ESG 212 INTRODUCTION TO ENVIRONMENTAL MATERIALS ENGINEERING
(ELECTIVE)
Credit: 3

COURSE CATALOG DESCRIPTION:
Multidisciplinary, materials-oriented approach to environmental and civil engineering, incorporating the concept of sustainable development: basic principles, including pollutant transport, water quality, waste and waste water treatment, energy systems and energy efficiency, use of sustainable building materials, ‘green’ manufacturing and pollution prevention, engineering materials issues unique to construction. Use of field and laboratory sensors and analytical tools will be discussed and demonstrated. Project and problem-based approach to design of structures and materials engineering, incorporating environmental considerations.

PRE- OR COREQUISITE(S): ESG 100 or ESG 201; ESG 198 or equivalent

TEXT(S) OR OTHER REQUIRED MATERIAL:

<table>
<thead>
<tr>
<th>COURSE LEARNING OUTCOMES</th>
<th>SOS</th>
<th>ASSESSMENT TOOLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understand impact of toxic chemicals on the environment</td>
<td>a,h, j</td>
<td>Homeworks, exams</td>
</tr>
<tr>
<td>Use of basic principles of energy efficiency and the role of materials selection in designing energy efficient structures</td>
<td>a, b, c, e, f, h, j, k</td>
<td>Homeworks, exams, course project, project presentation</td>
</tr>
<tr>
<td>Being able to describe several sustainable building materials</td>
<td>g,h</td>
<td>Course project, project presentations</td>
</tr>
</tbody>
</table>

COURSE TOPICS

Week 1. Design needs of environmental engineering and sustainable design Policy and global issues
Week 2. Basics of environmental materials chemistry
Week 3. Pollutant transport Basics of biogeochemical principles
Week 4. Water resource engineering Materials for water treatment technologies
Week 5. Methods of environmental remediation Wastewater treatment
Week 6. Materials in environmental remediation systems Filtration, barriers, bioremediation
Week 7. Pollution prevention and energy conservation in manufacturing Midterm
Week 8. Materials for energy generation and infrastructure development
Week 9. Basic concepts of building design and construction
Week 10. Materials for civil and construction engineers
Week 11. Material and soil mechanics
Week 12. Development and use of sustainable building materials Design of “green” buildings
Week 13. Sustainable engineering and development Methods and case studies
Week 14-15 Class presentations on semester projects Course final exam
CLASS/ LABORATORY SCHEDULE

<table>
<thead>
<tr>
<th>ESM</th>
<th>212</th>
<th>Environmaterials Engineering</th>
<th>LEC</th>
<th>1</th>
<th>TU</th>
<th>3:50 PM</th>
<th>6:40 PM</th>
</tr>
</thead>
</table>

CURRICULUM
This course contributes 3 credit hours toward meeting the required 48 hours of engineering topics.

STUDENT OUTCOMES (SCALE 1-3):

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
<th>K</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td></td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

3 – Strongly supported  2 – Supported  1- Minimally supported

LEAD COORDINATOR(S) WHO PREPARED THIS DESCRIPTION AND DATE OF PREPARATION:
Alexander Orlov       5/21/10