

**Resource and Environmental Economics (כלכלת סביבה)**

**Course syllabus (2018/19)**

**19 4050 B01**

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**Course period:** Period 2 (Dec 18-Feb 19)

**Course description**

The course explores the application of economic theory to environmental and natural resource management. The first part of the course addresses the theoretical foundations of the connections between the economy and the environment, the role of competitive markets, the theory of externalities in microeconomics, and the natural capital and ecosystem service framework. The role of economic valuation of environmental resources, cost-benefit analysis and cost-effectiveness analysis will be explored. The principal economic policy mechanisms for addressing environmental externalities will be presented. Finally, the course will conclude with practical examples of the application of environmental economics principles to climate change and to the spatially explicit analysis and mapping of ecosystem service values.

**Course requirements**

Familiarity with basic economic concepts and analytical tools such as those taught in an introductory course of economics is required to fully benefit from the course.

**Grading system**

Class attendance	10%
Participation in exercise sessions	20%
Final exam	70%

### **Course material**

The lectures are held in English. All lecture notes (in Hebrew and English), additional reading material will be made available on the University's eLearning portal (Moodle) as printable pdf documents. Suggestions for key readings (not compulsory but highly recommended) and further readings are provided on a lecture-by-lecture basis. Attendance to classes and exercise sessions is mandatory.

### **Course Outline**

The course is divided into eight lectures, which may be covered in one three-hour session or require more or less time. Each lecture will be accompanied by a discussion and exercise session. Unless otherwise indicated in class, the readings listed below are provided as recommended (not mandatory) readings.

For your convenience in following and understanding the lectures, a Glossary of key terms in environmental economics (including their translation to Hebrew) is provided on the Moodle alongside the slides of the lectures and key readings. The glossary is largely based on Mirovitskaya and Ascher (2001) *Guide to sustainable development and environmental policy*, Duke University Press, Durham, NC and Investopedia (<https://www.investopedia.com>; accessed May 2018). Additional resources for the translation of key economic terms from English to Hebrew and definitions in Hebrew are available at the Maot website (<http://www.maot.co.il/lex6/glosMarkersEng/glosItems1.asp>; accessed May 2018).

A breakdown of the individual parts of the course and the corresponding lecture's objectives, key readings and recommended readings is given below.

## Part 1. Theoretical foundations

### Lecture 1. Understanding the connections between the economy and the environment

- Objectives:
- Develop a basic understanding of the scope of environmental and ecological economics
  - Learn how economic activity depends upon and affects the natural environment
  - Consider the argument that the environment sets limits to economic growth and the limits of the conventional view of the economic system
  - Learn about utilitarianism as the ethical basis for welfare economics
  - Start to think about environmental problems in terms of utilities and welfare
- Key readings:
- Asafu-Adjaye J (2000) Incorporating the environment into the economic system. Ch. 2 in *Environmental Economics for Non-Economists*, Singapore: World Scientific.
  - Perman R, Ma Y, McGilvray J, Common M (2003) Ethics, economics and the environment. Ch. 3 in *Natural Resource and Environmental Economics*, Harlow: Pearson Education.
- Further readings:
- Fullerton D, Stavins N (1998) How economists see the environment. *Nature* 395: 433-434.
  - Costanza R, Cumberland J, Daly H, et al. (1997) Humanity's current dilemma. Ch. 1 in *An Introduction to Ecological Economics*, Boca Raton, FL: CRC Press.

## Lecture 2. Markets: how they work and why they fail

- Objectives:
- Understand economic efficiency and the importance of thinking on the margin
  - Find out about the circumstances in which markets allocate efficiently
  - Derive the conditions necessary for the realization of an efficient allocation in a partial equilibrium analysis
  - Learn about market failures and the basis for government intervention to correct them
  - Find out what public goods and open-access resources are in the context of environmental resources
  - Learn about pollution as an external effect (or externality)
- Key readings:
- Thampapillai D (2002) The market model and its failure. Ch. 2 in *Environmental Economics*. Oxford University Press, Oxford.
  - Keohane NO, Olmstead SM (2007) Economic efficiency and environmental protection. Ch. 2 in *Markets and the Environment*, Washington DC: Island Press.
  - Keohane NO, Olmstead SM (2007) Market failures in the environmental realm. Ch. 5 in *Markets and the Environment*, Washington DC: Island Press.
- Further readings:
- Scorse J (2010) The root causes of environmental problems. Ch. 1 in *What Environmentalists Need to Know about Economics*, New York: Palgrave Macmillan.
  - Scorse J (2010) Determining the “optimum” amount of pollution. Ch. 2 in *What Environmentalists Need to Know about Economics*, New York: Palgrave Macmillan.

