

<b>Course title:</b> Environmental Economics				
<b>Course code:</b> MPE 152		<b>No. of credits:</b> 4	<b>L-T-P:</b> 48-8-0	<b>Learning hours:</b> 56
<b>Pre-requisite course code and title (if any):</b> MPE 131 Microeconomics				
<b>Department:</b> Department of Policy Studies				
<b>Course coordinator(s):</b> Dr Sukanya Das			<b>Course instructor(s):</b> Dr Sukanya Das	
<b>Contact details:</b> sukanya.das@terisas.ac.in				
<b>Course type:</b> Core			<b>Course offered in:</b> Semester 3	
<b>Course description</b>				
<p>The course lies in the intersection of disciplines of economics and environment within which economic system operates. This interlinkage can be expressed through the (a) inputs from environment to the economic system and (b) byproducts of economic system to the environment. Latter, or, the ‘sink’ function of the environment, is covered within this course. The former, or ‘source’ function is covered in the Natural Resource Economics course that complements it.</p> <p>Over the years, impacts of economic system on the environment have increased; they have become qualitatively different too. The way in which environment impacts economic system have undergone both quantitative and qualitative changes. Discipline of economics have been one of first ones to recognize, appreciate and address environment related problems to human and environmental health. In the last one hundred years, the treatment has become more sophisticated, some which this course attempts to capture.</p>				
<b>Course objectives</b>				
<ol style="list-style-type: none"> <li>1. To familiarizes students with the theory and application of economics to environmental problems, in distinction with the other approaches.</li> <li>2. To make the student aware of the different methods, grounded on economic theory, to assign monetary values to a variety of environmental goods and services.</li> <li>3. To make the students appreciate the formulation of environmental policies involving economic instruments, associated institutions and supporting governance mechanisms.</li> </ol>				
<b>Course content</b>				
<b>Module</b>	<b>Topic</b>	<b>L</b>	<b>T</b>	<b>P</b>
1.	<b>Property right, externalities and environmental problems</b> 1.1 The Human-Environment relationship 1.2 Environmental Problems and Economic Efficiency 1.3 Property Rights 1.4 Imperfect Market Structures 1.5 Externalities and Public Goods as sources of Market Failure 1.6 The Government Failure 1.7 The Pursuit of Efficiency	3		
2.	<b>Economic Principles and Overview of Valuation Methods</b> 2.1 Welfare Measures for Changes in Supply of Environmental Good 2.2 Environmental Values and their classification 2.3 Use Values, Non-use Values and Option Value	3		
3.	<b>Stated Preference Techniques</b> 3.1 Contingent Valuation Method and its applications 3.2 Choice Experiment Method and its applications	8		
4.	<b>Revealed Preference Techniques</b> 4.1 Household Production Function models 4.2 Travel Cost method 4.3 Hedonic Price models	10		
5.	<b>Meta- Analysis and Cost benefit Analysis</b>	4		

