Birla Institute of Technology & Science, Pilani
Hyderabad Campus

FIRST SEMESTER 2022-2023

COURSE HANDOUT

Date: 29.08.2022

In addition to Part-I (General Handout for all courses appended to the timetable), this portion gives further specific details regarding the course.

Course No.	**: ECON F471**
Course Title	**: Resources and Environmental Economics**
Instructor-in-charge	**: Dr. Sudatta Banerjee**

1. Scope and Objective: This course examines economic perspectives on the allocation of natural resources and the management of environmental quality, with emphasis on the use of economic concepts in the design and evaluation of public policies. Environmental goods are not like normal goods. They need to be used sustainably. Since there are no proper markets to value environmental goods, they need different methods of valuation. The course deals with many of these valuation methods. The course examines how the natural environment is being degraded. So, analysis is done on the role of government in preserving the environment and the failure of government in this regard. National and international policies to preserve the environment are also considered. The course basically aims to create familiarity with environmental issues, make students aware of the importance of environmental preservation and the cost-benefit analysis attached to it, and enable them to take correct decisions in any business field, keeping in mind the concept of sustainable development.

2. Text Book:

i. **Charles D. Kolestad: Environmental Economics**

3. Reference Books:

i. **RN Bhattacharya: Environmental economics: An Indian perspective**

ii. **Pearce and Turner (1990): Economics of natural resources and the environment**

iii. **A. M. Freeman (1999): The measurement of environmental and resource values**

4. Course Plan:

Topic	No. of Lectures	Learning Objectives	Topics to be Covered	Chapter in the Text Book
1	1	What is environmental economics?	Environment economics and environment policy, economics, ecological economics, and resource economics	Chapter 1 (TB)
2	2	Relationship	The environment- economy interaction; The	Ch. 2 (Ref ii)

		between environment and economy	Circular Economy	+class notes
3	3-4	Economic valuation of environmental benefits and costs	Concept of total economic value; Preference-based valuations	Ch. 4 (ref i) Ch 14 (TB) Ch 3 (ref iii) +class notes
4	5-12	Indirect methods of valuation	Environmental quality as a factor input; Household production function; Travel cost method; Hedonic pricing	Ch 16, 17 (TB) Ch 4 (ref iii) +class notes
5	13-14	Direct methods of valuation	Contingent valuation method/ experimental markets	Ch. 10 (ref ii) Ch 18 (TB) Ch. 6 (ref iii) +class notes
6	15-16	Exhaustible Resources	The fundamental principle of exhaustible resource use; Optimal resource use; Resource prices and backstop technology; The effects of changing parameters; Monopoly and the rate of extraction	Ch. 18 (ref ii) +class notes
7	17-19	Renewable Resources	Growth curves; rate of exploitation; cost and revenues; preservation values	Ch. 16 (ref ii) +class notes
8	20-21	The extinction of species	The problem of extinction; Open access and species extinction; Profit maximization and extinction; Reasons for extinction	Ch. 17 (ref ii) +class notes
9	22-23	Development, Preservation, and Conservation	Conservation and Preservation; Development and the total economic value; Irreversibility and the Krutilla-Fisher algorithm; Safe minimum standards	Ch. 20 (ref ii) +class notes
10	24	A case study of wetlands	Social inefficiency in wetland resource use; Wetlands- concept, total economic value; Sources of inefficiency in wetland resource use; Methodologies for the measurement of wetland use inefficiency; Mechanisms for social cost internalization.	Ch. 21 (ref ii) +class notes
11	25-28	Social choice	Individual preferences regarding environmental protection, Social choice from individual values, examples	Ch. 3 (TB) +class notes
12	29-32	Efficiency and markets	What is efficiency? Efficiency and competitive markets, supply, demand, and efficiency	Ch. 4 (TB) +class notes
13	33-35	Demand for environmental goods	Environmental goods (public good), types, Willingness to pay and accept, revealed preference	Ch. 7 (TB) +class notes
14	36-37	Risk and Uncertainty	Environmental Risk; Making choices about risks; Regulating risk with liability; Liability versus direct regulation; Insurance	Ch. 12 (TB)
15	38-40	Development and Growth	Income and demand for environmental quality; Productivity growth and technological change; Green national accounting	Chapter 20 (TB)

5. Learning Outcomes:

Topic 1: What is Environmental Economics?
Environmental Economics is concerned with the impact of the economy on the environment, the significance of the environment to the economy, and the appropriate way of regulating economic activity so that balance is achieved among environmental, economic, and other social goals. We first discuss how environmental economics relates to environmental policy. We also discuss about how environmental economics meshes with the larger discipline of economics. We distinguish between environmental and ecological economics. We discuss the connection and difference between environmental and resource economics.

