

## **“Sustainability Decision Tools” 11:373:202**

**Spring (online)**

**Department of Agricultural, Food, and Resource Economics  
School of Environmental and Biological Sciences  
Rutgers University**

### INSTRUCTORS:

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### WHO SHOULD TAKE THIS COURSE?

This course is designed for students from any major (or no major) and at any stage of their undergraduate careers. The course is inter-disciplinary which makes it attractive to students in the natural sciences, social sciences, business, and engineering. It is hoped that such a diverse group will contribute important perspectives to class discussions.

The course is co-taught by an environmental engineer and an economist. When necessary, each instructor will teach basic concepts from her/his own discipline that provide essential background for course material on sustainability and decision-making.

### LEARNING GOALS:

By the end of the course students will be able to:

- Define the practical and theoretical aspects of “sustainability,” which has been an influential organizing principle for public and private-sector decision-making for more than 25 years.
- Integrate sustainability thinking into their individual consumption decisions and those they will make on behalf of future employers in the private, public, and nonprofit sectors.
- Identify and give examples of the primary sustainability decision tools, *life-cycle analysis* and *carbon footprint analysis*.
- Apply the theoretical foundation gained to careers such as corporate sustainability officer, green supply chain manager, environmental policy analyst, energy or materials accountant/auditor, etc.
- Describe the new emerging Food- Energy- Water “FEW” concept that is essential to achieve United Nations’ 2030 Sustainability Goals and creation of resilient communities

### CLASS FORMAT AND GRADED ASSIGNMENTS:

Online courses work best as reading and discussion seminars. Each week, your instructors will assign readings or other materials, some drawn from the two required paperbacks and others posted on eCollege. Students will be required to submit a one-

page paper at the end of most weeks, typically in response to a question from the instructors. These one-pagers will not be shared with other students, enabling the instructors to evaluate individual performance. Meanwhile, the entire class will engage in an asynchronous, open, guided discussion of the readings. These discussions will be open (approximately) until the following week's paper is due.

Two exams will be administered throughout the semester. Students will also be responsible for a final life cycle analysis project. Given the time constraints of a single semester, this project is not likely to require the collection of original data.

#### SOFTWARE PLATFORM:

eCollege

#### REQUIRED TEXTBOOKS:

Baumann and Tillman, *The Hitch Hiker's Guide to LCA: An Orientation in Life Cycle Assessment Methodology and Application*. Malmö, Sweden: Studentlitteratur, 2004.

Berners-Lee, *How Bad are Bananas? The Carbon Footprint of Everything*. Vancouver, Canada: Greystone Books, 2011.

(Limited copies of these paperbacks will be available at Cook-Douglass bookstore; somewhat more are at Barnes and Noble downtown. Also available from Amazon.com and their respective publishers.)

#### TOPICS AND READINGS BY WEEK:

##### **January, Week 1    Introductory case study: "Paper or plastic?"**

Berners-Lee, *Bananas*, pp. 1-15, 22-24.

Ciambrone, David, *Environmental Life Cycle Analysis*, CRC Press, 1997, pp. 9-16.

Matilla, Tuomas, et al, "Uncertainty and Sensitivity in the Carbon Footprint of Shopping Bags," *Journal of Industrial Ecology*, Vol. 15, No. 2, pp. 217-227 (2011).

Seattle Public Utilities, Plastic Bag Ban

<http://www.seattle.gov/util/MyServices/Recycling/ReduceReuse/PlasticBagBan/index.htm>.

Life Cycle Assessment for Three Types of Grocery Bags - Recyclable Plastic; Compostable, Biodegradable Plastic; and Recycled, Recyclable Paper

<http://seeds4green.open-green.net/sites/default/files/ThreeTypeofGroceryBags.pdf>

##### **January, Week 2    Sustainability: History, concepts, needs**

Edwards, A., *The Sustainability Revolution: Portrait of a Paradigm Shift*. New Society Publishers, Philadelphia, PA, 2005. pp. 1-27, 55-63.

Warner and DeCosse, "The Ethical Dimension of Sustainability," Markulla Center for Applied Ethics, Santa Clara University.

[http://www.scu.edu/ethics/practicing/focusareas/environmental\\_ethics/lesson4.html](http://www.scu.edu/ethics/practicing/focusareas/environmental_ethics/lesson4.html)

World Commission on Environment and Development, *Our Common Future* ("Brundtland Report") <http://www.un-documents.net/our-common-future.pdf> Read chapters 1 and 2 (pdf page numbers 10 through 59). Skim or read other sections if interested.