	5.1 Conducting Meta-analysis 5.2 Cost-Benefit analysis			
6.	<b>Economic Instruments</b> 6.1. Incentives through Market: prices through Charges and Subsidies 6.2. Incentives through Regulation: Liability Rules, Fees, Deposit-refunds 6.3. Incentives through Quantity Rationing—Tradeable Permits 6.4. Uncertainty and choice of Instruments 6.5. Market Structure, number of Players and choice of Instruments. 6.6. Evaluation of Instruments against selected criteria 6.7. Comparison of Instruments.	<b>12</b> 2 2 2 2 1 1		
7	<b>Environmental Governance: selected case studies</b> 7.1. Local Air Pollution: from stationary and non-point sources 7.2. Local and regional Water Pollution: from agriculture and industry	<b>8</b>	<b>8</b>	
<b>Evaluation</b>				
<p>1. <b>Test 1:</b> Written test (on 1-4 modules): 25%</p> <p>2. <b>Test 2:</b> Presentation of a seminal paper in Environmental Economics: 15%</p> <p><b>Choice:</b> from the list supplied by the course coordinator</p> <p><b>Structure:</b> No presentation can exceed 20 minutes. No more than 8 slides (excluding title and references) will be used. No more than 10 minutes per presentation on Q&amp;A. No more than two pages of handout distribution.</p> <p><b>Criteria:</b> Introduction; Identification of Research Question/Problem/Issue; Relevance-- either theoretically or in empirical terms or both; Clarity - Audible and comprehensible; Sequence and pace; Pronunciation and oratory skills; Organization and layout of visual presentation; Responses during Q&amp;A session -- Clarity and sufficiency [each with equal weight]</p> <p>3. <b>Test 3:</b> Written test (on 5-8 modules): 25%</p> <p>4. <b>Test 4:</b> Submission of an original essay of 5,000 words: 35%</p> <p><b>Structure:</b> (a) which one you think is the best answer to the question pursued by you addressed in the literature survey and why, (b) what are the strongest objection(s) to your choice; (c) briefly outline what further work would be needed to provide a better answer.</p> <p><b>Criteria:</b> Indicators: (a) Logical consistency, (b) Academic Rigour, (c) Originality [each with equal weight]</p>				
<b>Learning Outcomes</b>				
<p>a. To appreciate the ‘sink’ function of environment, its impact on the economic system and its valuation in monetary terms (test 1)</p> <p>b. To understand and assess applicability of a range of valuation methods, tools and techniques in the context of several environmental issues at local and national levels (test 1).</p> <p>c. To be exposed to and learn in the process skills for making effective presentations (test 2).</p> <p>d. To gain an understanding on a variety of economic instruments for addressing environmental problems (test 3)</p> <p>e. To be exposed to and learn in the process skills for preparing original works (test 4)</p>				
<b>Reading Materials</b>				
<b>CORE</b>				
<b>Module 1</b>				
T Tientenberg Chapter 2: The Economic Approach: Property Rights, Externalities, and Environmental Problems, in <i>Environmental and Natural Resource Economics</i>				
W J Baumol and W E Oates, 1988, <i>The Theory of Environmental Policy</i> , Cambridge University Press, ‘Chapter 2: Relevance and the theory of externalities’, ‘Chapter 3: Externalities: definition, significant types, and optimal-pricing conditions’, and ‘Chapter 4: Externalities: formal analysis’.				
Ayres, R. U., & Kneese, A. V. (1969). Production, consumption, and externalities. <i>The American Economic Review</i> , 59 (3): 282-297.				
<b>Module2</b>				

Freeman, III, A.M. (1993): *The Measurement of Environmental and Resource Values: Theory and Methods*, Washington D. C: Resources for the Future.

Karl-Göran Mäler, Jeffrey R. Vincent (Edited) (2005): *Handbook of Environmental Economics: Valuing Environmental Changes*, Volume 2, Elsevier/North-Holland, Amsterdam., 'Chapter 12 welfare theory of valuation' 'Chapter 13 Environment, uncertainty and option values'

### **Module 3**

Bateman, et al (2002) *Economic Valuation with Stated Preference Techniques: A Manual*, Edward Elgar Publishing, Cheltenham.

Whittington, D. (1998). 'Administering contingent valuation surveys in developing countries'. *World development*, 26(1), 21-30.

Bennett, J and R. Blamey (2001) *The Choice Modelling Approach to Environmental Evaluation*, Edward Elgar.

### **Module 4**

Freeman, III, A.M. (1993): *The Measurement of Environmental and Resource Values: Theory and Methods*, Washington D. C: Resources for the Future.

**Case studies for module 3 and 4** [All SANDEE working papers; freely downloadable from <http://www.sandeeonline.org/publicationdisp.php?pcid=1>]

### **Revealed Preference**

Irfan, M. (2013). Do Open Sewers Lead to a Reduction in Housing Prices? Evidence from Rawalpindi, Pakistan.

Das, S. (2007). Storm protection by mangroves in Orissa: an analysis of the 1999 super cyclone.

Guha, I., & Ghosh, S. (2009). A Glimpse of the Tiger: How Much are Indians Willing to Pay for It?.

Adhikari, N. Measuring Health Benefits from Air Pollution Reduction in Kathmandu Valley (No. 70)

### **Stated preference**

Mishra, P. P. (2014). Potential Benefits and Earnings from Improving the Hussain Sagar Lake in Hyderabad: A combined revealed and stated preference approach (No. 90).

Rai, R. K., Nepal, M., Shyamsundar, P., & Bhatta, L. D. (2015). Demand for Watershed Services: Understanding Local Preferences through a Choice Experiment in the Koshi Basin of Nepal (No. id: 7292).

