



DEPARTMENT OF CHEMICAL ENGINEERING

COURSE PLAN – PART I			
Name of the programme and specialization	M.Tech. I YEAR (II SEMESTER) CHEMICAL ENGINEERING		
Course Title	ECOLOGY FOR ENGINEERS		
Course Code	CL624	No. of Credits	3
Course Code of Pre-requisite subject(s)	NONE		
Session	January – 2021	Section (if, applicable)	Not Applicable
Name of Faculty	Dr. Jyoti Sahu	Department	Chemical Engineering
Official Email	jyoti@nitt.edu	Telephone No.	-
Name of Course Coordinator(s) (if, applicable)	NA		
Official E-mail	NA	Telephone No.	NA
Course Type (please tick appropriately)	Core course	✓ Elective course	
<b>Syllabus (approved in BoS)</b>			
<p><b>UNIT 1-</b> Ecosystem Concepts: Levels of biological organization; Native Species; Keystone Species; Population viability/ thresholds; Ecological resilience; Disturbances – Natural disturbances/ Human-induced disturbances; Connectivity/ fragmentation; Ecosystem management Concepts: Coarse and fine filter approach; Risk – inherent aspect of decision making; Adaptive management; Ecosystem based management (EBM); Protected area.</p> <p><b>UNIT 2-</b> Ecological principles: Protection of species and species sub-divisions to conserve gene diversity; Maintaining habitat – to conserve species; Large areas vs Small areas in accommodating species; Connections – nature and strength; Disturbances – influence on populations, communities and ecosystems; Influence of climate – terrestrial, freshwater and marine ecosystems</p> <p><b>UNIT 3-</b> Terrestrial Biomass: Biomass classification schemes – Holdredge scheme, Whittakes’s biome-type, Walter system; Equatorial, Tropical, Subtropical, Mediterranean, Warm temperate, Nemoral, Continental, Boreal and Polar; and Aquatic Biomes – Freshwater biomes, marine biomes – Marine habitat types – Hydrothermal vents, Cold seeps, Benthic Zone, Pelagic Zone, Abyssal, Hadal (ocean trench)</p> <p><b>UNIT 4-</b> Ecosystem services: Carbon Cycle – Estimation of Carbon Sources and distribution; Energy Cycle – Estimation of Energy Consumption and Balance of Energy associated with ecosystem. Sustaining biological resources for society's consumption – Moving from Water Problems to Water Solutions; Availability of resources; Access to resources; Theory of Change and Impact Pathways;</p> <p><b>UNIT 5-</b> Valuation of nature and ecosystem services: The general concepts of value; Total Economic Value; Instrumental/ Use Value – Direct Use Value, Indirect Use Value; Intrinsic or Non-use/ Passive Value – Existence Value, Bequest Value; Values in the concept of governance; Values in the concept of social -Ecological Systems.</p>			



**TEXT BOOKS:**

1. G. Tyler Miller, Jr, Scott E. Spoolman, Living in the Environment, International Student Edition, Seventeenth edition, Brooks/Cole, 2008.
2. Martin Beniston, Assessing the impact of climate change on mountain water resources, STOTEN 15559, 2013.
3. Balmansee, Sustainability of water resource systems in India: Role of value in Urban Lake Governance.
4. Allen, T.F.H., Bandurski B.L., King A.W. 1992, The ecosystem approach: theory and ecosystem integrity, International Joint Commission United States and Canada, Washington D.C. (USA).
5. Daly H.E., and Farley J., Ecological Economics: Principles and Applications, Island Press, 2004
6. Hanley, N., and Spash. Cost Benefit Analysis and the Environment. Edward Elgar, 1998.

**COURSE OBJECTIVES**

The course aims at giving substantial and functional knowledge on ecology, ecosystem services and provision of raw materials from biological systems to the industry in a society adapting towards sustainability.

**MAPPING OF COs with POs**

Course Outcomes	Programme Outcomes (PO) (Enter Numbers only)
CO1 describe fundamental ecological principles	PO1 to PO4, PO6
CO2 identify and describe the major biomes of the world	PO1, PO3, PO4
CO3 explain how the productivity of biological systems and ecosystem services affect and are affected by activities in society.	PO1 to PO4, PO6
CO4 explain how industry could be transformed to enable sustainable use of natural capital.	PO1, PO3, PO4, PO7, PO8, PO10
CO5 describe valuation of nature from different ethical perspectives.	PO1, PO2, PO4, PO9 to PO11

**COURSE PLAN – PART II**

**COURSE OVERVIEW**

The course aims to provide fundamental insights to substantial and functional knowledge on ecology, ecosystem services. The course majorly focusses on the provision of raw materials from biological systems to the industry in a society adapting towards sustainability.

