

2018

**[OBE DESIGN-
ENVIRONMENTAL SCIENCE
DEPARTMENT]**

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PREFACE

Outcome Based Education (OBE) is the educational approach which focuses on student centric education in the context of development of personal, social, professional and knowledge (KSA) requirements in one's career and life. It is the decade ago curriculum development methodology. The educational triangle of LEARNING-ASSESSMENT-TEACHING is the unique nature of the OBE approach. The curriculum practices such as Competency Based Curriculum, Taylor's Model of Curriculum Development, Spadys' Curriculum principles, Blooms taxonomy and further use of assessment methodologies like, Norm-reference testing and Criterion reference testing, etc is being practiced since decades. It is also interesting to know that, globally, different countries and universities adopts the curriculum development models/approaches such as, CDIO (Conceive-Design-Implement-Operate), Evidenced Based Education, Systems' Approach, etc as the scientific and systematic approaches in curriculum design.

The authorities of Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (M.S.) in-lieu of accreditation standards of National Assessment and Accreditation Council, decided to opt for Outcomes Based Education (OBE). As the part of the decision, different meetings, workshops and presentations were held at the campus of university.

This document is the outcome of different meetings and workshops held at university level and department level. The detailed document is designed and the existing curriculum of the department is transformed in to the framework of OBE. This is the first step towards the implementation of OBE in the department. The document will serve all stakeholders in the effective implementation of the curriculum. The OBE is continuous process for quality enhancement and it will go a long way in order to enhance the competencies and employability of the graduates/Post-graduates of the university department.

Head of Department

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OUTCOME BASED EDUCATION

Faculty of Science & Technology

Department of Environmental Science

1. Mission:

Mission Statement

Department of Environmental Science is committed to create trained manpower to protect public health of present generation and is bound to care for future generations with depth of expertise for inculcating all eco-scientific ethics and morals through its standard post-graduate research program, quality teaching, manpower training and extension of environmental science to the citizens of Marathwada region with its academic leadership and emerge as a key resource centre for the society and industrial clusters of India.

2. Vision:

Vision Statement

Environmentally educate the society to improve and maintain the quality of life and clean surroundings by setting the benchmark of standards and ensuring healthy air, pure water, uncontaminated soil, calm and healthy environment, hospitable for all stake holders through its academic, extracurricular, co-curricular and extension activities.

3. Title of the Program (s):

a. Master of Environmental Science

4. Program Educational Objectives:

The program educational objectives (PEO) are the statement that describes the career and professional achievement after the program of studies (graduation/ post-graduation). The PEOs are driven from question no. (ii) of the Mission statement (What is the purpose of organization). The PEOs can be minimum three and maximum five.

PEO1: To have advance knowledge of environmental science and solving environmental issues in varied domains.

PEO2: To provide the professional services to industry, research organization, institutes.

PEO3: To provide the professional consultancy and research support for the relevant organization in the domain of super specialization.

PEO4: To opt for higher education, disciplinary & multi-disciplinary research and to be a life-long learner.

PEO5: To provide, value based and ethical leadership in the professional and social life.

5. Program Outcomes:

The program outcomes (PO) are the statement of competencies/ abilities. POs are the statement that describes the knowledge and the abilities the graduate/ post-graduate will have by the end of program studies.

PO1. Apply advanced knowledge of Environmental Science and Technology for the solution of Industrial, municipal and agricultural waste and pollution related problems.

PO2. Identify industrial, municipal and agricultural domain related problems at varied complexity and analyze the same to formulate/ develop clean development mechanisms using first principles of domain sectors and scientific/ technical literature.

PO3. Design / develop solutions for critical environment problems to address changing challenges put forward by unmanaged pollution, climate change and contemporary global issues

PO4. Design and conduct technology enabled experiments, analyze the resulting data and interpret the same to provide sustainable conclusions using modern tools with clear understanding of limitations.

PO5. Apply clear understanding of ethical and professional environment related practice in the context of economic, and societal realities encompassing contemporary global issues and develop practical solutions within positive professional and ethical circumference.

