

SEE3002: ENERGY AND ENVIRONMENTAL ECONOMICS

Effective Term

Semester A 2024/25

Part I Course Overview

Course Title

Energy and Environmental Economics

Subject Code

SEE - School of Energy and Environment

Course Number

3002

Academic Unit

School of Energy and Environment (E2)

College/School

School of Energy and Environment (E2)

Course Duration

One Semester

Credit Units

3

Level

B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

Nil

Precursors

Nil

Equivalent Courses

Nil

Exclusive Courses

Nil

Part II Course Details

Abstract

This course aims to initiate students into the fields of energy and environmental economics and the economics of collectively shared resources. Students will become conversant with the language and methods of energy and environmental economics and be able to create applications of these methods to real-world problems. They will learn and use terminology such as externalities, public goods, common property resources, marginal cost pricing, cost-benefit analysis, and many other terms and the practical applications of these concepts. They will understand the economic principles and practices behind the use of market instruments to conserve energy resources and to discover the price of, and control environmental impacts, including taxation, feed-in tariffs, and other features of current and future economics-based methodologies, analyses, laws, standards, and regulations, and they will be able to innovate solutions to environmental problems by applying these principles.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if DEC-A1 DEC-A2 DEC-A3 app.)			
1	Define and identify externalities associated with various types of market transactions and describe and explain ways of discovering their shadow prices or values and internalizing them	15	x		
2	Define and identify examples of public goods, common property resources, and other types of collectively shared resources and describe market failure modes associated with each and means of remedying them	15	x		
3	Design ways of charging for and paying for energy and natural resources such that their use will be economically optimal and sustainable and will also produce adequate returns on investment for their providers	15		x	x
4	Describe and apply innovative techniques of non-market valuation to estimate the demand for environmental quality or the cost of environmental degradation	10	x	x	
5	Design and critically evaluate from an economic perspective public policies associated with energy and the environment	10		x	x
6	Apply and critically evaluate cost-benefit analyses of energy and environmental policies and projects	10		x	
7	Analyse and evaluate energy projects using internal rate of return on investment, net present value, and payback period methodologies	10	x		
8	Understand and be able to join intelligently in debates as an aid in the discovery of innovative applications of economics to energy and the environment	15	x	x	

A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Learning and Teaching Activities (LTAs)

	LTAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Classroom lectures	Learning in the presence of the teacher	1, 2, 3, 4, 5, 6, 7, 8	
2	Videos and other visual aids	Slide and videos are used to support the course content.	1, 2, 3, 4, 5, 6, 7, 8	
3	In-class student debates	Students will engage in debates (in groups of 4-6) surrounding topics in energy and environmental economics provided by the teacher. Students will gather information in advance and will present their work before the debate commences.	1, 2, 3, 4, 5, 6, 7, 8	
4	Group projects for class presentation	Students will work on projects in small groups (4-6 people) and will be expected to apply the concepts and methodologies learned during the course to address economic issues related to energy and the environment. Deliverables will be in the form of course papers.	1, 2, 3, 4, 5, 6, 7, 8	
5	Homework problems for discussion and solution	Homework and problems are used to apply the content of the course and to train the students.	1, 2, 3, 4, 5, 6, 7, 8	
6	Final examinations	Students should also learn from the exercises and the questions they have to do during the exam.	1, 2, 3, 4, 5, 6, 7, 8	

Assessment Tasks / Activities (ATs)

ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Homework problems	1, 2, 3, 4, 5, 6, 7, 8	20
2	Student projects (written reports in small group of 4-5 students)	1, 2, 3, 4, 5, 6, 7, 8	20
3	In-class debates	1, 2, 3, 4, 5, 6, 7, 8	20

Continuous Assessment (%)

60

Examination (%)

40

Examination Duration (Hours)

2

Additional Information for ATs

Examination duration: 2 hrs

Percentage of continuous assessment, examination, etc.: 60% by continuous assessment; 40% by exam

To pass a course, a student must do ALL of the following:

- 1) obtain at least 30% of the total marks allocated towards continuous assessment (combination of assignments, pop quizzes, term paper, lab reports and/ or quiz, if applicable);
- 2) obtain at least 30% of the total marks allocated towards final examination (if applicable); and
- 3) meet the criteria listed in the section on Assessment Rubrics.

Assessment Rubrics (AR)**Assessment Task**

1. Homework

Criterion

Ability to analyse and solve problems related to energy and environmental economics.

Excellent (A+, A, A-)

Demonstrates superior creativity, originality, or understanding in approach, content, or presentation to analyse and solve problems related to energy and environmental economics.

Good (B+, B, B-)

Demonstrates creativity, originality, or understanding beyond basic expectations to analyse and solve problems related to energy and environmental economics.

Fair (C+, C, C-)

Meets basic expectations for presentation, approach and content to analyse and solve problems related to energy and environmental economics.