Topic 2: Relationship between environment and economy
This topic deals with the environment-economy relation in detail and discusses about circular economy. We also discuss the existence theorems of the natural environment.

Topic 3: Economic valuation of environmental benefits and costs
This topic deals with the concept of total economic valuation of environmental goods and services incorporating distinction between the standard-based objective valuation techniques and preference-based subjective valuation methods.

Topic 4: Indirect methods of valuation
In this topic, we learn a few methods which value on the basis of some indirect factors like travel costs, property prices, etc.

Topic 5: Direct methods of valuation
Here we construct markets that are used to generate the value of an environmental good. These markets are either hypothetical or experimental and these are discussed in this topic.

Topic 6: Exhaustible Resources
In the case of exhaustible resources, it will be depleted so long as the harvest rate is positive. In this topic, we learn to derive the optimal rate at which to deplete the resource.

Topic 7: Renewable Resources
The essential feature of renewable resources is that their stock is not fixed and can be increased or decreased. It will increase if the stock is allowed to regenerate. Nonetheless, there is a maximum stock- no renewable resource can regenerate to levels above the carrying capacity of the ecosystem in which it exists. This chapter investigates some of the theorems which have been derived with regard to the optimal use of renewable resources. We discuss growth curves, exploitation rates, costs, and revenues.

Topic 8: The extinction of species
The danger of species extinction applies to harvested resources. Also, any resource with a significant minimum critical size faces a real problem of extinction, particularly, if the resource is

subject to open access harvesting. This topic explains open access and extinction, and how profit maximization can be related to extinction.

Topic 9: Development, Preservation, and Conservation

A given habitat can either be developed or preserved in its natural state. Whereas in the case of conservation, the natural habitat is maintained but the resource itself is used for commercial purposes. We understand these issues in detail. We introduce the concept of total economic value in this context and understand the costs and benefits associated with the case. We learn why this analysis is important as development can lead to losing preservation benefits forever and thus discuss sustainability.

Topic 10: A case study of wetlands

In this topic, we use economic principles and methods to understand the issue of wetland ecosystem management. We understand the market and information failure in the case of wetland management.

Topic 11: Social Choice

Individuals in a society have widely differing opinions and views regarding the right amount of environmental protection. In this topic, we start with individual preferences and understand how social or group decisions can be made. The focus is on developing methods for helping to make specific societal decisions.

Topic 12: Efficiency and markets

Like normal production decisions, here also in the case of the environment, we discuss here how much pollution is to be produced. Clearly, some pollution is necessary. We here determine how much pollution is efficient. We understand efficiency in obtaining the right overall amount of pollution control and efficiency in allocating pollution control responsibility to specific polluters. We learn about efficiency and market equilibrium and also market failures leading to government intervention. We deal with some cost-benefit analysis to determine efficient outcomes.

Topic 13: Demand for environmental goods

In this topic, we discuss of environmental goods and their types and specifically willingness to pay and accept, with revealed preference.

Topic 14: Risk and Uncertainty

Governments first focus on environmental problems where the relationship between pollution sources and damage is clear and certain. As these large sources of pollution are cleaned up, attention is given to more difficult sources of pollution. These sources are in realms of risk and are characterized by accidental pollution. The goal is not to eliminate but to manage risks. The risks are harmful. A conceptually similar uncertainty relates to the benefits, the environment may provide and these may be threatened by development and pollution. In this topic, we try to understand risk from a conceptual perspective as well as understand the various means for reaching socially acceptable levels of risk. We discuss private markets like insurance, decentralized regulation, public provision of risk-reducing technologies, and conventional direct regulation of activities.

Topic 15: Development and Growth

In this topic, we shall examine how income affects the demand for environmental quality. Another objective will be properly accounting for environmental protection in our aggregate measures of economic performance, e.g., GNP.

6. Evaluation scheme:

Component	Duration (minutes)	Weightage (%)	Date and Time	Nature of Component
Mid-semester exam	90	35	31/10 11.00 - 12.30PM	CB
Quiz	20-30	10		OB
Assignments	-	15		OB
Comprehensive Examination	180	40	17/12 AN	CB

7. Consolation Hour: To be announced in the class

8. Notices: Notices, if any, would be put on CMS.

9. Make-up Policy: Make-up will be granted only on genuine grounds and if prior permission is taken.

10. Academic Honesty and Integrity Policy: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

Instructor-in-Charge
ECON F471