

GUJARAT TECHNOLOGICAL UNIVERSITY (GTU)**Competency-focused Outcome-based Green Curriculum-2022 (COGC-2022)**
Semester-IV**Course Title: Environmental Project Management**
(Course Code: 4341303)

Diploma programme in which this course is offered	Semester in which offered
Environmental Engineering	4 th Semester

1. RATIONALE

Due to increase in Industrialization the energy demand has also increased, and this has resulted in increase in green house gas emission. All of these activities have led to climate change the effect of which are being felt in the present days. This has raised the need to implement all projects in an environmentally sound way. One would agree that managing an environmental project is a huge & challenging task, which largely depends on many environmental dimensions of the project. For environmental technicians/engineers it is important & essential to know some basics of 'project management' along with some critical aspects of environment management, safety, hazards etc. As environmental professionals they are expected to know the managerial aspects involved in industries like management of labor and materials for smooth completion of the project.

This course deals with general aspects of project management & environmental management system. In this course students are expected to learn the application of planning and execution of project in an environment friendly way leading to sustainable development.

2. COMPETENCY

The course content should be taught and implemented with the aim to develop different types of skills so that students are able to acquire following competencies:

- **Plan and execute environmental projects as per schedule and standards while ensuring quality and safety**

3. COURSE OUTCOMES (COs)

The practical exercises, the underpinning knowledge and the relevant soft skills associated with this competency are to be developed in the student to display the following COs:

- a) Identify various phases of Environmental project and various elements of Environmental project management triangle
- b) Interpret Environmental project management framework and methods
- c) Summarize Environmental Project Management tools and techniques
- d) Explain various aspects of safety management in industry
- e) Explain principles, & appropriate methods of "disaster management".

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T/2+P/2)	Examination Scheme				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	CA *	ESE	CA	ESE	
2	-	-	2	30	70	-	-	100

(*): Out of 30 marks under the theory CA, 10 marks are for assessment of the micro-project to facilitate integration of COs and the remaining 20 marks is the best of 2 tests to be taken during the semester for the assessing the attainment of the cognitive domain UOs required for the attainment of the COs.

Legends: **L**-Lecture; **T** – Tutorial/Teacher Guided Theory Practice; **P** -Practical; **C** – Credit, **CA** - Continuous Assessment; **ESE** -End Semester Examination.

5. UNDERPINNING THEORY

Only the major Underpinning Theory is formulated as higher level UOs of *Revised Bloom's taxonomy* in order development of the COs and competency is not missed out by the students and teachers. If required, more such higher level UOs could be included by the course teacher to focus on attainment of COs and competency.

Unit	Unit Outcomes(UOs)	Topics And Subtopics
Unit-I Environmental Project Management Methodology	1a. Define Environmental based project 1b.Explain Various phases of Environmental project 1c.Identify elements of Environmental project management triangle 1d.Incorporate Sustainability into Environmental project management	1.1 Definition of Environmental based project, Difference between Green project and Environmental based project, Definition of Environmental Project Management, Environmental project life cycle 1.2 Various phases of Environmental project like Initiation phase, Environmental Impact study phase, Decision making phase, Implementation phase, Close out phase 1.3 Elements of Environmental project management triangle 1.4 Brundtland's definition of sustainable development, Baridu's definition of Project sustainability
Unit-II Environmental Project Management Framework And Economics	2a Describe Environmental Project Management Framework 2b Interpret Environmental project management methods 2c Outline the relationship between Market Economy and environment	2.1 Purpose and desired outcome of Environmental Project Management Framework 2.2 Environmental project management methods such as ISO 14001 environmental management systems, Plan-Do-Check-Act (PDCA) cycle, the six sigma Define-Measure-Analyze-Improve-Control (DMAIC) system 2.3 Interdependency of market economy