FAO experience, activities and views in the area of policies for sustainable agricultural development – conceptual and practical approach, Dorina Minoiu  
[ftp://ftp.fao.org/seur/ceesa/FAO\\_exp.htm](ftp://ftp.fao.org/seur/ceesa/FAO_exp.htm)

"The Business Case for Environmental Sustainability." Chapter 15 in Ahmed Hussen, *Environmental Economics and Sustainability*, New York: Routledge, pp. 333-357.

## **February, Week 1 Corporate responsibility; more ethics**

Christian Becker, *Sustainability Ethics and Sustainability Research*. Springer Verlag, 2012, pp. 1-20, 26-31, 52-58, 67-84, 96-104.

Milton Friedman, "The Social Responsibility of Business is to Increase its Profits," *New York Times Magazine*, September 13, 1970.

Wikipedia article on Corporate Social Responsibility

[http://en.wikipedia.org/wiki/Corporate\\_social\\_responsibility](http://en.wikipedia.org/wiki/Corporate_social_responsibility)

Rogers, Dale, "Sustainability is Free—the Case for Doing the Right Thing." *Supply Chain Management Review*, November 2011, pp. 10-17.

Reich, Robert B., "Don't Blame Walmart," *The New York Times*, February 28, 2005.

Review "The Business Case for Environmental Sustainability." Chapter 15 in Ahmed Hussen, *Environmental Economics and Sustainability*, New York: Routledge, pp. 333-357.

## **February, Week 2 Life cycle analysis, part 1**

*Hitchhiker's Guide...*, chapter 1.

Horne, Ralph, *Life Cycle Assessment: Origins, Principles and Context*, Chapter 1. (pdf will be posted)

*Life Cycle Assessment: Principles and Practice*, written on contract to US EPA, May 2006. Read pp. 1-18.

### **February, Week 3 Life cycle analysis, part 2**

*Hitchhiker's Guide...*, chapter 4 (pp 97-107) and chapter 5.

*Life Cycle Assessment: Principles and Practice*, written on contract to US EPA, May 2006. Read pp.19-25 and 46-53.

### **February, Week 4 Life cycle analysis within the context of traditional decision-making tools of economics and business**

*Hitchhiker's Guide...*pp. 279-283.

Clark, Colin, "Economic Biases Against Sustainable Development," in Robert Costanza, ed., *Ecological Economics: The Science and Management of Sustainability*. New York: Columbia University Press, 1991, pp. 319-330.

"Frameworks for the economic appraisal of environmental projects: Cost-benefit analysis and others." Chapter 8 in Ahmed Hussien, *Environmental Economics and Sustainability*, New York: Routledge, pp. 149-162 first column.

*The Bottom Line on Sustainability*. White Paper of the Project Management Institute.

### **March, Week 1 Carbon footprint analysis as subset of LCA**

Review Berners-Lee, *Bananas*, pp. 1-15. Make sure that you understand the standard units of comparison used throughout this book.

Logan, Elise. *An exploration of the structure and development of carbon footprint analysis*.

Weber, Christopher. *Uncertainty and variability in carbon footprinting for electronics. Case study of an IBM rack-mount server*. Carnegie-Mellon University.

### **March, Week 2 Carbon footprint analysis as subset of LCA**

Skim Berners-Lee, *Bananas*, to get a feel for the CO2 ranking of general categories of activities. Find what you are interested in and read those sections more closely.

*Guide to PAS 2050: How to assess the carbon footprint of goods and services*. London: BSI Standards (2009).

### **March, Week 3 \*\*SPRING BREAK\*\***

### **March, Week 4 Understanding Food-Energy-Water Nexus**

USDOE Water-Energy Nexus Report 'Challenges and Opportunities'

"The Energy Water Food Nexus", US Chamber of Commerce Foundation

## **March, Week 5 – April, Week 1 Energy efficiency and alternative technologies**

Berners-Lee, *Bananas*, pp. 54-61, 89-91, 130-135.

*Unlocking Energy Efficiency in the U.S. Economy*. McKinsey Global Energy and Materials, July 2009.

*Overcoming market barriers and using market forces to advance energy efficiency*. American Council for an Energy Efficient Economy, March 2013.

*25 Energy Efficiency Policy Recommendations*. International Energy Agency, 2011 update.