**COURSE TEACHING AND LEARNING ACTIVITIES**

( Add more rows)

S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	WEEK 1	Ecosystem Concepts: Levels of biological organization; Native Species; Keystone Species; Population viability/ thresholds; Ecological resilience	ONLINE PRESENTATION SLIDES AND VIDEOS



2	WEEK 2	Disturbances – Natural disturbances/ Human-induced disturbances; Connectivity/ fragmentation	ONLINE PRESENTATION SLIDES AND VIDEOS
3	WEEK 3	Ecosystem management Concepts: Coarse and fine filter approach; Risk – inherent aspect of decision making; Adaptive management; Ecosystem based management (EBM); Protected area.	ONLINE PRESENTATION SLIDES AND VIDEOS
4	WEEK 4	Ecological principles: Protection of species and species sub-divisions to conserve gene diversity; Maintaining habitat – to conserve species; Large areas vs Small areas in accommodating species	ONLINE PRESENTATION SLIDES AND VIDEOS
5	WEEK 5	Connections – nature and strength; Disturbances – influence on populations, communities and ecosystems; Influence of climate – terrestrial, freshwater and marine ecosystems	ONLINE PRESENTATION SLIDES AND VIDEOS
6	WEEK 6	Terrestrial Biomass: Biomass classification schemes – Holdredge scheme, Whittakes's biome-type, Walter system; Equatorial, Tropical, Subtropical, Mediterrnaean, Warm temperate, Nemoral, Continental, Boreal and Polar	ONLINE PRESENTATION SLIDES AND VIDEOS
7	WEEK 7	Aquatic Biomes – Freshwater biomes, marine biomes – Marine habitat types – Hydrothermal vents, Cold seeps, Benthic Zone, Pelagic Zone, Abyssal, Hadal (ocean trench)	ONLINE PRESENTATION SLIDES AND VIDEOS
8	WEEK 8	Ecosystem services: Carbon Cycle – Estimation of Carbon Sources and distribution; Energy Cycle – Estimation of Energy Consumption and Balance of Energy associated with ecosystem.	ONLINE PRESENTATION SLIDES AND VIDEOS
9	WEEK 9	Sustaining biological resources for society's consumption – Moving from Water Problems to Water Solutions; Availability of resources; Access to	ONLINE PRESENTATION SLIDES AND VIDEOS



		resources; Theory of Change and Impact Pathways	
10	WEEK 10	Valuation of nature and ecosystem services: The general concepts of value	ONLINE PRESENTATION SLIDES AND VIDEOS
11	WEEK 11	Total Economic Value; Instrumental/ Use Value – Direct Use Value, Indirect Use Value; Intrinsic or Non-use/ Passive Value – Existence Value, Bequest Value	ONLINE PRESENTATION SLIDES AND VIDEOS
12	WEEK 12	Values in the concept of governance; Values in the concept of social - Ecological Systems.	ONLINE PRESENTATION SLIDES AND VIDEOS

**COURSE ASSESSMENT METHODS** (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Assignment-1	Week 2	-	10%
2	Seminar Presentation/Surprise Quiz	Week 3-4	40 min	10%
3	Online Classtest-1	Week 6	1 hr	20%
4	Assignment-2	Week 8	-	10%
5	Online Classtest-2	Week 10	1 hr	20%
CPA	Compensation Assessment*	Week 13	1 hr	20%
6	Final Assessment *	Week 15	2 hr	30%

**\*mandatory; refer to guidelines on page 4**

**COURSE EXIT SURVEY** (mention the ways in which the feedback about the course shall be assessed)

RATE THE COURSE OUT OF 5 –  
GRADE YOU OBTAINED -  
POINTS TO BE ADDED FOR THE IMPROVEMENT-

**COURSE POLICY** (including compensation assessment to be specified)

Student`s involvement during class; Compensation assessment; Academic honesty and plagiarism etc.

**ATTENDANCE POLICY** (A uniform attendance policy as specified below shall be followed)



- At least 75% attendance in each course is mandatory.
- A maximum of 10% shall be allowed under On Duty (OD) category.
- Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade.

**ACADEMIC DISHONESTY & PLAGIARISM**

- Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.
- The above policy against academic dishonesty shall be applicable for all the programmes.

**ADDITIONAL INFORMATION, IF ANY**

NA

**FOR APPROVAL**

Course Faculty

CC- Chairperson

HOD



**Guidelines**

- a) The number of assessments for any theory course shall range from 4 to 6.
- b) Every theory course shall have a final assessment on the entire syllabus with at least 30% weightage.
- c) One compensation assessment for absentees in assessments (other than final assessment) is mandatory. Only genuine cases of absence shall be considered.
- d) The passing minimum shall be as per the regulations.

B.Tech. Admitted in				P.G.
2018	2017	2016	2015	
35% or (Class average/2) whichever is greater.		(Peak/3) or (Class Average/2) whichever is lower		40%

- e) Attendance policy and the policy on academic dishonesty & plagiarism by students are uniform for all the courses.
- f) Absolute grading policy shall be incorporated if the number of students per course is less than 10.
- g) Necessary care shall be taken to ensure that the course plan is reasonable and is objective.