



**ROCHESTER INSTITUTE OF TECHNOLOGY
COURSE OUTLINE FORM**

COLLEGE OF SCIENCE

Chester F. Carlson Center for Imaging Science

NEW COURSE: COS-IMGS-728 Design and Fabrication of Solid State Camera-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:	Design and Fabrication of Solid State Camera
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	1	15
Lab	6	15
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: 1051-728 Design and Fabrication of Solid State Camera
	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
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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 concentrations 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 and Engineering 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 operation of a CCD camera by understanding the underlying theory and by building such a camera system.

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-728-X Design and Fabrication of Solid State Camera
 The purpose of this course is to provide the student with hands-on experience in building a CCD camera. The course provides the basics of CCD operation including an overview, CCD clocking, analog output circuitry, cooling, and evaluation criteria. (Graduate status in Imaging Science or by permission of instructor) **Class 1, Lab 6, Credit 3 (F)**

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

Janesick, J., *The Scientific Charge Coupled Device*, SPIE Press, Spokane, WA

6.0 Topics (outline):

- 6.1 Overview of CCDs
- 6.2 CCD clocking : how and why
- 6.3 Charge coupling and charge transfer efficiency
- 6.4 Analog Output Circuitry
- 6.5 Peltier Cooling
- 6.6 Evaluation Criteria and metrics for CCD performance

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

Course Learning Outcome	Test and Exams	Homework	Lab Book and Oral Exam
7.1 Explain how a CCD operates	x	x	x
7.2 Assemble a CCD camera including	x	x	x

electronics and cooling system.			
7.3 Rate the basic operability of the CCD camera built.	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 Dedicated laboratory for assembly of the cameras
10.2 Smart classroom

Programform.doc

NYSED Documentation Form

Audience

This document is intended for all department chairs and program directors.

Summary

This document includes the information and required forms for submission of program to NYSED for semester conversion.

Change Log

Responsible	Date	Version	Short description
<your name here>	<date>	1	Document originator