Rathnayake, R. W. (2015). Estimating demand for turtle conservation at the Rekawa sanctuary in Sri Lanka..

### **Module 5**

Borenstein, M., Hedges, L. V., Higgins, J. P., & Rothstein, H. R. (2011). *Introduction to meta-analysis*. John Wiley & Sons.

N Hanley, 2017, 'Environmental Cost Benefit Analysis' in Shorgen et al, *Encyclopaedia of Energy, Natural Resource and Environmental Economics*, volume 3, pp. 17-24

### **Module 6**

N Hanley, J F Shorgen and B White, 2007, *Environmental Economics in Theory and Practice* Palgrave Macmillan, Chapter 4: Incentive Design and Chapter 5: Pollution Taxes and tradable emission permits: Theory and Practice

W J Baumol and W E Oates, 1988, *The Theory of Environmental Policy*, Cambridge University Press, Chapter 5: Uncertainty and the choice of policy instruments: price or quantity controls? and Chapter 6: Market imperfections and the number of participants

### **Module 7**

**All from Jason F Shogren et al, eds., 2013 *Encyclopedia of Energy, Natural Resource and Environmental Economics*, Volume 3, London and San Diego: Elsevier**

J B Braden and JS Shortle, 2013, 'Agricultural Sources of Water Pollution', pp. 81-85

AM Bento, 2013, 'Local/Regional Air Pollution from Stationary Sources', pp. 103-108

D Earnhart, 'Water Pollution from Industrial Sources', pp. 114-120

M Walls, 2013, 'Deposit-Refund Systems in Practice and Theory', pp. 133-137

JS Shortle and JB Braden, 'Economics of Nonpoint Pollution', pp. 143-149

I Parry, 'Green Tax Design in the Real (Second-Best) World', pp. 161-168

K Segerson, 'Price Instruments', pp. 185-192

T Requate, 'Prices versus Quantities', pp. 193-203

J Rubin and S Siriwardena 'Quantity Instruments', pp. 204-211

GE Helfand, 'Standards', pp. 217-221

## **OTHER**

### **Module 1**

K Singh and A Shishodia, '3. Basic Concepts and Theories: Individual Choices' and '4. Basic Concepts and Theories: Collective Choices' in K Singh and A Shishodia, *Environmental Economics: theory and application*, Sage

David Anderson, 'Chapter 2: Efficiency and Choice', 'Chapter 3: Market Failure', 'Chapter 4: Role of Government' in *Environmental Economics and Natural Resource Management*

Ronald H Coase, 1960, 'The problem of social cost', *Journal of Law and Economics* 3: 1-44

N Hanley, J F Shorgen and B White, 2007, *Environmental Economics in Theory and Practice* Palgrave Macmillan, 'Chapter 3: Market Failure'

R Perman et al, Chapter 5: Welfare Economics and the Environment in *Natural Resource and Environmental Economics*

### **Module2**

Markandya, A. (2014). Economic principles and overview of valuation methods for environmental impacts.

Haab, Timothy C, and Kenneth E. McConnell (2002): *Valuing Environmental and Natural Resources: The Econometrics of Non-Market Valuation*, Edward Elgar, Cheltenham, UK. Northampton MA, USA.

Per-Olov Johansson, 2000, 'Microeconomic of Valuation' in *Principles of Environmental and Resource Economics*, edited by H Folmer and H Landis Gabel, Cheltenham and Northampton: Edward Elgar

Per-Olov Johansson, 1987, *The economic theory and measurement of environmental benefits*, Cambridge: Cambridge University Press (also for module 3 and 4)

Mordechai Shechter, 2000, 'Valuing the Environment' in *Principles of Environmental and Resource Economics*, edited by H Folmer and H Landis Gabel, Cheltenham and Northampton: Edward Elgar

### **Module 3**

Whittington, D. (2010). 'What have we learned from 20 years of stated preference research in less-developed countries?' *Annual Review of Resource Economics* 2(1), 209-236.

Hensher D.A., Rose J.M. & Greene W.H. (2005) *Applied Choice Analysis: A primer* Cambridge University Press.

Bennett J., Birol, E. (2010). *Choice experiments in developing countries. implementation, challenges and policy implications*. Edward Elgar Publications Ltd.