		and environment, Economics of environmental pollution, enlist methods of economic evaluation of environmental projects
Unit-III Environmental Project Management Tools And Techniques	3a Summarize Environmental Project Initiation tools 3b Summarize Environmental project planning tools 3c Summarize Environmental project Implementation tools 3d Acquire knowledge regarding Concept of Digital Earth	3.1 Brainstorming, stakeholder Analysis, SWOT Analysis 3.2 Affinity diagram, Work breakdown structure, Responsibility assignment matrix, Network diagram(CPM), Gantt chart 3.3 Milestone chart, Cause and effect diagram,PERT 3.4 Al gore's definition of Digital Earth concept, Introduction to geospatial data, role of geo spatial in Environmental Project Management
Unit-IV Safety Management	4a. Explain various terms related to safety in Industry. 4b. Explain the important operations /procedures of occupational safety & health relating to environmental aspects of projects. 4c Identify Accident Prevention techniques 4d Review Legislative measures in industrial safety	4.1 Preliminary knowledge regarding environmental related safety codes (BIS) for Fire Hazards & its prevention, Chemical hazards and its prevention, Mechanical, Electrical & radiation hazards, Biological and Ergonomical Hazards. 4.2 Control of Hazards through cases/examples/videos Occupational safety, Safety Equipment & Campaign, Dos and Don't for Storage of Chemicals. 4.3 Principle of accident prevention, Principle of accident causation, Personal protective equipments 4.4 Factories Act, 1948, Workman's Compensation Act, 1943, Employees State Insurance Act, 1948. Mines Act, Air (Prevention and control) Pollution Act, 1981, Water (Prevention and Control) Pollution Act, 1974, Boiler Vessels Act. Child Labour and Women Employee Act.
Unit-V Disaster Management	5a Describe through cases, programmes / examples various types of disasters and methods used for managing & mitigating the disaster. 5b List activities needed for pre and post-disaster management 5c Familiarize with NDMA and Disaster management act 2005	5.1 Introduction to various Kinds of Disaster, Effects of various kinds of disaster including Socio-economic & culture effects 5.2 Pre disaster management, Management during and after disaster 5.3 Role of NDMA, National Plan, Fund allocation for disaster management, offences and penalties stated in act

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A	Total Marks
I	Environmental Project Management Methodology	5	4	8	2	14
II	Environmental Project Management Framework And Economics	3	4	4	2	10
III	Environmental Project Management Tools And Techniques	8	4	8	4	16
IV	Safety Management	8	4	8	4	16
V	Disaster Management	4	4	6	4	14
Total		28	20	34	16	70

Legends: R=Remember, U=Understand, A=Apply and above (Revised Bloom's taxonomy)

Note: This specification table provides general guidelines to assist student for their learning and to teachers to teach and question paper designers/setters to formulate test items/questions assess the attainment of the UOs. The actual distribution of marks at different taxonomy levels (of R, U and A) in the question paper may vary slightly from above table.

7. SUGGESTED STUDENT ACTIVITIES

Other than the classroom learning, following are the suggested student-related **co-curricular** activities which can be undertaken to accelerate the attainment of the various outcomes in this course: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

Following is the list of proposed student activities like:

- 1.Student will visit nearby Industries to study the existing Environmental management system.
- 2.Student will Survey an ongoing project site and check whether environmental project management methods are implemented or not.
- 3.Student will carry out survey in nearby industries to study the safety management implemented over there.

8. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES

These are sample strategies, which the teacher can use to accelerate the attainment of the various outcomes in this course:

- a) Massive open online courses (MOOCs) may be used to teach various topics/sub topics.
- b) Guide student(s) in undertaking micro-projects.
- c) Use demonstration, video/animation films field/industry visit for explaining complex/abstract concepts of Environmental Project Management.
- d) **'L' in section No. 4** means different types of teaching methods that are to be

employed by teachers to develop the outcomes.

