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Sustainability: Foundations, Technology, and Design

This course is designed to provide students with an interdisciplinary introduction to issues surrounding the idea of “Sustainability.” As the title suggests, we will begin with a discussion of the underlying assumptions of sustainable thinking and practices, including defining what “sustainability” actually means, and what it might take to achieve it. These foundations include areas of energy extraction and consumption, economic principles, and environmental and social justice concerns that suggest the need for developing more sustainable practices. The course then introduces a number of specific topics and technologies that build on these foundations in an attempt to connect theory with practice. With an emphasis on the role of technology and design in both creating many of the problems of sustainable development and potentially solving these problems we will look at a number of areas including building systems and materials; repair, reuse, recycling and repurposing; and lifestyle decisions. Finally, to understand what is involved in integrating and communicating sustainable features into everyday living groups will design a model building that is targeted for LEED certification (like Georgetown’s Regents Hall).

Texts

The texts for this class will be:

The limits to growth: the 30-year update
Donella H. Meadows, Jørgen Randers, Dennis L. Meadows
Chelsea Green Pub., 2004

Brown, Lester R. 2009. Plan B 4.0. Earth Policy Institute, Washington DC.
(available online: http://www.earth-policy.org/images/uploads/book_files/pb4book.pdf)

McDonough, William and Michael Braungart. *Cradle to Cradle: Remaking the Way We Make Things*. North Point Press. 2002.

Additional Readings are noted on the syllabus and will be made available in pdf form.

COURSE REQUIREMENTS

Attendance – Everyone is expected to attend class weekly. If you need to miss a class you must notify the instructor in advance, in writing. Unexcused absences will affect your grade.

Leading Discussion –Once during the first third of the semester you will be responsible for leading a class discussion. I will assign you to work in pairs to produce 7-10 discussion questions based on that week’s reading, and the class will use these as a starting point for our discussion during the class period. I written copy of these questions must be submitted to the instructor before class. ~10%

Short Paper – At the end of the first unit you will be required to write a short paper ~3000 words that demonstrates your ability to balance arguments for and against a concept discussed in class. All topics should be cleared with the instructor beforehand to make sure they are suitable. ~30%

Presentations – For each class during the second unit you will give a 10-15 minute presentation on some aspect of sustainable design or technology. Topics can be chosen by you, but must be cleared with the instructor in advance. ~30% (10% each)

Final Project – the final component of your grade will be collaborative project (groups to be determined) in which your team designs and plans a sustainable building. These are typically a home, but other sites, scales, and interventions are possible if they better suit your interests. For example you may want to design a dance studio, or a sewage treatment plant, a transportation system, or a factory, etc. The purpose of this final project is to integrate the technologies and design principles we have discussed in class in an integrated and systemic fashion. Multiple deliverables will be required in stages leading up to the end of the semester. ~30%

SCHEDULE

UNIT ONE: FOUNDATIONS

Week 1
(8/29/13)

INTRODUCTION

to discuss: President’s Speech on Climate Change
http://www.youtube.com/watch?v=KY-gZXq_0nM

Week 2
(9/5/13)

Growth and Overshoot

Readings to discuss:
LTG: Preface, Chapters 1,2,3 (pp. ix-127);

The World Commission on Environment and Development. 1987. *Our Common Future*. Oxford University Press. New York, NY. (pp. 1-23)

Week 3
(9/12/13)

Consequences and Challenges

Readings to discuss:
Carson, Rachel (19xx) *Silent Spring*.
Ch. 1: pp. 13-15;

Ch 2: pp. 16-23;
CH 8: pp. 97-119;

Plan B 4.0: Chapter 1: pp. 3-13;
Chapter 6: pp. 143-167;
Chapter 8: pp. 192-215;
Chapter 9: pp. 216-238;

Week 4
(9/19/13)

Alternatives & Transitions

Readings to discuss:

Daly & Farley, Ecological Economics:

Introduction, Chapters 1&2 (pp. xix-35);

Livesey, S. (2001). Eco-identity as discursive struggle: Royal Dutch/Shell, Brent Spar and Nigeria. *Journal of Business Communication*, 30(1), 58-91.

Kurzweil, R (2006) *The Singularity Is Near*. Viking, 2005. Chapter 1.

Week 5
(9/26/13)

The Science Behind

Do the Math Blog

Follow Suggested Reading path for Sustainability and Growth:

<http://physics.ucsd.edu/do-the-math/post-index/>

(links are in appendix of this syllabus as well)

Sengers, P. What I Learned on Change Islands: Reflections on IT and Pace of Life. From ACM Interactions (2012).

Week 6
(10/3/13)

The Future

Read Cradle to Cradle.

Lifecycle Design In Class Exercise!

