ROCHESTER INSTITUTE OF TECHNOLOGY
COURSE OUTLINE FORM

COLLEGE OF SCIENCE

Chester F. Carlson Center for Imaging Science

NEW COURSE: COS-IMGS-251-Radiometry

1.0 Course Designations and Approvals

Required course approvals:	**Approval request date:**	**Approval granted date:**
Academic Unit Curriculum Committee	7/23/10	8/17/10
College Curriculum Committee	10/19/10	11/4/2010

Optional designations:	**Is designation desired?**		***Approval request date:**	****Approval granted date:**
General Education:		No		
Writing Intensive:		No		
Honors		No		

2.0 Course information:

Course title:	Radiometry
Credit hours:	3
Prerequisite(s):	COS-MATH-182, COS-PHYS-212
Co-requisite(s):	
Course proposed by:	Emmett Ientilucci
Effective date:	September 2013

	Contact hours	**Maximum students/section**
Classroom	2	30
Lab	3	12
Studio		
Other (specify)		

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)

Fall	Spring X	Summer	Other

All courses must be offered at least once every 2 years. If course will be offered on a bi-annual 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

Course Learning Outcome	Assessment 1	Assessment 2
7.1 Solve simple quantitative source-propagation-sensor radiation transfer problems	Homework and quizzes	Exams
7.2 Derive and use governing equations for using simple imaging devices as quantitative radiometer.	Lab reports	

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.

9.0

	General Education Learning Outcome Supported by the Course	Assessment Method
Communication		
	Express themselves effectively in common college-level written forms using standard American English	
	Revise and improve written and visual content	
	Express themselves effectively in presentations, either in spoken standard American English or sign language (American Sign Language or English-based Signing)	
	Comprehend information accessed through reading and discussion	
Intellectual Inquiry		
	Review, assess, and draw conclusions about hypotheses and theories	
	Analyze arguments, in relation to their premises, assumptions, contexts, and conclusions	
	Construct logical and reasonable arguments that include anticipation of counterarguments	
	Use relevant evidence gathered through accepted scholarly methods and properly acknowledge sources of information	
Ethical, Social and Global Awareness		
	Analyze similarities and differences in human experiences and consequent perspectives	
	Examine connections among the world's populations	
	Identify contemporary ethical questions and relevant stakeholder positions	
Scientific, Mathematical and Technological Literacy		
	Explain basic principles and concepts of one of the natural sciences	
	Apply methods of scientific inquiry and problem solving to contemporary issues	
	Comprehend and evaluate mathematical and statistical information	
	Perform college-level mathematical operations on quantitative data	
	Describe the potential and the limitations of technology	
	Use appropriate technology to achieve desired outcomes	
Creativity, Innovation and Artistic Literacy		
	Demonstrate creative/innovative approaches to course-based assignments or projects	
	Interpret and evaluate artistic expression considering the cultural context in which it was created	

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)