PO6. Practice and apply clean development mechanisms for sustainable environment solutions

PO7. Function effectively as a leader and as well as team member in diverse/ multidisciplinary work environments and communicate scientifically/ technically in oral and written format addressing specific professional/ social demands.

PO8. Demonstrate understanding of the advance knowledge of environmental science and apply these to one's own work as a member and leader in a team, to complete project in any environment.

PO9. Recognize the need for and have the ability to address to the changing global environmental scenario.

6. Course- Program outcome Matrix:

The Program Outcomes are developed through the curriculum (curricular/co-curricular-extra-curricular activities). The program outcomes are attained through the course implementation. As an educator, one must know, **“to which POs his/her course in contributing?”**. So that one can design the learning experiences, select teaching method and design the tool for assessment. Hence, establishing the Course-PO matrix is essential step in the OBE. The course-program outcomes matrix indicates the co-relation between the courses and program outcomes. The CO-PO matrix is the map of list of courses contributing to the development of respective POs.

The CO-PO matrix is provided in the below table.

ANNEXURE- C									
CO-PO MATRIX									
ENVIRONMENTAL SCIENCE : HOMOGENEOUS MATRIX									
Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
ENV-001		*		*	*		*		
ENV-401	*	*	*		*	*	*		
ENV-402	*	*	*	*		*	*		
ENV-403	*	*		*					
ENV-421	*			*			*		*
ENV-100	*	*	*	*					
L-ENV-441	*	*	*	*	*			*	*
L-ENV-442	*	*	*	*	*	*	*		
L-ENV-443	*	*	*	*		*	*		
ENV-404	*	*		*					
ENV-405	*	*	*		*	*			
ENV-406	*	*	*	*				*	
ENV-422A	*	*	*		*		*	*	
ENV-445	*	*	*	*	*				*
ENV-446	*	*	*		*	*			
ENV-447	*	*	*	*				*	
ENV-448	*	*	*		*		*	*	
ENV-501	*	*		*	*		*		
ENV-502	*	*		*				*	
ENV-503	*	*		*				*	

ENV-521B.1	*		*	*	*				*
L-ENV-541	*	*		*	*		*		
L-env-542	*	*		*				*	
L-ENV-543	*		*	*	*				*
L-ENV-544	*		*	*	*				*
ENV-504	*	*	*		*		*	*	
ENV-505	*	*	*		*		*	*	
ENV-506	*	*	*		*		*	*	
ENV-523A	*	*	*						*
L-ENV-545	*	*	*		*		*	*	
L-ENV-546	*	*	*		*		*	*	
ENV-547 P & S				*	*	*		*	

7. Course Outcomes (for all courses):

The course outcomes are the statement that describes the knowledge & abilities developed in the student by the end of course (subject) teaching. The focus is on development of abilities rather than mere content. There can be 5 to 7 course outcomes of any course. These are to be written in the specific terms and not in general. The list of Course Outcomes is the part of **Annexure-B** attached herewith.

8. Set Target levels for Attainment of Course Outcomes:

The course outcome attainment is assessed in order to track the graduates' performance w.r.t target level of performance. The CO-PO attainment is the tool used for continuous improvement in the graduates' abilities through appropriate learning & teaching strategies. In order to assess students' performance with respect to abilities (at the end of course teaching/by the end of program) the course outcome attainment are measured/calculated. In order to calculate the program outcome attainment, the course outcome attainment is calculated. Prior to that, the course-program outcome mapping is done.

9. Set Target level for Attainment of Program Outcomes:

The program outcome attainment is assessed in order to track the graduates' performance w.r.t target level of performance. The CO-PO attainment is the tool used for continuous improvement in the graduates' abilities through appropriate learning & teaching strategies. In order to assess students' performance with respect to abilities (at the end of course teaching/by the end of program) the course outcome attainment and program outcome attainment is measured/calculated. The program outcome attainment is governed by curricular, co-curricular and extra-curricular activities including the stakeholders'

participation. The direct method and indirect method is adopted to calculate the PO attainment. The direct method implies the attainment by course outcomes contributing to respective program outcomes. And indirect method is the satisfaction/feed-back survey of stakeholders. In order to calculate the program outcome attainment, the course outcome attainment is calculated. Prior to that, the course-program outcome mapping is done. The set target level is the set benchmark to ensure the continuous improvements in the learners/ graduates' performance.