Week 7
(10/10/13)

Feels like we've been here before

PAPER DUE!!!!!!!!!!!!!!!!!!!!!!

Walt Disney's Presentation about EPCOT:

<https://www.youtube.com/watch?v=u9M3pKsrcc8>

Advertising shorts for Masdar City

<https://www.youtube.com/watch?v=8V7UpFOM8w0>

Fully Charged Masdar episode part 1&2

<https://www.youtube.com/watch?v=NIaz61zpLfs>

<https://www.youtube.com/watch?v=G4ohXTnIxzA>

UNIT TWO: TECHNOLOGIES

Week 8
(10/17/13)

PRESENTATIONS I: ENERGY

Sample Topics: Solar, wind, geothermal, nuclear, tidal, hydro.

Week 9
(10/24/13)

PRESENTATIONS II: Transportation & Lifestyle

Sample Topics: Automobiles mass transit, bikes, EVs, air travel,
Alternative communities: arcossanti & arcology, transitional
communities, recycling, reuse, repurposing.

Week 10
(10/31/13)

PRESENTATIONS III: Food, Water & Social Justice

Sample Topics: Urban farming, freshwater, desalinization, land-use,
migration and urbanization, water issues; food supply and transport,
farming practices, local sources, fishing, diet, waste disposal, landfills,
biodigesters

Week 11
(11/7/13)

Presentation on LEED system

Some Background Readings on Building and Planning:

Berke, Philip, and Edward John Kaiser. *Urban land use planning*.
University of Illinois Press, 2006.

Gibson, Robert B., et al. *Sustainability assessment: criteria and processes*.
London: Earthscan, 2005.

Baltimore Sustainability Plan

Pay attention to the format, design, layout, etc., as well as the content. How
does the plan function as a tool for communication? What is being
communicated and how?

UNIT THREE: DESIGN

Week 12 **Iteration 1 of Final Project**
(11/14/13)

Week 13 **Iteration 2 of Final Project**
(11/21/13)

Week 14 **Wrap-up**
(12/5/13)
Final Project Presentations

LINKS

[Galactic Scale Energy](http://physics.ucsd.edu/do-the-math/2011/07/galactic-scale-energy/)

<http://physics.ucsd.edu/do-the-math/2011/07/galactic-scale-energy/>

[Can Economic Growth Last?](http://physics.ucsd.edu/do-the-math/2011/07/can-economic-growth-last/)

<http://physics.ucsd.edu/do-the-math/2011/07/can-economic-growth-last/>

[dinner conversation with an economist](http://physics.ucsd.edu/do-the-math/2012/04/economist-meets-physicist/)

<http://physics.ucsd.edu/do-the-math/2012/04/economist-meets-physicist/>

[Discovering Limits to Growth.](http://physics.ucsd.edu/do-the-math/2011/09/discovering-limits-to-growth/)

<http://physics.ucsd.edu/do-the-math/2011/09/discovering-limits-to-growth/>

[Sustainable Means Bunkty to Me](http://physics.ucsd.edu/do-the-math/2011/10/sustainable-means-bunkty-to-me/)

<http://physics.ucsd.edu/do-the-math/2011/10/sustainable-means-bunkty-to-me/>

[The Energy Trap](http://physics.ucsd.edu/do-the-math/2011/10/the-energy-trap/)

<http://physics.ucsd.edu/do-the-math/2011/10/the-energy-trap/>

[Peak Oil Perspective](http://physics.ucsd.edu/do-the-math/2011/11/peak-oil-perspective/)

<http://physics.ucsd.edu/do-the-math/2011/11/peak-oil-perspective/>

[attitude adjustment](http://physics.ucsd.edu/do-the-math/2011/12/the-future-needs-an-attitude-adjustment/)

<http://physics.ucsd.edu/do-the-math/2011/12/the-future-needs-an-attitude-adjustment/>

[the-way-is-shut](http://physics.ucsd.edu/do-the-math/2012/02/the-way-is-shut/)

<http://physics.ucsd.edu/do-the-math/2012/02/the-way-is-shut/>

[my-great-hope-for-the-future](http://physics.ucsd.edu/do-the-math/2012/02/my-great-hope-for-the-future/)

<http://physics.ucsd.edu/do-the-math/2012/02/my-great-hope-for-the-future/>

[ruthless extrapolation](http://physics.ucsd.edu/do-the-math/2012/06/ruthless-extrapolation/)

<http://physics.ucsd.edu/do-the-math/2012/06/ruthless-extrapolation/>

[when-science-brings-bad-news](http://physics.ucsd.edu/do-the-math/2012/10/when-science-brings-bad-news/)

<http://physics.ucsd.edu/do-the-math/2012/10/when-science-brings-bad-news/>