EE-3190
Optical Sensing and Imaging

Curricular Designation:  EE: required    CpE: required

Catalog Description:
EE 3190 – Optical Sensing and Imaging  Optical sensing techniques, including imaging and non-imaging systems. Credits: 3.0  Lec-Rec-Lab: (3-0-0)  Semesters Offered: Fall
Restrictions: Must be enrolled in one of the following Major(s): Computer Engineering, Electrical Engineering, Physics  Pre-requisites: EE 2190 or EE 4800.

Textbooks(s) and/or Other Required Materials:
1. Need Text Info

Prerequisites by Topic:
1. Familiarity with the basics of electromagnetics and geometrical optics.
2. Familiarity with basics of light detection and conversion to electrical signals.

Course Objectives:
1. Understand two dimensional signals fundamental to analyzing optical systems.
2. Understand and be able to use diffraction theory to model propagation and imaging problems.
3. Understand and be able to model various sensing and imaging systems.
4. Understand basic remote sensor designs, tradeoffs, and sensing modes.
5. Understand basics of data calibration and processing.

Topics Covered:
1. Nature of remote sensing.
2. Optical radiation models.
4. Data models.
5. Spectral transforms.
7. Correction and calibration.
**Relationship of the Course Content to Program Outcomes:**

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Topics and Level of Coverage</th>
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<tbody>
<tr>
<td>a</td>
<td>an ability to apply knowledge of mathematics, science and engineering</td>
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<tr>
<td>b</td>
<td>an ability to design and conduct experiments, as well as to analyze and interpret data</td>
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<tr>
<td>c</td>
<td>the ability to design a system, component, or process to meet desired needs within realistic constraints such as...</td>
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<td>d</td>
<td>an ability to function on multi-disciplinary teams</td>
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<td>e</td>
<td>an ability to identify, formulate and solve engineering problems</td>
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<td>f</td>
<td>an understanding of professional and ethical responsibility</td>
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<td>g</td>
<td>an ability to communicate effectively</td>
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<tr>
<td>h</td>
<td>the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context</td>
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<tr>
<td>i</td>
<td>a recognition of the need for, and an ability to engage in life-long learning</td>
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<td>j</td>
<td>a knowledge of contemporary issues</td>
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<td>k</td>
<td>the ability to use the techniques, skills, and modern engineering tools necessary for the practice of electrical engineering</td>
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**Contribution of Course to Meeting Degree Requirements:**

3 Credit Hours – Engineering Topics

**Class/Laboratory Schedule** (note: 1 hour = 50 minutes):
Lecture: 42 hours = 3 hours/week for 14 weeks

**Prepared by:**
Michael Roggemann, Professor, March 5, 2010