Course alpha, number, title: ME 417 Design of Alternative Energy Systems

Required or elective: Elective

Course (catalog) description: Analysis of alternative energy systems, including ocean, wind, fuel cells, solar, and nuclear. Predictive models for the systems. Design studies.

Prerequisite(s): ME 410 or concurrently

Textbook(s) and/or other required material: Class notes. Course web site (http://www.egr.msu.edu/classes/me417/benard).

Class/Lab schedule: Total Credits: 3 Lecture/Laboratory/Discussion Hours: 3/0/0

Topics covered:
1. Sociological, Political and Economic Aspects of Alternative Energy Sources
2. Review of basic thermal sciences and economic analysis
3. Fuel Cells
4. Wind Energy
5. Geothermal Energy
6. Ocean Energy
7. Solar Energy
8. Nuclear Energy
9. Biomass Energy
10. Energy Storage

Course learning objectives:
1. Students will develop and practice design skills as they apply to alternative energy systems.
   [L: Application] [M: Project report]
2. Students will learn how to use simple models to predict the behavior of alternative energy systems and can use these models to design such systems.
   [L: Application] [M: Question in Exams/Quizes]
3. Students will gain an understanding of the social, political, and economic aspects of alternative energy sources.
   [L: Application] [M: Project report]

Relationship of course to ME program outcomes:
The following measurement standard is used to evaluate the relationship between the course outcomes and the educational-program outcomes:
2 = Strong Emphasis, 1 = Some Emphasis, 0 = Little or No Emphasis.
(a) an ability to apply knowledge of mathematics, science, and engineering—2
(b) an ability to design and conduct experiments, as well as to analyze and interpret data—1
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability—2
(d) an ability to function on multidisciplinary teams—2
(e) an ability to identify, formulate, and solve engineering problems—2
(f) an understanding of professional and ethical responsibility—1
(g) an ability to communicate effectively—1
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context—1
(i) a recognition of the need for and the ability to engage in life-long learning—0
(j) a knowledge of contemporary issues—1
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice—2
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<thead>
<tr>
<th>Contribution to professional component:</th>
<th>Engineering Science 30% Engineering Design 70%</th>
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<tbody>
<tr>
<td>Person(s) who prepared this description</td>
<td>Craig Somerton and Andre Bénard</td>
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<td>Date of Preparation</td>
<td>2011, updated 2014</td>
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