



Arcadia University Center for Italian Studies

ROMA ESSU 360

Sustainability: A Simple Thing That Is Hard To Do

Credits: 4

Prerequisites: General knowledge of Mathematics and Physics (High School level.)

Course description

“Sustainable” and “Sustainability” have become very fashionable words, to be used in any possible context. As always in such cases, the widespread adoption of words presents positive and negative aspects. On the positive side, it means that a greatly appreciable concern for our future is creeping into mainstream thinking. On the negative side, words can become screens, behind which to hide one’s lack of real interest and decision, lip service, that is.

According to Brundtland (1987) “sustainable development is meeting the needs of the present generation without compromising the ability of future generations to meet their needs”. But long before that, Thomas Jefferson (1789) had stated a very similar concept: “Then I say the earth belongs to each ... generation during its course, fully and in its own right, no generation can contract debts greater than may be paid during the course of its own existence”. Or, paraphrasing the Holy Book, “do unto future generations that which you would have them do unto you”.

Finally, “A community is unsustainable if it consumes resources faster than they can be renewed, produces more wastes than natural systems can process or relies upon distant sources for its basic needs” (Sustainable Community Roundtable Report; www.olywa.net/roundtable, 2005).

Thus, the concept is quite simple. Its implementation, though, appears extremely difficult (hence, quoting Bertolt Brecht, the subtitle of this course).

Aim of the course is to provide students with information necessary to fill the words with meanings, and to review the obstacles and the possible solutions, in the hope that that, in turns, helps in developing the desire to translate concepts into real actions.

Learning Objectives and Desired Impact

The course is intended for a wide audience of students, particularly those concerned with the environment and its likely deterioration due to human activities. The general aim is to provide students with knowledge and tools enabling them to understand and cope with the main challenges posed by the need to combine high living standards with low environmental impact.

Students will:

- a) Understand the basic principles of sustainability and energy;
- b) Review the main available technological options;
- c) Recognize the complexity of the problem in its cultural, social, economic and technical aspects;
- d) Consider the interrelations between individual freedom and social interests;
- e) Question critically the very concept of “development”, at least as it is currently defined and accepted;

- f) Understand and appreciate the value of “diversity”, that is spatial and temporal relativity, when examining social and economic models.

Method

Lectures, seminar-based discussion, field visits.

Students will be required to read critically various texts, and to find, examine and compare web sites devoted to sustainability, and will be expected to discuss in class.

Subjects Covered

- Energy, Entropy and Exergy, or the First and the Second Principle of Thermodynamics
- Conventional and alternative energy sources and technologies
- Energy and lifestyle
- Life-cycle analysis of materials and components
- The ecological footprint
- Agriculture and industry
- Cities, villages, communities
- Buildings
- Transportation and urban planning
- Individual vs. collective interests and responsibility
- The economics of Sustainability
- Case-studies in Italy

Program

Lesson	Topic
1	Introduction. Sustainability: definitions, concepts, examples.
2	The Principles of Thermodynamics: Heat, Energy, Entropy, Exergy, Efficiency
3	Life-cycle analysis: concepts and examples
4	Non-renewable and renewable Energy Sources; Energy saving: an overview
5	Greenhouse effect and climate change
6	Bamboo, earth, wood: “new” construction materials
7	Heat transfer: conduction, convection, radiation
8	Radiation and materials
9	Sun movements: Sun-path diagrams. Solar energy
10	Energy and buildings: an overview
11	Electricity production and use
12	Natural and artificial lighting
Mid-term exam	
13	Description of the research paper to be prepared by students
14	Active solar systems
15	Passive solar systems and bio-climatic architecture
16	Passive cooling: traditional and modern technologies
17	Solar Cooling
18	Energy and Transportation
19	Field study: Tuscia
20	Bio-energy: bio-gas, bio-fuels. Dilemma: use crps as food, fuel, or food for animals?
21	Waste disposal: Re-using and Re-cycling
Field study: I Trulli	
22	Wind energy
23	Renewable energy and developing countries

24	Sustainable development and the economy of sustainability
25	Geothermal energy
26	Human comfort: thermal, visual, acoustic
27	Research papers presentation and discussion
Final exam: written test: multiple answers questions and a short essay	

Mid-Term and Final Exams

Student will be tested on the knowledge acquired and their ability to critically analyze that knowledge in a wider, global context.

Research Paper/Project

Students will be required to prepare a 10 page research paper on one of the topics discussed in the course or one of the case-studies examined. The final document will be in the form of a report, whose format and content will be detailed by the professor, to be delivered the week prior to final exams.

Grading

15% class participation

20% mid-term exam

25% final exam

25% final paper

15% oral and written quizzes

Textbooks

Articles, essays, papers and excerpts of books, provided by professor

Site visits

Given the importance of local conditions (climate, natural resources, social structure, historical background, infrastructures, etc.) in determining possible sustainable projects, participating students will have the opportunity to visit communities in various parts of Italy, where “sustainable” practices are implemented. Two Fridays will be dedicated to these site visits and students will be required to contribute a “lab fee” equal to the cost incurred of said visits.

At the end of the course, a two-days seminar will be held in the “Trulli” area in the region of Puglia, in Southern Italy.

References

1. Levine, R. S., Hughes, M. T., Mather, C. R., “Thesaurus Of Sustainability”, www.centerforsustainablecities.com
2. Bernal, J. D., *Science in History*, M.I.T. Press, Cambridge, MA, 1986
3. Butera, F., *Dalla caverna alla casa ecologica, storia del confort e dell'energia* (From Cave to Ecological House: A History of Comfort and Energy), 2007
4. Levine, R. S., Yanarella, E. J., Hughes, M. T., Mather, C. R., “The Sustainable City Game: Systems Dynamics Modeling Toward a Democratic Urban Design Process,” presented at the CORP conference, Vienna, Austria, 2005
5. Brower, D. R., Chapple, S., *Let the Mountains Talk, Let the Rivers Run: A Call to Save the Earth*, 2007
6. Lovins, A., Lovins, H., Hawken, P., *Natural Capitalism: Creating the Next Industrial Revolution*, 1999

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Links

- <http://www.centerforsustainablecities.com>
- <http://www.cscdesignstudio.com>
- <http://www.oikodrom.org>