ROCHESTER INSTITUTE OF TECHNOLOGY
COURSE OUTLINE FORM

COLLEGE OF SCIENCE

Chester F. Carlson Center for Imaging Science

NEW COURSE: COS-IMGS-739 Principles of Solid State Imaging Arrays-X

1.0 Course Designations and Approvals

Required course approvals:	**Approval request date:**	**Approval granted date:**
Academic Unit Curriculum Committee	3-31-2011	4-1-2011
College Curriculum Committee	4-29-2011	5-3-2011

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:	Principles of Solid State Imaging Arrays
Credit hours:	3
Prerequisite(s):	Graduate status in Imaging Science or by permission of instructor
Co-requisite(s):	None
Course proposed by:	Zoran Ninkov
Effective date:	Fall 2013

	Contact hours	**Maximum students/section**
Classroom	3	15
Lab		
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: 1051-739 Principles of Solid State Imaging Arrays
	Semester Replacement (SR) Please indicate the quarter course(s) this course is replacing:
	New

2.2 Semester(s) offered (check)

Fall x	Spring	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)
First or second year graduate students following the Instrumentation concentration in the AST program.

Students who might elect to take the course:
Advanced undergraduate and graduate students in Imaging Science. Other undergraduate and graduate students in the College of Science, Engineering and Imaging Arts and Sciences may take the class with the permission of the instructor.

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

To understand the underlying principles which govern the design of a variety of CMOS and Infrared Imaging Arrays. To understand the source of limitations in such arrays as they pertain to fundamental principles of science and engineering.

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-739-X **Principles of Solid State Imaging**
This course covers the basics of solid state physics, electrical engineering, linear systems and imaging needed to understand modern focal plane array design and use. The course emphasizes knowledge of the working of CMOS and infrared arrays. (Graduate status in Imaging Science or by permission of instructor) **Class 3, Credit 3 (F)**

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

5.1 Ohta, Jun, *Smart CMOS Image Sensors and Applications*, CRC Press, Boca Raton, FL

6.0 Topics (outline):

6.1 Photons in semiconductors (energy bands and materials)
6.2 The PN junction
6.3 Semiconductor photodetectors
6.4 Noise, sampling techniques and output circuits for noise minimizations in imagers
6.5 Hybridized arrays
6.6 Design of a sample focal plane arrays
6.7 Detector materials and their limitations.
6.8 Evolving new current detector arrays.

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

Course Learning Outcome	Test and Exams	Homework	Term Paper and Presentation
7.1 Explain the photon detection and readout processes used in CMOS type detectors.	x	x	
7.2 Evaluate the limitations to practical operation of these detectors.	x	x	
7.3 Summarize new detector technology developments.	x	x	x

8.0 Program outcomes and/or goals supported by this course

8.1 To provide students with a depth and breadth of knowledge of detectors and related technologies.
8.2 Provide students with a depth and breadth of knowledge of astrophysics and related technologies, enabling them to develop as effective researchers and/or educators.
8.3 To develop the student's skills in applying mathematical techniques and scientific reasoning to different laboratory situations.

9.0 N/A

10.0 Other relevant information (such as special classroom, studio, or lab needs, special scheduling, media requirements, etc.)

10.1 Smart Classroom