ESM 609: Energy and Poverty Solutions

Course Syllabus – Spring 2013

General Information

Schedule: Sunday/Wednesday 1:15 – 2:30; Room 2

Instructor: Scott Kennedy, skennedy@masdar.ac.ae

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Web Site: We will be using the Source to post course materials online. The site will be updated with the syllabus, assignments, readings, software tools and other useful information.

Course Overview

Energy and Poverty Solutions examines the challenges of reducing poverty within developing communities by promoting improved access to modern energy services. Normative assumptions underlying various definitions and approaches for development are examined, with an emphasis on the human development and capabilities approach as a useful theoretical foundation. Statistical data and indicators on energy poverty and energy access are critically examined to better understand current global energy needs. Students learn and apply advanced tools and methodologies for localized energy needs assessment, energy planning, and design of integrated energy systems. Throughout the semester, students work in small teams on a structured, in-depth design project that addresses an energy related need for a specific community, and participate in a week-long visit to work with the community on the project. The course is highly interactive and multidisciplinary, and relies heavily on readings, class participation and the successful management of team projects.

Course Objectives

The course has been designed with the following objectives:

- Provide a critical understanding of current energy needs and the link to human and economic development.
- Impart relevant skills for designing, building and evaluating off-grid or "weak-grid" energy systems with a focus on development impact.
- Provide real-world experience in understanding and evaluating technical and systems level implementation challenges.

Course Grading

The course grade will be based upon reading reflections, regular assignments, a trip report for the field visit, and a final team report for the group design project. Reading reflection grades are based on written summaries of a required reading. Regular assignments consist of both written reports and class presentations completed individually or in assigned groups. In addition to the assignments and project, students will receive a grade based on a peer and self-assessment of their level of effort for the group assignments.

The following grading scheme will be used to determine the final course grade:

- Reading Reflections 20%
- Assignments: 20%
- Trip Report: 10%
- Final Project: 35%
- Final Presentation: 5%
- Team Effort: 10%

Course Readings

Readings will be assigned and provided periodically throughout the semester, primarily in electronic format. Reading reflections must be submitted prior to the start of a class in which readings are discussed.

Course Learning Outcomes

Through class participation, completion of reading and writing assignments, participation in field work, and group projects, students are expected to achieve the learning outcomes listed below.

1. Ability to identify normative bases underlying development policies, interpret development indicators, and critically evaluate development approaches;
2. Develop a clear understanding of the human development approach, multidimensional poverty, links between energy and poverty, and apply the concepts to a case study;
3. Ability to assess the energy needs of a developing community, design a potential solution, develop a deployment strategy, and successfully integrate perspectives and participation from the community;
4. Develop an informed perspective on the technical, economic, and social challenges behind deployment of energy systems in developing communities;
5. Improve teamwork and project management skills;
6. Recognize one's individual potential to make a positive impact as a social entrepreneur and develop an idea for a social enterprise.

Final Projects

An important and unique aspect of Energy and Poverty Solutions is the opportunity to visit and work with a developing community on issues directly related to their sustainable development. These projects are developed in consultation with the community and non-governmental or other organizations that work with the community. At the start of the semester, student teams will be formed and each team will focus on one or more particular topics (e.g., energy, health, governance) as they relate to the community. Teams will do an extensive background review in the first part of the semester and will then perform field analysis during the spring break. Projects will then be refined following the trip. A final community development strategy that leverages technology, economics, governance and other aspects from all groups will be developed and integrated. The final outcome will be in a single report/book format for the entire class.

It is expected that students will draw upon the existing and diverse expertise within their team to apply their combined skills to the design project. Each team member may therefore contribute uniquely according to his or her background, which may include technical expertise, project management, business plan development, modeling, or other skills.

Project Locations and Field Work

The location that each project team will visit will be finalized at the start of the semester. All students will be required to contribute significantly to the field project and are required to participate in the field work component of the course.

Important: Students considering taking this course must be aware that the traveling, living and working conditions at the locations they will be visiting may be very different and more difficult than what they are accustomed to. Due to the remote location of some potential sites, traveling to reach the community may be very physically demanding and a good level of physical fitness will be required.

Lecture List (subject to change)

Class	Topic	Description
1	Course Introduction	Course introduction, energy and poverty myths and ideas;
2	Poverty and Development Concepts	Poverty and development definitions; normative basis for policy formulation; different perspectives on development approaches;
3	Demographics of the Poor	Demographics and data on how the poor live;
4	Poverty Traps	Dynamic perspectives on poverty and development; Introduction to case study projects and discussion;
5	Case Study Project Introductions	Introduce project themes, partner organizations, initial team formation exercise
6	Development Indicators and Metrics	Measuring development, multidimensional poverty metrics, millennium development goals;

7	Global energy access	Energy consumption patterns in developing countries; current energy service needs; (potentially expand to 2 lectures)
8	Project Definition	Working session to define projects
9	Development and Climate Change	Interlinks between energy, development and climate change
10	Design Exercise	Group exercise for system design;
11	Energy system design concepts	Energy planning approaches, system design for development impact;
12	Energy planning and design tools	In-class exercise on HOMER
13	Participatory planning and design	Planning and design methods to engage participation of stakeholders and community;
14	Field work methods	Qualitative methods for field work; surveys; needs assessment; community participation;
15	Water Solutions	Water production and treatment for rural villages, case study examples;
16	Biomass Utilization	Conversion pathways (briquettes, combustion, gasification, pyrolysis)
17	BoP enterprise development	Ideas on enterprise development for the “bottom of the pyramid”; evaluation of case study
18	Trip planning	Logistics, presentation on prototypes and trip workplans
	Field Trip	Location TBD
19	Trip debrief	Group reports
20	Developing a business plan	Methods for developing a business plan
21	Full project proposals	Presentation on full project proposal and objectives for end of semester.
22	Case Study: TB treatment in India	Organizational management of Tuberculosis treatment program in India using system dynamics
23	Social Entrepreneurship	Definitions of social entrepreneurship and personal brainstorming
24	Case Study: Village Power Delivery	Case study of Husk Power and Avani - Gasification of biomass for electricity delivery
25	Gender Issues in Development	Gender, energy and poverty
26	Case Study: ICT and Development	Case studies on applications of information and communication technology for development

27	Project Workshop	In class work on projects
28	Project Workshop	In class work on projects
29	Final Presentations	Final presentations on course projects
30	Final Presentations	Final presentations on course projects