10. Course Attainment Levels:

- a. CO attainment is defined/set at three levels;
- b. The CO attainment is based on end term examination assessment and internal assessment;
- c. The Co attainment is defined at three levels in ascending order-
 - i. e.g. For end term and internal examination;
 - ii. Level-1: 30% students scored more than class average
 - iii. Level-2: 40% students score more than class average;
 - iv. Level-3: 50% students score more than class average.
- d. The target level is set (e.g. Level-2). It indicates that, the current target is level-2; 40% students score more than class average. The CO attainment is measured and the results are obtained. Based on the results of attainment, the corrective measures/remedial action are taken.
- e. CO Attainment= 80% (Attainment level in end term examination) + 20% (Attainment level in internal examination).

11. Program attainment Level:

- a. PO attainment is defined at five levels in ascending order;
- b. The PO attainment is based on the average attainment level of corresponding courses (Direct Method) and feed-back survey (Indirect method);
- c. The PO attainment levels are defined / set as stated below;
 - i. Level-1: Greater than 0.5 and less than 1.0 (0.5>1)- Poor
 - ii. Level-2: 1.0>1.5-Average
 - iii. Level-3: 1.5>2.0-Good
 - iv. Level-4: 2.0>2.5-Very Good
 - v. Level-5: 2.5>3.0 -Excellent
- d. The PO attainment target level is set/defined (say, Level-4). It implies that, the department is aiming at minimum level-4 (very good) in the performance of abilities by the graduates. Based upon the results of attainment, the remedial measures are taken;
- e. PO Attainment= 80% (Average attainment level by direct method) + 20% (Average attainment level by indirect method).

12. The Results of CO Attainment:

THE RESULTS OF PO ATTAINMENT ARE PROVIDED IN ANNEXURE-C

FOR EXAMPLE:

COURSE CODE/TITLE: ENV-445

e.g. For end term and internal examination;

- i. Level-1: 40% students scored more than class average
- ii. Level-2: 50% students score more than class average;
- iii. Level-3: 60% students score more than class average

Average Total Practical Marks in External examination: 37.80 = i.e. 38.00

% Students score more than 38 are 17/25, i.e. 68% i.e. Level-3

$$A(\text{CO}) \text{ ENV-445} = 100 \% (3) \\ = 3.00$$

Hence, the attainment level is Level-3 and the set target level is Level-2 and therefore the CO is fully attained.

Table No. 1.0: CO Attainment Level

Course Code	CO Attainment Value	Attainment Target level	Fully Attained/Not attained	Remedial measures
ENV-001	1.6	2	Not Attained	The remedial measures such as assignments, tutorials, exercises and coaching shall be arranged to enhance the attainment level.
ENV-401	1.4	2	Not Attained	
ENV-402	0.6	2	Not Attained	
ENV-403	1.4	2	Not Attained	
ENV-421	1.4	2	Not Attained	
ENV-100	1	2	Not Attained	
L-ENV-441	2.2	2	Fully Attained	
L-ENV-442	3	2	Fully Attained	
L-ENV-443	1.4	2	Not Attained	The remedial measures such as assignments, tutorials, exercises and coaching shall be arranged to

			enhance the attainment level.
ENV-404	3	2	Fully Attained
ENV-405	2.2	2	Fully Attained
ENV-406	2.8	2	Fully Attained
ENV-422A	2.2	2	Fully Attained
ENV-445	3	2	Fully Attained
ENV-446	2.2	2	Fully Attained
ENV-447	3	2	Fully Attained
ENV-448	2.2	2	Fully Attained
ENV-501	3	2	Fully Attained
ENV-502	3	2	Fully Attained
ENV-503	3	2	Fully Attained
ENV-521B.1	1.4	2	Not Attained
L-ENV-541	3	2	Fully Attained
L-env-542	3	2	Fully Attained
L-ENV 543	2.2	2	Fully Attained
L-ENV-544	2.2	2	Fully Attained
ENV-504	2.6	2	Fully Attained
ENV-505	3	2	Fully Attained
ENV-506	3	2	Fully Attained
ENV-523A	2.8	2	Fully Attained
L-ENV-545	2.2	2	Fully Attained
L-ENV-546	3	2	Fully Attained
ENV-547 P & S	3	2	Fully Attained