Marginal (D)

Below average in presentation, approach, understanding or content to analyse and solve problems related to energy and environmental economics.

Failure (F)

Not even reaching marginal levels of skills to analyse and solve problems related to energy and environmental economics.

Assessment Task

2. In-class debates

Criterion

Ability to analyse and solve problems related to energy and environmental economics.

Excellent (A+, A, A-)

Demonstrates superior creativity, originality, or understanding in approach, content, or presentation to analyse and solve problems related to energy and environmental economics.

Good (B+, B, B-)

Demonstrates creativity, originality, or understanding beyond basic expectations to analyse and solve problems related to energy and environmental economics.

Fair (C+, C, C-)

Meets basic expectations for presentation, approach and content to analyse and solve problems related to energy and environmental economics.

Marginal (D)

Below average in presentation, approach, understanding or content to analyse and solve problems related to energy and environmental economics.

Failure (F)

Not even reaching marginal levels of skills to analyse and solve problems related to energy and environmental economics.

Assessment Task

3. Student projects

Criterion

Ability to analyse and solve problems related to energy and environmental economics.

Excellent (A+, A, A-)

Demonstrates superior creativity, originality, or understanding in approach, content, or presentation to analyse and solve problems related to energy and environmental economics.

Good (B+, B, B-)

Demonstrates creativity, originality, or understanding beyond basic expectations to analyse and solve problems related to energy and environmental economics.

Fair (C+, C, C-)

Meets basic expectations for presentation, approach and content to analyse and solve problems related to energy and environmental economics.

Marginal (D)

Below average in presentation, approach, understanding or content to analyse and solve problems related to energy and environmental economics.

Failure (F)

Not even reaching marginal levels of skills to analyse and solve problems related to energy and environmental economics.

Assessment Task

4. Examination

Criterion

Ability to analyse and solve problems related to energy and environmental economics.

Excellent (A+, A, A-)

Demonstrates superior creativity, originality, or understanding in approach, content, or presentation to analyse and solve problems related to energy and environmental economics.

Good (B+, B, B-)

Demonstrates creativity, originality, or understanding beyond basic expectations to analyse and solve problems related to energy and environmental economics.

Fair (C+, C, C-)

Meets basic expectations for presentation, approach and content to analyse and solve problems related to energy and environmental economics.

Marginal (D)

Below average in presentation, approach, understanding or content to analyse and solve problems related to energy and environmental economics.

Failure (F)

Not even reaching marginal levels of skills to analyse and solve problems related to energy and environmental economics.

Additional Information for AR

For in-class debate: evaluated based on contents (e.g., clearly states purpose or motivation for study; methods and findings clearly stated, consistent with results; mentions limitations or future research directions), presentation style (e.g., good poise, effective interactions with viewers; organized explanations; can communicate with general audience), response to questions and comments (e.g., confident and effective response to questions).

For student projects: evaluated based on scientific merit and writing.

Part III Other Information**Keyword Syllabus**

- a. Introduction to economics; introduction to microeconomics (3 Lectures). Keywords: invisible hand, incentives, marginality, supply/demand curves, market equilibrium, optimum
- b. Externalities, market failure, Pigovian fees, and the efficient level of pollution (2 Lectures). Keywords: externalities, internalizing externalities, market failure, polluter pays principle, Coase theorem, taxes
- c. Public goods, private goods, rival goods, excludable goods, and common property resources (2 Lectures). Keywords: rival and excludable goods, public and private goods, common property resources, tragedy of the commons
- d. Cost-benefit analysis; project evaluation (1 Lecture). Keywords: cost-benefit ratio, present value, private/social discount rate, payback period
- e. Energy economics (2 Lectures). Keywords: marginal cost / average cost pricing, time of day pricing, congestion pricing, baseload / peak load, feed-in tariff

Reading List**Compulsory Readings**

Title	
1	Jonathan M. Harris and Brian Roach, Environmental and Natural Resource Economics: A Contemporary Approach, Fifth Edition, Routledge (2022).

2	Perman R., Ma Y. and McGillvray J. : Natural Resources and Environmental Economics, Pearson Education Fourth Edition, 2012.
3	Tom Tietenberg and Lynne Lewis, Environmental and Natural Resource Economics, 12th Edition, Routledge (2024).

Additional Readings

	Title
1	Varian H. : Intermediate Microeconomics, W.W. Norton 10th ed., 2024.
2	Stephen Smith, Environmental Economics: A Very Short Introduction, Oxford University Press (2011).
3	Robert Falkner, ed., The Handbook of Global Climate and Environmental Policy, Wiley-Blackwell (2016).
4	Christine Greenhalgh and Mark Rogers, Innovation, Intellectual Property, and Economic Growth, Princeton University Press (2010).
5	J.D. Angrist and J.S. Pischke, Mastering 'Metrics: The Path from Cause to Effect, Princeton University Press, 2015(MM).