### Lecture 3: The economics of biodiversity and ecosystem services

- Objectives:
- Find out the categories of economic value assigned to the natural environment
  - Understand the concept of Total Economic Value and the distinction between use and non-use values
  - Learn about the concepts of ecosystem services and natural capital and the state-of-the-art taxonomies of ecosystem services
  - Understand how biodiversity richness underpins the provision of ecosystem services and their values
- Key readings:
- Elmqvist T, Maltby E, Barker T, Mortimer M, Perrings C (2010) Biodiversity, ecosystems and ecosystem services. Ch. 2 in Kumar P (ed.) *The Economics of Ecosystems and Biodiversity: Ecological and Economic Foundations*, London: Earthscan.
  - Costanza R, de Groot R, Braat L, Kubiszewski I, Fioramonti L, Sutton P, Farber S, Grasso M (2017) Twenty years of ecosystem services: How far have we come and how far do we still need to go? *Ecosystem Services* 28A: 1-16.
- Further readings:
- Thampapillai D (2002) Consumer demand and the environment. Ch. 5 in *Environmental Economics*. Oxford University Press, Oxford.
  - Keohane NO, Olmstead SM (2007) The benefits and costs of environmental protection. Ch. 3 in *Markets and the Environment*, Washington DC: Island Press.

## Part 2: Economic tools for environmental analysis

### Lecture 4: Economic valuation of ecosystem services

#### Objectives:

- Learn about the main approaches to ecosystem service valuation including non-market valuation methods based on revealed and stated preferences
- Find out how the Travel Cost Method uses data on actual behavior to infer use value
- Learn how the Contingent Valuation Method generates and uses data from individuals' responses to hypothetical questions to infer (non-use) values
- Learn about the principles underlying secondary valuation techniques based on benefit transfer
- Be introduced to some of the controversies and limitations about monetary ecosystem service valuation and its uses

#### Key readings:

- Pascual U, Muradian R, Brander L, Gomez-Baggethun E, Martin-Lopez B, Verma M (2010) The economics of valuing ecosystem services and biodiversity. Ch. 5 in *The Economics of Ecosystems and Biodiversity: Ecological and Economic Foundations*, London: Earthscan.
- Bateman IJ, Mace GM, Fezzi C, Atkinson G, Turner RK (2014) Economic analysis for ecosystem service assessments. Ch 2 in Ninan KN (ed.) *Valuing Ecosystem Services*, Cheltenham, UK: Edward Elgar.

#### Further readings:

- Asafu-Adjaye J (2000) Environmental valuation. Ch. 5 in *Environmental Economics for Non-Economists*, Singapore: World Scientific.
- Perman R, Ma Y, McGilvray J, Common M (2003) Valuing the environment Ch. 12 in *Natural Resource and Environmental Economics*, Harlow: Pearson Education.

## Lecture 5: Cost-benefit analysis and cost-effectiveness analysis

- Objectives:
- Explain the conceptual basis of cost-benefit analysis and its application to the environment
  - Learn about the importance of temporal aspects in cost-benefits analysis and the tyranny of discounting
  - Identify and calculate discounted cash flows for various types of costs and benefits
  - Learn about objections to environmental cost-benefit analysis
  - Be introduced to some alternatives to cost-benefit analysis such as cost-effectiveness analysis
- Key readings:
- Asafu-Adjaye J (2000) Cost-benefit analysis. Ch. 6 in *Environmental Economics for Non-Economists*, Singapore: World Scientific.
  - Perman R, Ma Y, McGilvray J, Common M (2003) Cost-benefit analysis. Ch. 11 in *Natural Resource and Environmental Economics*, Harlow: Pearson Education.
- Further readings:
- Scorse J (2010) Valuing future generations. Ch. 5 in *What Environmentalists Need to Know about Economics*, New York: Palgrave Macmillan.
  - Turner RK, Pearce D, Bateman I (1993) Cost-benefit thinking. Ch 7 in *Environmental Economics: An Elementary Introduction*. Harvester Wheatsheaf, New York.

