NEW COURSE: COS-IMGS-251-Radiometry

1.0 Course Designations and Approvals

<table>
<thead>
<tr>
<th>Required course approvals:</th>
<th>Approval request date:</th>
<th>Approval granted date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic Unit Curriculum Committee</td>
<td>7/23/10</td>
<td>8/17/10</td>
</tr>
<tr>
<td>College Curriculum Committee</td>
<td>10/19/10</td>
<td>11/4/2010</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Optional designations:</th>
<th>Is designation desired?</th>
<th>*Approval request date:</th>
<th>**Approval granted date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Education:</td>
<td>No</td>
<td></td>
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<tr>
<td>Writing Intensive:</td>
<td>No</td>
<td></td>
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<tr>
<td>Honors</td>
<td>No</td>
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2.0 Course information:

<table>
<thead>
<tr>
<th>Course title:</th>
<th>Radiometry</th>
</tr>
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<tbody>
<tr>
<td>Credit hours:</td>
<td>3</td>
</tr>
<tr>
<td>Prerequisite(s):</td>
<td>COS-MATH-182, COS-PHYS-212</td>
</tr>
<tr>
<td>Co-requisite(s):</td>
<td></td>
</tr>
<tr>
<td>Course proposed by:</td>
<td>Emmett Ientilucci</td>
</tr>
<tr>
<td>Effective date:</td>
<td>September 2013</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contact hours</th>
<th>Maximum students/section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classroom</td>
<td>2</td>
</tr>
<tr>
<td>Lab</td>
<td>3</td>
</tr>
<tr>
<td>Studio</td>
<td></td>
</tr>
<tr>
<td>Other (specify)</td>
<td></td>
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</table>

2.1 Course Conversion Designation (Please check which applies to this course)

X Semester Equivalent (SE) Please indicate which quarter course it is equivalent to: 1051-370

Semester Replacement (SR) Please indicate the quarter course(s) this course is replacing:

New
2.2 Semester(s) offered (check)

<table>
<thead>
<tr>
<th>Fall</th>
<th>Spring</th>
<th>X</th>
<th>Summer</th>
<th>Other</th>
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</thead>
</table>

All courses must be offered at least once every 2 years. If course will be offered on a biannual basis, please indicate here:

2.3 Student Requirements

**Students required to take this course:** (by program and year, as appropriate)
IMG SCI 2nd year. Digital Cinema 2nd year.

**Students who might elect to take the course:**
Film and Video, Environmental Science, Physics

3.0 Goals of the course (including rationale for the course, when appropriate):

3.1 To learn the tools and vernacular associated with the measurement and quantification of light energy.
3.2 To provide the necessary skills to solve a broad range of source-propagation-sensor problems, use detector figures of merit to compute the feasibility of using these detectors to measure and record various signals.
3.3 To calculate the signal recorded by an imaging system given radiometric characterizations of a scene.

4.0 Course description (as it will appear in the RIT Catalog, including pre- and co-requisites, and quarters offered). Please use the following format:

**COS-IMGS-251 Radiometry**
This course introduces the concepts of quantitative measurement of electromagnetic energy. The basic radiometric and photometric terms are introduced using calculus-based definitions. Governing equations for source propagation and sensor output are derived. Simple source concepts are reviewed and detector figures of merit are introduced and used in problem solving. The radiometric concepts are then applied to simple imaging systems so that a student could make quantitative measurements with imaging instruments. (COS-MATH-182, COS-PHYS-212) **Class 2, Lab 3, Credit 3 (F)**

5.0 Possible resources (texts, references, computer packages, etc.)

5.1 Notes delivered in class
6.0 **Topics (outline):**

- 6.1. Definitions and terms
- 6.2. Blackbody radiation
- 6.3. Radiation sources
- 6.4. Irradiance and distance
- 6.5. Detectors
- 6.6. Radiance
- 6.7. Photometry
- 6.8. Detector figures of merit
- 6.9. Spectroradiometry
- 6.10. Properties of materials
- 6.11. Imaging systems
- 6.12. Integrating spheres
- 6.13. Non-point sources

7.0 **Intended course learning outcomes and associated assessment methods of those outcomes**

<table>
<thead>
<tr>
<th>Course Learning Outcome</th>
<th>Assessment 1</th>
<th>Assessment 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.1 Solve simple quantitative source-propagation-sensor radiation transfer problems</td>
<td>Homework and quizzes</td>
<td>Exams</td>
</tr>
<tr>
<td>7.2 Derive and use governing equations for using simple imaging devices as quantitative radiometer.</td>
<td>Lab reports</td>
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8.0 **Program outcomes and/or goals supported by this course**

This course supports the Imaging Science program goal of training students to be able to quantitatively describe the electromagnetic propagation of energy as recorded by imaging devices.
<table>
<thead>
<tr>
<th>Communication</th>
<th>Assessment Method</th>
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<tbody>
<tr>
<td>Express themselves effectively in common college-level written forms using standard American English</td>
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<tr>
<td>Revise and improve written and visual content</td>
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<tr>
<td>Express themselves effectively in presentations, either in spoken standard American English or sign language (American Sign Language or English-based Signing)</td>
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<tr>
<td>Comprehend information accessed through reading and discussion</td>
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<tr>
<td>Intellectual Inquiry</td>
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<tr>
<td>Review, assess, and draw conclusions about hypotheses and theories</td>
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<td>Analyze arguments, in relation to their premises, assumptions, contexts, and conclusions</td>
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<tr>
<td>Construct logical and reasonable arguments that include anticipation of counterarguments</td>
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<td>Use relevant evidence gathered through accepted scholarly methods and properly acknowledge sources of information</td>
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<tr>
<td>Ethical, Social and Global Awareness</td>
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<tr>
<td>Analyze similarities and differences in human experiences and consequent perspectives</td>
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<tr>
<td>Examine connections among the world’s populations</td>
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<tr>
<td>Identify contemporary ethical questions and relevant stakeholder positions</td>
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<tr>
<td>Scientific, Mathematical and Technological Literacy</td>
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<tr>
<td>Explain basic principles and concepts of one of the natural sciences</td>
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<tr>
<td>Apply methods of scientific inquiry and problem solving to contemporary issues</td>
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<tr>
<td>Comprehend and evaluate mathematical and statistical information</td>
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<tr>
<td>Perform college-level mathematical operations on quantitative data</td>
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<td>Describe the potential and the limitations of technology</td>
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<tr>
<td>Use appropriate technology to achieve desired outcomes</td>
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<tr>
<td>Creativity, Innovation and Artistic Literacy</td>
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<tr>
<td>Demonstrate creative/innovative approaches to course-based assignments or projects</td>
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<tr>
<td>Interpret and evaluate artistic expression considering the cultural context in which it was created</td>
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10.0 Other relevant information (such as special classroom, studio, or lab needs, special scheduling, media requirements, etc.)

10.1 Smart classroom
10.2 Lab spaces/rooms that are dark (i.e., absence of light)