ROCHESTER INSTITUTE OF TECHNOLOGY
COURSE OUTLINE FORM

COLLEGE OF SCIENCE

Chester F. Carlson Center for Imaging Science

New Course: COS-IMGS-221-Vision and Psychophysics

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:	Vision & Psychophysics
Credit hours:	3
Prerequisite(s):	CIAS-SOFA-103 or permission of instructor
Co-requisite(s):	None
Course proposed by:	Jeff B. Pelz
Effective date:	Fall 2013

	Contact hours	**Maximum students/section**
Classroom	3	30
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: 1051-400 *Vision & Psychophysics*
	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)

Second-year majors in Imaging Science and Digital Cinema

Students who might elect to take the course:

Diagnostic medical sonography, Psychology, Biomedical photography; others with permission of instructor

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

This course provides a detailed overview of the components of the human visual system and the tools used to make quantitative measurements of perceptual phenomena (psychophysics). Components include physical aspects (*e.g.*, visual optics and photoreceptors) and neural processes such as retinal and cortical processing.

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-221 Vision & Psychophysics

This course presents an overview of the organization and function of the human visual system and some of the psychophysical techniques used to study visual perception. (CIAS-SOFA-103 or permission of instructor) **Class 3, Credit 3 (F)**

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

5.1 J.M. Wolfe, K.R. Kluender, D. M. Levi, L.M. Bartoshuk, R.S. Herz, R.L. Klatzky, and S.J. Lederman*, Sensation and Perception*, Sinauer Associates, Inc., Sunderland MA.

5.2 Selected chapters from: G.A. Gescheider, *Psychophysics: The Fundamentals*, Psychology Press, Oxford, UK

5.3 Journal articles

6.0 Topics (outline):

- 6.1 Vision as Imaging Chain; Visual Optics
  - 6.1.1 Cornea
  - 6.1.2 Lens
  - 6.1.3 Accommodation
  - 6.1.4 Refractive errors
  - 6.1.5 Spectacle correction (glasses, contact lenses, laser surgery)
  - 6.1.6 The Inverse problem
- 6.2 Photodetector array
  - 6.2.1 Rods and cones
  - 6.2.2 Foveal/peripheral distribution
  - 6.2.3 Spectral selectivity of cone classes
- 6.3 Retinal processing
  - 6.3.1 Retinal cells; rods, cones, horizontal, bipolar, amacrine, and ganglion
  - 6.3.2 Lateral inhibition
  - 6.3.3 Retinal receptive fields
- 6.4 Cortical Processing
  - 6.4.1 Optic nerve/chiasma
  - 6.4.2 Lateral geniculate nucleus
  - 6.4.3 Cortical pathways
- 6.5 Spatial Vision
  - 6.5.1 Contrast sensitivity function
  - 6.5.2 Acuity/hyperacuity
  - 6.5.3 Visual fields
- 6.6 Depth and size perception
  - 6.6.1 Monoclar cues
  - 6.6.2 Binocular cues
- 6.7 Color perception
  - 6.7.1 Principle of univariance
  - 6.7.2 Trichromatic *vs.* opponent models
  - 6.7.3 Color constancy
- 6.8 Temporal and motion perception
  - 6.8.1 Flicker and apparent motion
  - 6.8.2 Motion selectivity mechanisms
  - 6.8.3 Retinal stabilization and destabilization; eye movements
- 6.9 Visual Psychophysics
  - 6.9.1 Classical methods
  - 6.9.2 Signal detection theory
- 6.10 Depth Perception
  - 6.10.1 Depth cues; 2D, 3D-spatial, & 3D-motion
  - 6.10.2 Binocular disparity

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

Course Learning Outcome	Homework	Examinations	Computational assignments
7.1 Identify individual components of the human visual system	X	X	
7.2 Describe the human visual system as an imaging chain	X	X	
7.3 Describe optical image formation in human visual system	X	X	X
7.4 Describe retinal processing	X	X	X
7.5 Describe classical psychophysical techniques	X	X	X
7.6 Describe signal-detection theory techniques	X	X	X

8.0 Program outcomes and/or goals supported by this course

Application of knowledge of imaging systems to formulate, analyze, and solve practical problems in imaging science.

	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.)

Smart classroom, access to laboratory for demonstrations