, time and stress management, interactive skills, presentations, budgeting, marketing, liability and risk management, paperwork, equipment ordering, maintenance, responding to emergencies etc. The objective are further,

- To put theory into practice.
- To expand thinking and broaden the knowledge and skills acquired through course work in the field.
- To relate to, interact with, and learn from current professionals in the field.
- To gain a greater understanding of the duties and responsibilities of a professional.
- To understand and adhere to professional standards in the field.
- To gain insight to professional communication including meetings, memos, reading, writing, public speaking, research, client interaction, input of ideas, and confidentiality.
- To identify personal strengths and weaknesses.
- To develop the initiative and motivation to be a self-starter and work independently.

Internship/Professional practice: Students under the guidance of internal guide/s and external guide shall take part in all the activities regularly to acquire as much knowledge as possible without causing any inconvenience at the place of internship.

Seminar: Each student, is required to

- Present the seminar on the internship orally and/or through power point slides.
- Answer the queries and involve in debate/discussion.
- Submit the report duly certified by the external guide.
- The participants shall take part in discussion to foster friendly and stimulating environment in which the students are motivated to reach high standards and become self-confident.

Course outcomes:

At the end of the course the student will be able to:

- Gain practical experience within industry in which the internship is done.
- Acquire knowledge of the industry in which the internship is done.
- Apply knowledge and skills learned to classroom work.
- Develop a greater understanding about career options while more clearly defining personal career goals.
- Experience the activities and functions of professionals.
- Develop and refine oral and written communication skills.
- Identify areas for future knowledge and skill development.

PROJECT WORK			
Course Code	MPRJ481	CIE Marks	100
Number of contact Hours/Week (L:P:S)	00:08:00	SEE Marks	**100**
Credits	20	Exam Hours	**03**

Course objectives:

- To support independent learning.
- To guide to select and utilize adequate information from varied resources maintaining ethics.
- To guide to organize the work in the appropriate manner and present information (acknowledging the sources) clearly.
- To develop interactive, communication, organisation, time management, and presentation skills.
- To impart flexibility and adaptability.
- To inspire independent and team working.
- To expand intellectual capacity, credibility, judgement, intuition.
- To adhere to punctuality, setting and meeting deadlines.
- To instil responsibilities to oneself and others.
- To train students to present the topic of project work in a seminar without any fear, face audience confidently, enhance communication skill, involve in group discussion to present and exchange ideas.

Each student of the project batch shall involve in carrying out the project work jointly in constant consultation with internal guide, co-guide, or external guide and prepare the project report as per the norms avoiding plagiarism.

Seminar: Each student, under the guidance of a Faculty, is required to

- Present the seminar on the selected project orally and/or through power point slides.
- Answer the queries and involve in debate/discussion.
- Submit two copies of the typed report with a list of references.

The participants shall take part in discussion to foster friendly and stimulating environment in which the students are motivated to reach high standards and become self-confident.

Course outcomes:

At the end of the course the student will be able to:

- Present the project and be able to defend it.
- Make links across different areas of knowledge and to generate, develop and evaluate ideas and information so as to apply these skills to the project task.
- Habituated to critical thinking and use problem solving skills
- Communicate effectively and to present ideas clearly and coherently in both the written and oral forms.