Central Michigan University
College of Science and Technology
School of Engineering & Technology

Master Course Syllabus

IET 680  Sustainability and Green Technology  3 ( 3 - 0 )
Desig. & #  Full Title of Course  Credits (Mode)

I.  Bulletin Description:

This class seeks to apply the concepts of engineering and technology utilizing the framework of sustainability related to green energy technology.

II.  Prerequisites, Pre/Co-requisites, Co-requisites, Recommended:

IET 524

III.  Rationale for Course Level:

IET 680 is for graduate students only. The subject material covers advanced topics in the area of sustainability. The students will require advanced knowledge acquired in IET 524 to be successful in this course.

IV.  Suggested Textbooks:


V.  Other Requirements and/or Materials for the Course:

None

VI.  Student Learning Course Objectives:

Upon completion of this course, the student will be able to:

1. Define the various types of sustainability.
2. Demonstrate the use of the concepts underlying the use sustainability.
3. Able to apply the various measures of sustainability.
4. Synthesize the concepts of green design and engineering.
5. Calculate energy balance with a focus on batteries and fuel cells.
6. Describe and report the underlying concepts used to discuss various sustainability concepts.
7. Perform the life cycle analysis calculation (LCA) utilized in sustainability.
8. Evaluate and judge various levels of sustainability for different applications
10. Calculate and determine the life cycle cost (LCC) of a product using concepts based on value stream mapping

VII. Suggested Course Outline:

Week 1: Introduction to definitions and concepts underlying sustainability
Week 2-3: State of the world using measures of sustainability
Week 4: Mass conservation & closed energy cycles
Week 5: Green Design & Green Manufacturing Concepts
Week 6: Energy Balance – The case of electric batteries and fuel cells
Week 7: Mass and Energy Transport Systems
Week 8: Mid-Term Examination + Project Proposals Due
Week 9: Economic Concepts: Net Present Value (NPV) calculations
Week 10: Optimization Problems & resource allocation in sustainability
Week 11: Value Stream Mapping (VSM) – Theory and practice
Week 12-14: Life Cycle Analysis (LCA): Theory – Applications - Examples
Week 15: Summary & Conclusions + Final Term Projects Presentations
Week 16: Written Final Examination

VIII. Suggested Course Evaluation:

<table>
<thead>
<tr>
<th></th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Mid-Term Examination (week 8)</td>
<td>20 %</td>
</tr>
<tr>
<td>Homework Assignments</td>
<td>30 %</td>
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<tr>
<td>Class Project</td>
<td>25 %</td>
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<tr>
<td>Final Examination (week 16)</td>
<td>25 %</td>
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IX. Bibliography:


Syllabus Prepared By:

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Typed Name of Faculty, Credentials

November 5, 2010

Date