



# ECONOMICS AND SUSTAINABILITY

## Module Handbook / Course Outline

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The following module handbook is based on *SOEE 2610: Economics and Sustainability*, a second year module/course offered in the School of Earth and Environment at the University of Leeds. The module is designed as a one-semester (eleven week) introduction to ecological and environmental economics for students with little or no prior exposure to economics.

The module uses *Ecological Economics*, by Herman Daly and Joshua Farley, as the primary text, but also incorporates a significant amount of material on steady-state economics from *Enough Is Enough*, by Rob Dietz and Dan O'Neill. The module was developed by Dan O'Neill, Olivia Rendon, Katy Roelich, and Marco Sakai at the University of Leeds.

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## 1. Overview

### Summary

Every economic activity has environmental impacts, and yet achieving continual growth in the economy is a goal of nearly every nation in the world. This module provides both a macro and micro perspective on the relationship between the economy and environmental impacts, questioning the compatibility between economic growth and sustainability.

Students will discover some of the basic concepts that underlie current economic theory, as well as the main ideas in ecological and environmental economics. Specific topics covered include:

1. Key concepts such as the relationship between the economy and the environment, the five types of capital, weak and strong sustainability, and the laws of thermodynamics
2. Microeconomic concepts including the basic market equation, supply and demand, market failure, discounting, the valuation of ecosystem services, and human behaviour
3. Macroeconomic concepts including economic and biophysical accounting, the nature of money, distribution, and limits to growth
4. Alternative models to conventional economics including degrowth and steady-state economics

### Objectives

Ecological economics is a trans-disciplinary field that focuses on the relationship between the human enterprise and the biosphere. It seeks to overcome the conceptual and professional divide that has traditionally existed between economists and natural scientists to achieve a more coherent and pluralistic approach to the sustainability challenges faced by society.

The main objective of the module is to give students a good understanding of the basic concepts and terminology of economics, and to inspire students to think differently about our economy and the field of economics. The module is designed around principles of active learning. A high level of student preparation and engagement is expected.

### Learning Outcomes

On completion of the module, students should:

- Understand the key concepts that underpin current economic thinking, as well as alternative models
- Appreciate the relationship between economic activity and environmental impacts
- Understand how markets work, and where they fail
- Be familiar with economic policy tools that may be used to address environmental and social problems
- Have become critical consumers of current economic theories and pathways

## 2. Organisation and Timetable

The module includes eleven lectures, which introduce the main material, and six tutorials, which explore specific topics in more depth.

Week	Item	Topic
<b>Introductory Ideas</b>		
1	Lecture 1	What is economics?
2	Lecture 2	Fundamental vision and key concepts
"	<i>Tutorial I</i>	<i>Economics and sustainability</i>
<b>Microeconomics</b>		
3	Lecture 3	Markets and supply and demand
4	Lecture 4	Market failures and discounting
"	<i>Tutorial II</i>	<i>Markets</i>
5	Lecture 5	Valuing the environment
6	Lecture 6	Human behaviour
"	<i>Tutorial III</i>	<i>Debate on valuation</i>
<b>Macroeconomics</b>		
7	Lecture 7	Economic and biophysical accounting
8	Lecture 8	Economic growth and alternatives
"	<i>Tutorial IV</i>	<i>Macroeconomics of growth</i>
9	Lecture 9	Money and distribution
"	<i>Tutorial V</i>	<i>Money as debt</i>
10	Lecture 10	Environmental policy design
"	<i>Tutorial VI</i>	<i>Stakeholder review of policy proposals</i>
<b>Conclusion</b>		
11	Lecture 11	Review and future outlook

### 3. Assessment

Student performance is primarily assessed with two essay assignments. The first essay relates to a microeconomic issue, while the second essay relates to a macroeconomic issue.

**Assignment 1** (1000 words, 40%): Critical Essay on Monetary Valuation.

*Discuss the case for and against the monetary valuation of ecosystem goods and services. In your opinion, is putting a price on nature helpful or harmful? Defend your position.*

The assignment involves producing a critical essay on an important debate in ecological/environmental economics. The assignment tests your ability to summarise the main arguments on both sides of the debate, to critically evaluate the literature related to this debate, and to make a convincing argument based on the evidence presented.

To help you with this assignment you will be taking part in a group debate on monetary valuation in Tutorial III. The debate will consider two motions:

1. It is possible to put a monetary value on all important ecosystem services. (i.e. we *can* value the environment)
2. Despite all the difficulties, putting a monetary value on the environment makes for better decisions (i.e. we *should* value the environment)

**Assignment 2** (1500 words, 50%): Analysis of a Policy for a Steady-State Economy.

Your assignment is to critically analyse one of the specific proposals that have been put forward for how to achieve a steady-state economy. You may choose from one of the following seven proposals:

1. Direct limits on resource use
2. Policies to stabilise population
3. Policies to reduce inequality
4. Full-reserve banking
5. New indicators of progress
6. Working-time reduction
7. New business models that generate shared value

In your analysis you are asked to reflect on the following four questions:

- What are the details of the proposal?
- Why is this proposal needed to achieve a steady-state economy?
- What obstacles are there to implementing the proposal?
- Are there any examples where this proposal has been put into practice? (If no examples exist, then what are the closest examples that you can find?)