13.The Results of PO Attainment:

FOR EXAMPLE:

PO NO.: PO-8 (h)

(Note: Refer point No. 11 above which describes the attainment level and set target attainment level)

PO Attainment= 80% (Average attainment level by direct method) + 20% (Average attainment level by indirect method).

$$\begin{aligned}
 A \text{ (PO) } d &= 80\% (2.2+2.8+2.2+3+2.2+3+3+3+2.6+3+3+2.2+3+3)/14 +20\% (2.70) \\
 &=80\% (2.7288) + 20\% (2.7) \\
 &= 1.852.18+ 0. 54 \\
 &= 2.72 \text{ i.e. Level-5. The Target Attainment Level is Level-4.}
 \end{aligned}$$

Hence PO is attained.

THE RESULTS OF PO ATTAINMENT ARE ROVIDED IN ANNEXURE-C

Table No. 2.0 PO Attainment Level

PO/PSO number	PO Attainment Value	Target Attainment level	Fully attained/ Not Attained	Remedial Measures
a	2.35	4	Fully attained	
b	2.40	4	Fully attained	
c	2.31	4	Fully attained	
d	2.26	4	Fully attained	
e	2.43	4	Fully attained	
f	1.97	4	Not attained	The remedial measures such as assignments, tutorials, exercises and

				coaching shall be arranged for the corresponding courses to enhance the attainment level.
g	2.24	4	Fully attained	
h	2.73	4	Fully attained	
i	2.17	4	Fully attained	

14. Planned Actions for Course Attainment:

The CO value below 2.0 will be addressed by undertaking the remedial measures like assignment, field work and remedial coaching.

15.Planned Actions for Program Outcome Attainment:

The PO having attainment level less than Level-4 shall be addressed by planning the remedial measures for the corresponding courses w.r.t. the PO.

ANNEXURE-B

COURSE OUTCOMES

Course Structure (110 Credit against 2650 marks)

M.Sc. I year (Semester- I)					
Course	Course Code	Paper Titles	Hrs/ week	Credits	Marks
COM	COM-100	Constitution of India	02	02	50
RM	ENV-001	Research Methodology Part-I	02	02	50
FC	ENV-401	Foundation Course on Environment	04	04	100
CC	ENV-402	Environmental Chemistry	04	04	100
CC	ENV-403	Environmental Instrumentation & Analysis	04	04	100
EC	ENV-421A	Wildlife Conservation & Management	04	04	100
EC	ENV-421B	Environmental Metrology & Geosciences	04	04	100
LC	ENV-441	Lab Course-I	04	02	50
LC	ENV-442	Lab Course-II	04	02	50
LC	ENV-443	Lab Course-III	04	02	50
LEC	ENV-444A	Lab Course-IV	04	02	50
LEC	ENV-444B	Lab Course-IV	04	02	50
Total Credits for Semester – I : 28 (Theory:20 ;Lab:08)					
M.Sc. I Year (Semester-II)					
Course	Course Code	Paper Titles	Hrs/ week	Credits	Marks
RM	ENV-002	Research Methodology Part-II	02	02	50
CC	ENV-404	Environmental Biotechnology	04	04	100
CC	ENV-405	Green Technology	04	04	100
CC	ENV-406	Environmental Engineering & Technology	04	04	100
EC	ENV-422A	Environmental Management Systems	04	04	100
EC	ENV-422B	Environmental Statistics & Modeling	04	04	100
LC	ENV-445	Lab Course-V	04	02	50
LC	ENV-446	Lab Course-VI	04	02	50
LC	ENV-447	Lab Course-VII	04	02	50
LEC	ENV-448A	Lab Course -VIII	04	02	50
LEC	ENV-448B	Lab Course-VIII	04	02	50
Total Credits for Semester – II : 26 (Theory:18 ;Lab:08)					

