COURSE HANDOUT

ENVIRONMENT & SUSTAINABILITY (NCC-201)

Computer Science and Engineering

2nd SEMESTER

ACADEMIC YEAR (2023-24)

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Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Sessional	Final Exam	Total
NCC-201	Environment & Sustainability	NCC	0	2	0	0	-	-	Satisfactory/Not Satisfactory

COURSE OUTCOMES

At the end of the course the student will be able to:	
CO1	Describe the relationship between Humans, Environment and Sustainability.
CO2	Articulate different environmental risks and issues and potential interventions to tackle them
CO3	Appraise sustainable energy systems through case-studies and real-world examples.
CO4	Articulate Sustainable Infrastructure Development plan.
CO5	Appreciate global sustainability best practices in diverse domains

Unit-I

Introduction to Sustainability: Humanity and the Environment: What is Sustainability? The IPAT Equation, Human Consumption Patterns and the "Rebound" Effect, Challenges for Sustainability.

Climate and Global Change: Climate Processes; External and Internal Controls, Milankovitch Cycles and the Climate of the Quaternary, Modern Climate Change, Climate Projections.

(3 Hours)

Unit-II

Biosphere: Introduction, Biogeochemical Cycles and the Flow of Energy in the Earth System. Biodiversity, Species Loss, and Ecosystem Function. Soil and Sustainability.

Physical Resources: Water, Pollution, and Minerals. Water Cycle and Fresh Water Supply. Water Pollution. Mineral Resources: Formation, Mining, Environmental Impact.

(4 Hours)

Unit-III

Environmental and Resource Economics: Tragedy of the Commons. Environmental Valuation. Evaluating Projects and Policies. Solutions: Property Rights, Regulations, and Incentive Policies.

Modern Environmental Management: Systems of Waste Management. Case Study: Electronic Waste and Extended Producer Responsibility. Government and Laws on the Environment. Risk Assessment Methodology for Conventional and Alternative Sustainability Options.

(4 Hours)

Unit- lV

Sustainable Energy Systems: Environmental Challenges in Energy, Carbon Dioxide, Air, Water and Land Use. Energy Sources and Carriers. Electricity. Energy Uses. Applications of Phase Change Materials for Sustainable Energy. Problem-Solving, Metrics, and Tools for Sustainability.

(6 Hours)

Unit-V

Sustainable Infrastructure: The Sustainable City. Sustainability and Buildings. Sustainable Energy Practices: Climate Action Planning.

Sustainable Transportation: Accessibility, Mobility, and Derived Demand. Sustainable Stormwater Management.

(4 Hours)

Textbooks

S.No	Name of the Books	Name of the Author	Publisher Name	Edition (Pub.Yr.)
1	Sustainability: A Comprehensive Foundation	Tom Theis and Jonathan Tomkin	Open Textbook Library	1st (2015)
2	Energy, Environment, and Sustainability with MindTap	Saeed Moaveni	Cengage India Private Limited	1st (2012)
3	Improving the Sustainable Development Goals: Strategies and the Governance Challenge (Routledge Focus on Environment and Sustainability)	Lars Niklasson	Routledge	1st (2019)

Reference Books

S.No	Name of the Books	Name of the Author	Publisher Name	Edition (Pub.Yr.)
1	Global Challenges to CSR and Sustainable Development: Root Causes and Evidence from Case Studies (CSR, Sustainability, Ethics and Governance)	Stephen Vertigans, Samuel O. Idowu	Springer	1st (2021)

COURSE PLAN

S.No	Topics	Recommended Books
	Unit-I Introduction to Sustainability	
1	Introduction to Sustainability: Humanity and the Environment: What is Sustainability?	Book 1, Ch.1
2	The IPAT Equation, Human Consumption Patterns and the “Rebound” Effect, Challenges for Sustainability.	Book 1, Ch.2
3	Climate and Global Change: Climate Processes; External and Internal Controls, Milankovitch Cycles and the Climate of the Quaternary, Modern Climate Change, Climate Projections.	Book 1, Ch.2
	Unit-II Biosphere	
4	Biosphere: Introduction, Biogeochemical Cycles and the Flow of Energy in the Earth System.	Book 2, Ch.2
5	Biodiversity, Species Loss, and Ecosystem Function. Soil and Sustainability	Book 2, Ch.2
6	Physical Resources: Water, Pollution, and Minerals. Water Cycle and Fresh Water Supply. Water Pollution.	Book 2, Ch.2
7	Mineral Resources: Formation, Mining, Environmental Impact.	Book 2, Ch.2
	Unit-III Environmental and Resource Economics	
8	Environmental and Resource Economics: Tragedy of the Commons.	Book 2, Ch.3

	Environmental Valuation.	
9	Evaluating Projects and Policies. Solutions: Property Rights, Regulations, and Incentive Policies	Book 2, Ch.3
10	Modern Environmental Management: Systems of Waste Management. Case Study: Electronic Waste and Extended Producer Responsibility.	Book 2, Ch.3
11	Government and Laws on the Environment. Risk Assessment Methodology for Conventional and Alternative Sustainability Options	Book 2, Ch.3
Unit-IV Sustainable Energy Systems		
12	Sustainable Energy Systems: Environmental Challenges in Energy, Carbon Dioxide, Air, Water and Land Use.	Book 3, Ch.4
13	Energy Sources and Carriers. Electricity. Energy Uses.	Book 3, Ch.4
14	Applications of Phase Change Materials for Sustainable Energy. Problem-Solving, Metrics, and Tools for Sustainability.	Book 3, Ch.4
Unit-V Sustainable Infrastructure and sustainable transportation		
15	Sustainable Infrastructure: The Sustainable City. Sustainability and Buildings. Sustainable Energy Practices: Climate Action Planning.	Book 3, Ch.6
16	Sustainable Transportation: Accessibility, Mobility, and Derived Demand. Sustainable Stormwater Management.	Booker 3, Ch.6

ADDITIONAL WEB RESOURCES

1.	**NPTEL:** Video lectures on Introduction to Environmental Sustainability in Engineeering https://archive.nptel.ac.in/courses/127/105/127105018/

GRADING AND ASSESSMENT

- **Sessional Test**: S/NS
- **Assignment**: S/NS
- **Attendance**: S/NS

COURSE POLICIES

- **Attendance**: Minimum 75% attendance is mandatory to appear in the final examination of the course.
- **Academic Integrity**: MIET's academic integrity policies apply. Plagiarism will not be tolerated.
- **Late Submissions**: Assignments and projects must be submitted by the specified timelines.

FACULTY INFORMATION

- **Office Hours**

  Monday and Friday (12:05 PM - 12:55 PM)

- **Contact Information**
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