To help you with this assignment, you will be conducting a stakeholder review of the policy proposals in Tutorial VI.

The remaining 10% of the final grade is assessed based on group exercises completed in the tutorials. Each exercise is worth 2%, and your mark is based on the best five out of six.

## 4. Textbooks

The module has two main textbooks, which contain the majority of the required readings:

- Daly, H.E., Farley, J., 2011. *Ecological Economics: Principles and Applications, 2nd ed.* Island Press, Washington, DC.
- Dietz, R., O'Neill, D.W., 2013. *Enough Is Enough: Building a Sustainable Economy in a World of Finite Resources.* Berrett-Koehler (San Francisco) and Routledge (London).

The following texts provide additional reference material:

- Cato, M.S., 2011. *Environment and Economy.* Routledge, London.
- Common, M., Stagl, S., 2005. *Ecological Economics: An Introduction.* Cambridge University Press, Cambridge, UK.
- Daly, H.E., Townsend, K.N. (Eds.), 1993. *Valuing the Earth: Economics, Ecology, Ethics.* MIT Press, Cambridge, Massachusetts.
- Goodwin, N., Nelson, J.A., Harris, J., 2009. *Macroeconomics: In Context.* M.E. Sharpe, Armonk, New York.
- Hanley, N., Shogren, J.F., White, B., 2001. *Introduction to Environmental Economics.* Oxford University Press, Oxford, UK.

In addition to the above textbooks, there are many other excellent sources that deal with the topics covered in this module. Consult the list of suggested readings in Daly and Farley (pp. 495-498). The following journals, which are available online from most university libraries, also contain many articles that are directly relevant to this module:

- *Ecological Economics*
- *Journal of Environmental Economics and Management*
- *Solutions* (<http://www.thesolutionsjournal.com>)

## 5. Topics and Readings

Each week there are required readings (generally two textbook chapters for lectures, and 1-2 journal articles for tutorials). These readings should be done *in advance* of the lectures and tutorials, as students are expected to participate in discussions of the readings.

### Introductory Ideas

#### *Lecture 1: What Is Economics?*

Topics:

- Module structure
- What is economics?
- Microeconomics vs. macroeconomics
- Schools of thought (neoclassical, environmental, ecological, green)
- Pareto efficient allocation
- What is sustainability?
- The five types of capital
- Weak vs. strong sustainability

Required Reading:

- Daly and Farley, Ch. 1: Why Study Economics?

#### *Lecture 2: Key Concepts and the Fundamental Vision*

Topics:

- Opportunity cost
- Marginal utility and marginal cost
- Open, closed, and isolated systems
- Circular flow diagram
- The economy as a subsystem of the environment
- Optimal scale and uneconomic growth
- Full world vs. empty world
- The laws of thermodynamics
- Stocks and flows; funds and services

Required Reading:

- Daly and Farley, Ch. 2: The Fundamental Vision; Ch. 4: The Nature of Resources and the Resources of Nature

## ***Tutorial I: Economics and Sustainability***

### Required Reading:

- Ehrlich, P.R., Ehrlich, A.H., Holdren, J.P., 1993 [1977]. Availability, Entropy, and the Laws of Thermodynamics, Chapter 2 in H. E. Daly and K. N. Townsend (Eds.) *Valuing the Earth: Economics, Ecology, Ethics*, MIT Press, Cambridge, Massachusetts, pp. 69-73.
- Boulding, K., 1993 [1966]. The economics of the coming spaceship Earth, Chapter 16 in H. E. Daly and K. E. Townsend (Eds.) *Valuing the Earth: Economics, Ecology, Ethics*, MIT Press, Cambridge, Massachusetts, pp. 297-309.

## **Microeconomics**

### ***Lecture 3: Markets and Supply and Demand***

#### Topics:

- Competitive markets
- Key principles
  - a. Law of diminishing marginal utility
  - b. Law of diminishing marginal physical product
  - c. Equimarginal principle of maximisation
- The basic market equation
- Marginal cost and marginal revenue
- Non-price adjustments
- Shifting vs. moving supply and demand curves
- Shortage, surplus, and equilibrium
- Elasticity of demand and supply
- Production functions
- Complementarity and substitutability
- Utility functions

#### Required Reading:

- Daly and Farley, Ch. 8: The Basic Market Equation; Ch. 9: Supply and Demand

### ***Lecture 4: Market Failures and Discounting***

#### Topics:

- Characteristics of market goods
  - Excludability
  - Rivalness
- Market failures
  - Imperfect competition (i.e. monopolies)
  - Imperfect information
  - Open access regimes (e.g. Tragedy of the Commons)
  - Excludable and nonrival goods (e.g. information)

- Pure public goods
  - Free rider effect
- Externalities
  - Coase theorem
  - Transaction costs
  - Cost-benefit analysis
- Discounting and net present value
- Social discount rate

Required Reading:

- Daly and Farley, Ch. 10: Market Failures; Ch. 16: Distribution (but only pp. 315-320)

### ***Tutorial II: Markets***

Required Reading:

- Cherfas, J., 1986. What price whales? *New Scientist* 110 (1511), 36-40.