M.Sc. II year (Semester- III)					
Course	Course Code	Paper Titles	Hrs/ week	Credits	Marks
CC	ENV-501	Municipal & Hazardous waste Management	04	04	100
CC	ENV-502	Remote Sensing and GIS application for Environmental Management	04	04	100
CC	ENV-503	Environmental Toxicology & Biodiversity	04	04	100

		Assessment			
EC	ENV-521A	Environmental Plan, Policies, and legislation	04	04	100
EC	ENV-521B	Ecological footprints and carbon sequestration	04	04	100
SC	ENV-522	Climate Change and Global Environmental Issues	04	04	100
LC	ENV-541	Lab Course- IX	04	02	50
LC	ENV-542	Lab Course- X	04	02	50
LC	ENV-543	Lab Course- XI (Project /Dissertation Part- I)	08	08	100
Total Credits for Semester – III : 32 (Theory:20 ;Lab:04;Research Project :08)					
M.Sc. II Year (Semester-IV)					
Course	Course Code	Paper Titles	Hrs/ week	Credits	Marks
CC	ENV-504	Risk Assessment and Disaster Management	04	04	100
CC	ENV-505	EIA & Environmental Auditing	04	04	100
EC	ENV-523A	Advanced Technologies & CDM	04	04	100
EC	ENV-523B	Ground Water Engineering and Watershed Management	04	04	100
LC	ENV-545	Lab Course-XII	04	02	50
LC	ENV-546	Lab Course – XIII (Field work and In-plant training)	04	02	50
LC	ENV-547	Lab Course- XIV (Seminar / Dissertation Part- II)	08	08	200
Total Credits for Semester – IV : 24 (Theory:12 ;Lab:04;Research Project :08)					
Total Credits : 110 (Sem I : 28 +Sem II : 26 + Sem III : 32 + Sem IV:24)					

Semester - I

RM (ENV- 001:- Research Methodology – Part-I)

(Theory Course with 02 Credits)

Course Outcome

Students should be able to:

1. Explain the different research approaches, scientific methods, criteria for good researches.
2. Describe the problems encountered while working on research plan, trouble shooting mechanism, field and laboratory problems.
3. Acquire knowledge of data collection, presentation of data, data analysis and presentation of samples.

FC (Env-401 :- Foundation Course on Environment)

(Theory Core Course with 04 credits)

1. define ecological systems and its functionality along with stability concept of ecosystem
2. Describe various types of pioneer species and their role in restoration of ecosystems.
3. Recognize ecological succession, concept of climax and degraded ecosystem.
4. Examine nature and status of renewable and non renewable energy resources, mineral resources and energy resources.

CC (Env-402 :- Environmental Chemistry)

(Theory Core Course with 04 credits)

- Define basics of environmental chemistry.
- Explain chemical contamination in environment
- Analyze air, water and soil.
- Apply the knowledge to assess the contamination of environment.

CC (Env-403 :- Environmental Instrumentation and Analysis)

(Theory Core Course with 04 credits)

1. Define sampling techniques, instrumental trouble shooting
2. Apply applications in pollution studies.
3. Categorize analytical instruments and instruments used for environmental problems.
4. Create consultancies.

EC (Env-421 A :- Wildlife Conservation and Management)

(Theory Elective Course with 04 credits)

1. Identify the value of wildlife, its ecological importance and its scientific, commercial and ethical values.
2. Examine the threats and causes of loss of wildlife, extension of wildlife species from India.
3. Assess different wildlife conservation methods and importance of protected area such as national parks, biosphere reservoirs, zoo, botanical gardens and gene bank.
4. Evaluate importance of wildlife management, management of forest fires, water resources, shelters and corridors management for wildlife protection.

EC (Env-421-B :- Environmental Meteorology & Geosciences)

(Theory Elective Course with 04 credits)

1. Classify different climatic regions of the world, distribution of vegetations and climatic conditions in India.
2. Compare the various seasons in India, distribution of rainfall, monsoon forecast and climatic conditions, in agricultural and industrial sectors.
3. Identify the meteorological parameters to forecast the weather, scale of meteorology and establish ambient and emission standards.
4. Assess different earth process, natural cycles and risk of geological hazards.

