LECTURE SERIES IN ENVIRONMENTAL ECONOMICS

(Revised July 2020)
OBJECTIVES
Overall, the course seeks to demonstrate how economic techniques covered in the core courses in microeconomics, macroeconomics and quantitative methods are applied to environmental and natural resource policy and research, with special reference to Sub-Saharan Africa. It also seeks to explain the role of environmental economics in the development process in general, and in the integrated management of environmental resources in particular. The specific objectives of the course are to:

(a) Expose students to the theories and models of Environmental Economics;
(b) Enable students to understand and appreciate linkages between the environment and economics;
(c) Help students apply the environmental models to practical situations with specific reference to Sub-Saharan Africa;
(d) Acquaint students with the dynamics of global environment and the implications for development in Sub-Saharan Africa.

PREREQUISITES
The pre-requisites for this elective are the core courses. Students should note that topics covered in the core courses that are of particular importance to environmental economics include:

Microeconomics: Choice under uncertainty; Inter-temporal choice; Game theory; Welfare economics, Market failure including Externalities, Public Goods and Information Asymmetry.

Macroeconomics: National Income Accounting, Growth theory, Stabilization policy.

Quantitative Methods: Difference and differential equations, Dynamic optimization.

COURSE ASSESSMENT
The final course mark in each part will comprise of the following: Continuous assessment 40%; final examination 60%.

<table>
<thead>
<tr>
<th>Assessment Type</th>
<th>Marks</th>
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<tbody>
<tr>
<td>Group Work/Class Presentations (by students)</td>
<td>10 marks</td>
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<tr>
<td>Class Test</td>
<td>15 marks</td>
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<tr>
<td>Term paper/Literature Review</td>
<td>15 marks</td>
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<tr>
<td>Final examination</td>
<td>60 marks</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>100 marks</strong></td>
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COURSE OUTLINE AND READING LIST
The reading material comprises core text books, supplementary texts, journal articles and other general readings. These are selected to meet the international standards required at the master’s level, and give the student a chance to understand the concepts involved and how they may be applied. The general reading list is intended to provide a resource for students including alternative perspectives to the arguments in the main texts.
SEMESTER I: ENVIRONMENTAL ECONOMICS I

LECTURE 1: BASIC ISSUES IN ENVIRONMENTAL ECONOMICS (15 Hours)

1.1. Nature and Evolution of Environmental Economics

1.1.1. Definition and classification of environmental and natural resources

1.1.2. Evolution of environmental economics

1.1.3. Paradigms and basic concepts related to the interaction between environmental processes and economic management.

1.1.4. Efficiency, Optimality, Sustainability. Ethics, and Discounting

1.2. Economic Development and the Environment

1.2.1 Sustainable Development: Definitions, Basic Concepts and Operationalization; Weak Sustainability

1.2.2. Factors responsible for Environmental Degradation: Economic activities, Institutional failures (Markets, Government and public policy), the IPAT Identity (population, economic growth and poverty, technology)

1.2.3. IPAT Identity and Determinants of Environmental Degradation: Demographic transition, Environmental Kuznets’ Curves, Empirical evidences and trends.

1.2.4. Green Growth

Required Readings


Supplementary


LECTURE 2: WELFARE ECONOMICS, MARKET FAILURE AND THE ENVIRONMENT (18 Hours)

2.1. Review of welfare economics and market outcomes

2.2. Public goods

2.2.1 Definition and characteristics of public goods and its distinction from private goods
2.2.2 Efficient Provision of Public Goods
2.2.3 Problems of managing the commons
2.2.4 Focus: Management of Common Property in Africa

2.3. Environmental Externalities

2.3.1 Definition and Classification of externalities
2.3.2 Externalities and Resource Allocation
2.3.3 Solutions toExternality Problems

2.4. The second-best problem, Imperfect information, and Government failure
2.4.1 The Second-best Problem
2.4.2 The Role of Imperfect Information
2.4.3 Government failure

Required Readings

Supplementary


**LECTURE 3: THE ECONOMICS OF NATURAL RESOURCE EXTRACTION AND MANAGEMENT**

(27 Hours)