### Part 3: Mechanisms for addressing environmental externalities

#### Lecture 6: Environmental policy and the role of government

Objectives:

- Consider theoretical and practical issues involved in the implementation of solutions to the problem of market failure
- Learn about the Coase theorem
- Understand the differences between market-based instruments (e.g., pollution taxes, subsidies, and marketable permits) and Command-And-Control policies
- Learn about Payment for Ecosystem Services schemes

Key readings:

- Keohane NO, Olmstead SM (2007) Principles of market-based environmental policy. Ch. 8 in *Markets and the Environment*, Washington DC: Island Press.
- Keohane NO, Olmstead SM (2007) The case for market-based instruments in the real world. Ch. 9 in *Markets and the Environment*, Washington DC: Island Press.
- Engel S, Pagiola S, Wunder S (2008) Designing payments for environmental services in theory and practice: An overview of the issues. *Ecological Economics* 65: 663-674.

Further readings:

- Turner RK, Pearce D, Bateman I (1993) Using the market to protect the environment. Ch 10 in *Environmental Economics: An Elementary Introduction*. Harvester Wheatsheaf, New York.
- Scorse J (2010) Tools to address environmental problems: Taxes, property rights, information, psychological insights, and command and control regulation. Ch. 6 in *What Environmentalists Need to Know about Economics*, New York: Palgrave Macmillan.



## Part 4: Applied environmental economics

### Lecture 7: An introduction to climate change economics

- Objectives:
- Understand why economists sometimes refer to climate change as the “mother of all externalities”
  - Learn about Integrated Assessment Models and their role in climate change economics
  - Explore the notion of social cost of carbon and the role carbon prices play in climate change mitigation
  - Be exposed to the state-of-the-art estimates of the economic impacts of climate change
  - Review the key role played by intergenerational issues and discounting in climate change policies
- Key readings:
- Nordhaus W (2013) The economic origins of climate change. Ch. 3 in *The Climate Casino*, New Haven: Yale University Press.
  - Tol RSJ (2018) The economic impacts of climate change. *Review of Environmental Economics and Policy* 12(1): 4-25.
  - Pearce D (2003) The social cost of carbon and its policy implications. *Oxford Review of Economic Policy* 19(3): 362-384.
- Further readings:
- Scorse J (2010) Climate change. Ch. 6 in *What Environmentalists Need to Know about Economics*, New York: Palgrave Macmillan.
  - Nordhaus W (2013) The central role of carbon prices. Ch. 19 in *The Climate Casino*, New Haven: Yale University Press.
  - Nordhaus W (2013) Climate-change policies at the national level. Ch. 20 in *The Climate Casino*, New Haven: Yale University Press.

## Lecture 8: Geographic Information Systems (GIS) and environmental valuation

- Objectives:
- Understand the spatial nature of environmental goods and services and its implications for valuation
  - Learn about the role of Geographic Information Systems in environmental economics, and in ecosystem service value mapping in particular
  - Be exposed to the methodological issues associated with the spatially explicit transfer of ecosystem service benefits
  - Explore the role of distance decay and spatial heterogeneity in the transfer of environmental benefits
- Key readings:
- Bateman IJ, Jones AP, Lovett AA, Lake IR, Day BH (2002) Applying Geographic Information Systems (GIS) to environmental and resource economics. *Environmental and Resource Economics*, 22: 219-269.
  - Schaegner JP, Brander L, Maes J, Hartje V (2013) Mapping ecosystem services' values: Current practice and future prospects. *Ecosystem Services*, 4: 33-46.
  - Schaafsma M (2015) Spatial and geographical aspects of benefit transfer. Ch. 18 in *Benefit Transfer of Environmental and Resource Values: A Guide for Researchers and Practitioners*, Dordrecht: Springer.
- Further readings:
- Bateman IJ, Garrod GD, Brainard JS, Lovett AA (1996) Measurement issues in the travel cost method: A geographical information systems approach. *Journal of Agricultural Economics*, 47(2): 191-205.
  - Troy A, Wilson MA (2006) Mapping ecosystem services: Practical challenges and opportunities in linking GIS and value transfer. *Ecological Economics*, 60: 435-449.