- e) About **20% of the topics/sub-topics** which are relatively simpler or descriptive in nature is to be given to the students for **self-learning**, but to be assessed using different assessment methods.
- f) With respect to **section No.9**, teachers need to ensure to create opportunities and provisions for **co-curricular activities**.
- g) Guide students on how to address issues on environment and sustainability

9. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her in the beginning of the semester. In the first four semesters, the micro-project are group-based. However, in the fifth and sixth semesters, it should be preferably be **individually** undertaken to build up the skill and confidence in every student to become problem solver so that she/he contributes to the projects of the industry. In special situations where groups have to be formed for micro-projects, the number of students in the group should **not exceed Six**.

The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. Each student will have to maintain dated work diary consisting of individual contribution in the project work and give a seminar presentation of it before submission. The total duration of the micro-project should not be less than **16 (sixteen) student engagement hours** during the course. The student ought to submit micro-project by the end of the semester to develop the industry oriented COs.

A suggestive list of micro-projects is given here. This has to match the competency and the COs. Similar micro-projects could be added by the concerned course teacher:

- a) Study various types of project and classify them into Green project and Environment based project and prepare a chart of classification.
- b) Perform literature survey and identify and report various environment based projects undertaken in India till date.
- c) Prepare individual charts for world's environmental disasters identifying their cause and effect.
- d) Apply environmental project management tools for planning, scheduling and implementation for a hypothetical project and report it.
- e) Study safety management system of some environmental organization and prepare a report
- f) Study the various acts related to occupational health and safety and prepare a report of important provisions.
- g) Undertake case study of accidents in industries/factories and prepare report on cause and effect and preventive measures to avoid such accidents.
- h) Prepare a report on disaster management preparedness of residing district.
- i) Prepare report on various kinds of disasters that took place in India with their causes and possible preventive measures.
- j) Study the Disaster Management act and make a report of important provisions listed in the act.

10. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication with place, year and ISBN
1	Environmental Project Management Principles, Methodology, and Processes	Ebenezer A. Sholarin, Joseph L. Awange	Springer
2	Industrial Safety , Health and Environment Management Systems	R. K. Jain and Sunil S. Rao	Khanna publishers
3	Fundamentals of Industrial Safety & Health	Dr. K. U. Mistry	Siddharth Prakashan
4	Industrial Safety		National Safety Council of India ISHET
5	Project Planning by CPM & Pert	B.C.Punamia & Khandwala	Laxmi publications
6	Industrial Safety and Environment	Anupama Prashar & Pratibha Bansal	S.K. Kataria and sons
7	Safety health and environment handbook	CPWD	Director general, CPWD, New Delhi
7	Disaster management in India		Ministry of home affairs, Government of India

11. SOFTWARE/LEARNING WEBSITES

- a) Microsoft Project
- b) ndma.gov.in
- c) <https://labour.gov.in/industrial-safety-health>
- d) www.nptel.ac.in

12. PO-COMPETENCY-CO MAPPING

Semester II	Environmental project management (Course Code:4341303)									
	POs and PSOs									
Competency & Course Outcomes	PO 1 Basic & Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design/ development of solutions	PO 4 Engineering Tools, Experiment & Testing	PO 5 Engineering practices for society, sustainability & environment	PO 6 Project Management	PO 7 Life- long learning	PSO 1 Environmental planning & design	PSO 2 Environmental Impact Assessment	PSO 3 (If needed)
Competency	i. Plan and execute environmental projects as per schedule and standards while ensuring quality and safety									
Course Outcomes										
CO a) Identify various phases of Environmental project and various elements of Environmental project management triangle	3	-	-	-	3	3	2	3	3	-
CO b) Interpret Environmental project management framework and methods	3	-	-	-	3	3	2	3	3	-
CO c) Summarize Environmental Project Management tools and techniques	3	-	-	3	3	3	2	3	3	-
CO d) Explain various aspects of safety management in industry	3	-	-	-	3	3	2	3	3	-
CO e) Explain principles, & appropriate methods of "disaster management".	3	-	-	-	3	3	2	3	3	-

Legend: '3' for high, '2' for medium, '1' for low or '-' for the relevant correlation of each competency, CO, with PO/ PSO

13. COURSE CURRICULUM DEVELOPMENT COMMITTEE

GTU Resource Persons

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