Semester - II

RM (ENV- 002 : Research Methodology – Part-II)

(Theory Course with 02 Credits)

1. Collect research data through experimentation, questionnaire by direct observations and sensitivity study of spatial and temporal data.
2. Infer the importance of statistical analysis, errors occurring in the collected research data and proper interpretation of produced research
3. Design the research project with the help of review of produced research, techniques of interpretation, published literature and proper layout of research.

CC (Env-404 :- Environmental Biotechnology)

(Theory Core Course with 04 credits)

1. Classify the concept of biotechnology.
2. Illustrate the regulations of biosafety protocols.
3. Assess biotechnological tools in pollution studies.
4. Design reactors for treatability studies

CC (Env-405 :- Green Technology)

(Theory Core Course with 04 credits)

1. Define the concept and application of green chemistry for minimization of wastes and environmentally balanced industrial complexes.
2. Design green product to maintain quality predictability, functionality and upgradability to improve performance of the products in environment
3. Apply the concept of green nanotechnology, carbon nano tubes, green nano particles and biocompatibility for resource conservation, ecosystems, non medical applications and human being.
4. Choose the applications of green chemistry in industries, fuel cell, solar photovoltaic technology and in bio fuel product etc.

CC (Env-406 :- Environmental Engineering and Technology)

(Theory Core Course with 04 credits)

- Define hazardous and non-hazardous waste treatment methods.
- Express the functioning of effluent treatment plant
- Use the treatment methods for hazardous and non hazardous waste management.
- Analyze the hazardous and non hazardous waste
- Design the different hazardous waste treatment methods

EC (Env-422 A:- Environmental Management Systems)

(Theory Elective Course with 04 credits)

1. Illustrate the concept of environmental management system the national and international standards.
2. Asses the plan for environmental planning for air, water, soil, heritage, demography and natural assets.
3. Identify micro and macro- planning for natural resource at national, regional, rural and urban areas.
4. Define the concept of LCA, environmental enterprises, ISO 14000 and OSHAS 18000, total quality management and business environment, fair environmental practices and international environmental initiatives.

EC (Env-422 B:- Environmental Statistics & Modeling)

(Theory Elective Course with 04 credits)

1. Apply the fundamental concepts of statistics in environmental analysis.
2. Bullet concept of probability in environmental variables.
3. Hypotheses the problems and apply the test of significance
4. Illustrate the environmental models for point and non point source of pollution.

Semester – III

CC (Env-501 :- Municipal & Hazardous waste Management)

(Theory Core Course with 04 credits)

1. Discuss current scenario of MSW, models for appropriate waste collection.
2. Apply management and handling rule of MSW
3. Differentiates of hazardous waste sources and characteristics
4. Create designing and operation facilities for hazardous waste
5. Evaluate biomedical handling and management rule 2008

CC (Env-502 :- Remote Sensing and GIS Application for Environmental Management)

(Theory Core Course with 04 credits)

1. Define and discuss the concepts and components of aerial photographs
2. Summarize the principle and procedure of remote sensing
3. Identify and use the different types of satellite images and aerial photographs
4. Illustrate the use of GIS software for extraction of information and interpretation
5. Demonstrate the use of RS and GIS in environmental study and management

CC (Env-503 :- Environmental Toxicology and Biodiversity Assessment)

(Theory Core Course with 04 credits)

1. Describe the basic principle of environmental toxicity.
2. Apply the different toxicity tests and protocols of toxicity.
3. Categorize toxicants and biodiversity.
4. Assess the biodiversity.

EC (Env-521-A :- Environmental Plan, Policies and Legislation)

(Theory Core Course with 04 credits)

1. Describe environmental management plan (EMP), environmental rules, laws and policies.

2. Explain need of laws, importance of environmental legislations, governmental policies for protection and development of environment.
3. Rearrange prevention and control rooms, regulations and governmental policies.
4. Design various strategies of pollution control techniques, green buildings, NCEP and environmental policies resolutions.