### ***Lecture 5: Valuing the Environment***

Topics:

- The concept of value
- Types of value (use value, existence value, option value)
- Willingness to pay and willingness to accept
- Economic valuation techniques
  - Conventional market approaches (e.g. replacement cost)
  - Stated preference methods (e.g. contingent valuation)
  - Revealed preference methods (e.g. hedonic pricing, travel cost)
  - Production-function approaches
- Valuing ecosystem services
- Payments for ecosystem services
- Arguments for and against monetary valuation

Required Reading:

- Hanley et al., Ch. 3: Valuing the Environment and Natural Resources

### ***Lecture 6: Human Behaviour***

Topics:

- Consumption and well-being
  - Easterlin paradox
  - Paralysis of choice
  - Sources of happiness
- Rationality

- Self-interest
- Empirical evidence (Game theory)
  - Dictator game
  - Ultimatum game
  - Prisoner's dilemma
  - Common-pool and public-good game
- Extrinsic and intrinsic incentives
- Altruistic punishment
- Cooperation vs. competition

Required Reading:

- Daly and Farley, Ch. 13: Human Behaviour and Economics

### ***Tutorial III: Debate on Valuation***

Required Reading:

- Costanza, R., d'Arge, R., de Groot, R., Farber, S., Grasso, M., Hannon, B., Limburg, K., Naeem, S., O'Neill, R.V., Paruelo, J., Raskin, R. G., Sutton, P., van den Belt, M., 1997. The value of the world's ecosystem services and natural capital. *Nature* 387, 253-260.
- Vatn, A., Bromley, D.W., 1994. Choices without prices without apologies. *Journal of Environmental Economics and Management* 26 (2), 129-148.

## **Macroeconomics**

### ***Lecture 7: Economic and Biophysical Accounting***

Topics:

- Intro to macroeconomics
- The idea of progress
- Indicators
- Calculating GNP/GDP
  - Product approach, spending approach, income approach
  - Nominal vs. real GDP
  - Inflation
- Critique of GNP/GDP as a measure of welfare
- Alternatives measures of economic welfare
  - ISEW, GPI
  - Subjective well-being
- Biophysical indicators
  - Ecological footprint

Required Reading:

- Daly and Farley, Ch. 14: Macroeconomic Concepts: GNP and Welfare

### ***Lecture 8: Economic Growth and Alternatives***

#### Topics:

- What is economic growth?
- The argument for growth
  - Environmental Kuznets curve hypothesis
- The argument against growth
  - Biophysical limits to growth
  - Social desirability of growth
- Rebound effect
- Alternatives to growth
  - Degrowth
  - Steady-state economy
- Policy reforms for a steady-state economy

#### Required Reading:

- Dietz and O'Neill, Chs. 1-4

### ***Tutorial IV: Macroeconomics of Growth***

#### Required Reading:

- Cobb, C., Halstead, T., Rowe, J., 1995. If the GDP is up, why is America down? *Atlantic Monthly*, October, 59-78. <http://www.theatlantic.com/past/politics/ecbig/gdp.htm>
- Daly, H.E., 2008. A steady-state economy. Opinion Piece for Redefining Prosperity, Sustainable Development Commission, UK. <http://www.sd-commission.org.uk/publications.php?id=775>

### ***Lecture 9: Money and Distribution***

#### Topics:

- What is money?
- Use value and exchange value
- Seigniorage
- Fractional reserve banking
- Money as a public good
- Money and thermodynamics
- Distribution of income and wealth
- Measuring distribution (Gini coefficient)
- Consequences of inequality

#### Required Reading:

- Daly and Farley, Ch. 15: Money; Ch. 16: Distribution (but only pp. 301-314)

### ***Tutorial VI: Money As Debt***

Required Preparation:

- Watch the six Banking 101 videos on the Positive Money website:  
<http://positivemoney.org/how-banks-create-money/banking-101-video-course/>
- Read Ch. 15 (Equality and Sustainability) of Wilkinson, R., Pickett, K., 2009. *The Spirit Level: Why More Equal Societies Almost Always Do Better*. Allen Lane, London.

### ***Lecture 10: Environmental Policy Design***

Topics:

- Policy design principles
  - Adaptive management; principle of subsidiarity
- Price vs. quantity as the policy variable
- Sources vs. sinks
- Property rights
- Direct regulation
  - Command-and-control regulations (e.g. bans and emission limits)
- Pigouvian taxes and subsidies
- Abatement costs
- Ecological tax reform
- Cap and trade (quotas); cap and share

Required Reading:

- Daly and Farley, Ch. 21: General Policy Design Principles; Ch. 22: Sustainable Scale

### ***Tutorial VI: Stakeholder Review of Policies for a Steady-State Economy***

Required Reading:

- Dietz and O'Neill, Chs. 5-11

## **Conclusion**

### ***Lecture 11: Review and Future Outlook***

Topics:

- Review of main topics covered in the module
- Future outlook for a sustainable economy

Required Reading:

- Dietz and O'Neill, Chs. 12-15