## **April, Week 2 Sustainability assessment of a project or instrument and role for innovation**

*Hitchhiker's Guide*...Read whichever of the following chapters you are most interested in: 9 or 11 or 12.

Bakkes, Jan. "Bellagio SusTainability Assessment and Measurement Principles (BellagioSTAMP) – Significance and Examples from International Environment Outlooks." In Raggamby and Rubik, eds., *Sustainable development, evaluation, and policy making*. Elgar Publishing, 2012.

*Hydropower sustainability assessment protocol*. International Hydropower Association, November 2010.

Sustainability assessment and LEED compliance evaluation. Amerigreen strategies, consultant to Borgo Contract Seating.

## **April, Week 3 Existing policies and laws; where to find information**

Citizen's Guide to the National Environmental Policy Act (online; US federal)

Plain English Guide to the Clean Air Act (online; US federal)

Summary of Clean Water Act (online; US federal)

Directive of the European Parliament and of the Council on End-of-life Vehicles, 2000/53/EC of 18 September 2000, OJ L 269 , 21.10.2000, p. 34.

M Nancy Zierman, "How does the German green dot system help to reduce the quantity of solid waste?" Colby College, 1996.

"Kyoto Protocol," United Nations Framework Convention on Climate Change ([http://unfccc.int/kyoto\\_protocol/items/2830.php](http://unfccc.int/kyoto_protocol/items/2830.php)).

## **April, Week 4 Basic skills/roles of a sustainability officer or small business owner**

*Hitchhiker's Guide...*, chapter 13.

"Green Career Information." US Department of Labor, Bureau of Labor Statistics  
(<http://www.bls.gov/green/greencareers.htm>).

James Hamilton, "Is a Sustainability Career on your Green Horizon?" US Department of Labor, Bureau of Labor Statistics  
(<http://www.bls.gov/green/sustainability/sustainability.htm>)

#### **April, Week 5 Spreading the message: Marketing and social media and Case Study project**

*Hitchhiker's Guide...*, chapter 10.

*The SMI-Wizness Social Media Sustainability Index 2012*

*Digital Persuasion: How Social Media Motivates Action and Drives Support for Causes*  
(Waggener Edstrom Worldwide)

#### **GRADING:**

The four course components will contribute to your semester grade as follows:

- One-page papers 30%
- Quality and regularity of online discussion 20%
- Exams (2) 20%
- Final project 30%

Your final grade is determined using the following scale:

A: 88% and above  
B+: 84-87.9%  
B: 76-83.9%  
C+: 72-75.9%  
C: 64-71.9%  
D: 52-63.9%  
F: below 52%

#### **COURSE ETHICS POLICY**

Students will be held to the highest standards of academic integrity, as described in the University code of academic conduct (<http://academicintegrity.rutgers.edu/academic-integrity-at-rutgers>). One-page papers will be run through the plagiarism program "turnitin."

An online course raises special issues with regard to academic integrity. For the most part, all work in this class will be done independently, and interactions between students are expected to occur in the course's open discussion forums. The term project *may* be an exception to this rule; we will provide further information about this project later in the course.

*Special note regarding exams:*

The readings for this course contain an enormous amount of information, including engineering principles and processes, conceptual diagrams, details of various policy documents, and dozens of conceptual frameworks and organizations that are denoted by an equal number of acronyms. Memorizing all of this information solely for the purpose of doing well on the two exams would be an extremely frustrating, and we believe, counterproductive exercise.

So we recommend that you approach the readings as follows:

Do each reading with the goal of extracting the most important information, not with the goal of memorizing facts for a future test. Details are rarely important. Broad themes are important. For example, you will quickly see that the World Commission on Environment and Development (Brundtland) report contains two key conceptual frameworks for sustainability, which are also cited by many of the other authors. The chapter by Edwards draws a contrast between “environmentalism” and “sustainability”– two policy approaches that appeared in precisely this chronological order in history. Two principles that are important for life cycle analysis are the range of uncertainty surrounding the results, and the problem of where to put boundaries around what you choose to analyze. *And so on.*

In order to relieve any anxiety you might have about the memorization of facts, which we do not advise, we will make the one exam open book. This has the extra advantage of not requiring use of an honor system to enforce testing rules in an online setting. We have not yet decided how the exams will be timed. Ideally, we want the time that you have for tests to be short enough that you will study for them, but not so short that you have a lot of anxiety, or are unable to consult the course materials during the exams if you wish.

Please contact one of the instructors if you have any questions about how this course works!