EC (Env-521-B: - Ecological Foot Prints & Carbon Sequestration)

(Theory Core Course with 04 credits)

1. Identify the concepts of ecological footprint
2. Interpret carbon capturing for sustainable future
3. Apply carbon sequestration as green house mitigation policy
4. Create own consultancies

Semester – III

SC (Env-522:- Climate Change and Global Environmental Issue)

(Theory Core Course with 04 credits)

1. Locate global environmental issues
2. Compare climatic change effects on natural environmental components
3. Correlate developmental priorities in India
4. Evaluate controversial issue s and its mitigations

Semester – IV

CC (Env-504:- Risk Assessment and Disaster Management)

(Theory Core Course with 04 credits)

1. Define the different types of disasters.
2. Describe risk assessment and disaster management process
3. Apply the knowledge for industrial disaster management
4. Plan for the disaster management.

CC (Env-505:- EIA & Environmental Auditing)

(Theory Core Course with 04 credits)

1. Define scope and objectives of EIA , nexus between development and environment, skip relation of EIA to sustainable development
2. Identify social, economical and environmental impact for human welfare

3. Evaluate EIA notification 2006 and amendments, public participation in EIA
4. Assess screening process in EIA, TOR, protocols for evaluation of impacts and impact analysis.
5. Explain environmental audits, hazardous waste audit and safety audit

CC (Env-523-A: - Advance Technologies and CDM)

(Theory Core Course with 04 credits)

1. Define the advanced technologies and CDM
2. summarizes nanotechnology for optimization of treatment plant
3. apply CDM mechanism as a strategy plan
4. create own consultancies

SC (Env-523-B: - Ground Water Engineering and Watershed Management)

(Theory Core Course with 04 credits)

1. Describe current status of ground water with respective environmental influence
2. Apply knowledge in wells hydraulic mechanisms
3. Analyze ground water quality
4. Create models of integrated water sheds & Apply GIS and Remote Sensing in watershed management

ANNEXURE- C									
CO-PO ATTAINEMENT									
ENVIRONMENTAL SCIENCE : HOMOGENEOUS MATRIX									
Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
ENV-001		1.6		1.6	1.6		1.6		
ENV-401	1.4	1.4	1.4		1.4	1.4	1.4		
ENV-402	0.6	0.6	0.6	0.6		0.6	0.6		
ENV-403	1.4	1.4		1.4					
ENV-421	1.4			1.4			1.4		1.4
ENV-100	1	1		1					
L-ENV-441	2.2	2.2	2.2	2.2	2.2			2.2	2.2
L-ENV-442	3	3	3		3	3	3		
L-ENV-443	1.4	1.4	1.4	1.4		1.4	1.4		
ENV-404	3	3		3					
ENV-405	2.2	2.2	2.2		2.2	2.2			
ENV-406	2.8	2.9	2.8	2.8				2.8	
ENV-422A	2.2	2.2	2.2		2.2		2.2	2.2	
ENV-445	3	3	3	3	3				3
ENV-446	2.2	2.2	2.2		2.2	2.2			
ENV-447	3	3	3	3				3	
ENV-448	2.2	2.2	2.2		2.2		2.2	2.2	
ENV-501	3	3		3	3		3		
ENV-502	3	3		3				3	
ENV-503	3	3		3				3	
ENV-521B.1	1.4		1.4	1.4	1.4				1.4
L-ENV-541	3	3		3	3		3		
L-env-542	3	3		3				3	
L-ENV-543	2.2		2.2	2.2	2.2				2.2
L-ENV-544	2.2		2.2	2.2	2.2				2.2
ENV-504	2.6	2.6	2.6		2.6		2.6	2.6	
ENV-505	3	3	3		3		3	3	

ENV-506	3	3	3		3		3	3	
ENV-523A	2.8	2.8	2.8						2.8
L-ENV-545	2.2	2.2	2.2		2.2		2.2	2.2	
L-ENV-546	3	3	3		3		3	3	
ENV-547 P & S				3	3	3		3	
	2.35	2.40	2.31	2.26	2.43	1.97	2.24	2.73	2.17