### **Module 4**

Ward, F.A and D.J Beal (2000), *Valuing Nature with Travel Costs Models: A Manual*, Edward Elgar, Cheltenham

Viscusi (1993) 'The Value of Risk to Life and Health' *Journal of Economic Literature* 31.

Orgill-Meyer, Jennifer, Marc Jeuland, Jeff Albert, and Nathan Cutler. 2018. 'Comparing contingent valuation and averting expenditure estimates of the costs of irregular water supply' *Ecological Economics* 146: 250-264.

David Pearce, ed. (2009) *Environmental Valuation in Developed Countries: Case Studies*, Edward Elgar Publishing Ltd

M N Murty (2009): *Environment, Sustainable Development and Well-Being: Taxation, Incentives and Valuation*, Oxford University Press, New Delhi.

A E Haque, M N Murty and P Shyamsundar. (2011). *Environmental Valuation in South Asia*. Cambridge University Press.

S Kumar and D N Rao (2001). 'Valuing the benefits of air pollution abatement using a health production function a case study of Panipat thermal power station, India'. *Environmental and Resource Economics*, 20(2), 91-102.

### **Module 5**

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & Prisma Group. (2009). 'Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement'. *PLoS medicine*, 6(7), e1000097.

Lindhjem, H., & Navrud, S. (2008). 'How reliable are meta-analyses for international benefit transfers?' *Ecological Economics*, 66(2-3), 425-435.

Asian Development Bank (2013) *Cost-benefit analysis for development: A practical guide*.

R Stavins, ed., 2005, *Economics of the Environment: selected readings*, W W Norton,

Section on The Goals of Environmental Policy: economic efficiency and benefit-cost analysis

Kenneth Arrow et al, 'Is there a role for Benefit-Cost Analysis in Environmental, Health and Safety Regulation?'

Steven Kelman, 'Cost Benefit Analysis: An ethical critique'

Replies to Steven Kelman from J V DeLong, R M Solow, G Butterns, J Calfee and P Ippolito

N Hanley, 2000, 'Cost-Benefit Analysis' in *Principles of Environmental and Resource Economics*, edited by H Folmer and H Landis Gabel, Cheltenham and Northampton: Edward Elgar

Drèze, Jean, and Nicholas Stern. "The theory of cost-benefit analysis." In *Handbook of public economics*, vol. 2, pp. 909-989. Elsevier, 1987

#### **Module 6**

Tomasz Zylicz, 2000, 'Goals, principles and constraints in environmental policies' in *Principles of Environmental and Resource Economics*, edited by H Folmer and H Landis Gabel, Cheltenham and Northampton: Edward Elgar

Jean-Philippe Barde, 2000, 'Environmental policy and policy instruments' in *Principles of Environmental and Resource Economics*, edited by H Folmer and H Landis Gabel, Cheltenham and Northampton: Edward Elgar

#### **Module 7**

**All from Jason F Shogren et al, eds., 2013 *Encyclopedia of Energy, Natural Resource and Environmental Economics*, Volume 3, London and San Diego: Elsevier**

E Lichtenberg, 2013, 'Economics of Pesticide Use and Regulation', pp. 86-97

SL Stafford, 2013, 'Hazardous Substances', pp. 98-102

MA Cohen, 'Water Pollution from Oil Spills', pp. 121-126

C Bohringer and A Lange, 'European Union's Emissions Trading System', pp. 155-160

S Kallbekken, 'Public Acceptability of Incentive-Based Mechanisms', pp. 306-312

R Innes, 'Liability Rules and the Environment', pp. 169-184

#### **Pedagogical Approach**

Lectures will provide an overview besides emphasizing on a few matters in each area. Students are expected to read the materials listed above but not marked compulsory to gain a better understanding. Presentations will provide opportunities for co-learning. They will complement the lectures.

**Additional information (if any):** none

#### **Student responsibilities**

The students are expected to submit assignments in time and come prepared with readings when provided

**Prepared by:** Sukanya Das and Nandan Nawn

#### **Reviewers:**

1. M.N. Murty, Retired Professor, Institute of Economic Growth, Visiting Professor, TERI School of Advanced Studies
2. R.N. Bhattacharya, Honorary Adjunct Professor of Economics, School of Oceanographic Studies, Jadavpur University, Kolkata-700032.

Approved by Academic Council in its 46<sup>th</sup> meeting held at Conference Hall, TERI School of Advanced Studies on 26<sup>th</sup> July 2019.