3.1. Optimal Extraction of Non-Renewable Resources: The Basic Model

3.1.1 Categorization of nonrenewable resources

3.1.2 Optimal extraction of non-renewable resources with constant extraction costs

3.1.3 Dynamic efficiency, intertemporal fairness, and Hartwick rule

3.1.4. The Empirical Evidence

3.2. Optimal Extraction of Non-Renewable Resources: Extensions to the Basic Model

3.2.1. The N-period constant-cost case

3.2.2. Some comparative statics: Effect of changes in discount rate, demand, available resource stock, uncertainty.

3.2.3 Transition to a substitute

3.2.4. Optimal extraction in the case of variable (rising) marginal cost

3.2.5. The Effect of Recycling

3.2.6 Market Allocations of depletable resources: property rights, environmental cost.

3.3. Optimal Extraction of Non-Renewable Resources: Application to Sub-Saharan Africa

3.4. Optimal Extraction of Renewable Resources: The Basic Model

3.4.1 Introduction: Natural growth, regeneration and cyclical resources

3.4.2 Biological growth processes

3.4.3 Steady-state harvesting, Maximum Sustainable Yield, and Efficiency

3.4.4. Equilibria in the Renewable Resource harvesting Model
3.5. Renewable Resources: Optimal Harvesting under different Property right Regimes
   3.5.1. Open-access Harvesting Model
   3.5.2. The Private-property Model
   3.5.3. Socially-Efficient Resource Harvesting
   3.5.4. Safe Minimum Standard (SMS) of Conservation
   3.5.5. Some Empirical Evidence

3.5 Optimal Extraction of Renewable Resources: Application to Sub-Saharan Africa

Required Readings


Supplementary


**SEMESTER II: ENVIRONMENTAL ECONOMICS II**

**LECTURE 4: ENVIRONMENTAL POLICY INSTRUMENTS**

(15 Hours)

4.1. Framing the Environmental Problem: Pollution

4.1.1. What level of pollution is desirable?

4.1.2. Categories of Pollutants and the efficient level of pollution

4.1.3. The Efficient Allocation of Pollution: Fund Pollutants

4.1.4. The Efficient Allocation of Pollution: Stock Pollutants

4.2. Policy Instruments

4.2.1. Command-and Control Instruments: Regulation of technology, regulation of performance

4.2.2. Economic Instruments: Price-based instruments, Property rights-based instruments, Legal, voluntary and information-based instruments.

4.2.3. Direct provision of public goods.

4.3 Selection and Evaluation of Policy Instruments

4.3.1 Choosing an effective environmental policy package to address a target environmental problem: Understanding the nature and extent of the problem and determining baseline conditions; Making Policy Choices

4.3.2 Evaluation of Environmental Policies: Evaluation criteria, Cost-effectiveness, cost-effective policies for uniformly-mixed and non-uniformly mixed fund pollutants, Applications to overharvesting of renewable resources
4.4 Applications to Africa

Required readings:


UNEP (2009): The Use of Economic Instruments for Environmental and Natural Resource Management First Edition

Supplementary


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LECTURE 5: ENVIRONMENTAL VALUATION AND ANALYSIS  (18 Hours)

5.1  Value and Welfare
5.1.1 The concept of total economic value: use and non-use values.
5.1.2 Welfare economics as the basis for valuation: Consumer and producer surplus; compensating and equivalent variation; willingness to accept/pay

5.2 Environmental Valuation Techniques and Analysis
5.2.1 Revealed Preference Methods: Hedonic Pricing, Travel Cost, Production Function-Based Techniques
5.2.2 Stated Preference Methods: Contingent Valuation, Choice Experiments

5.3 Environmental Cost- Benefit Analysis

5.4 Environmental Impact Assessment: An introduction

Required readings:


Freeman A.M., Joseph A. Herriges and Catherine L. Kling (2014). The measurement of environmental and resource values, Washington DC, RFF.


Supplementary


LECTURE 6: ENVIRONMENTAL ACCOUNTING (12 Hours)

6.1 Environmental Accounting: Theory
   6.1.1 Resource use in a competitive world
   6.1.2 Consumption, income and wealth
   6.1.3 Measuring national income

6.2 Environmental Accounting: Practices
   6.2.1 Information on the environment: Elaboration of environmental information systems; Accounting frameworks: the satellite accounts and the modified national income accounts
   6.2.2 The environment in the system of national accounts: Non-renewable resources; renewable resources; environmental capital

6.3 Applications of Green National Accounts in Africa

Required readings:


**Supplementary**


**LECTURE 7: INTERNATIONAL ENVIRONMENTAL MANAGEMENT**  (15 Hours)

7.1 International Environmental Externalities

7.2 Economics of Climate Change

7.3 World trade and the environment

7.4 International Environmental Conventions

7.5 Applications to Africa

**Required readings:**


World Bank (2010), Economics of Adaptation to Climate Change, Washington, DC.

Supplementary


