ROCHESTER INSTITUTE OF TECHNOLOGY
COURSE OUTLINE FORM

COLLEGE OF IMAGING ARTS & SCIENCES

School of Film and Animation

REVISED COURSE: CIAS-SOFA-103-FilmVideoMaterialsTechnology

1.0 Course Designations and Approvals

Required course approvals:	**Approval request date:**	**Approval granted date:**
Academic Unit Curriculum Committee	1/10/11	1/14/11
College Curriculum Committee	1/14/11	1/25/11

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

2.0 Course information:

Course title:	Film/Video Materials & Technology
Credit hours:	3
Prerequisite(s):	MATH-171 Calculus A or MATH-181 Project-based Calculus 1 or MATH-181A Calculus I
Co-requisite(s):	none
Course proposed by:	David Long
Effective date:	Fall 2013

	Contact hours	**Maximum students/section**
Classroom	2	20
Lab	3	20
Studio		
Other (specify)		

2.a Course Conversion Designation* (Please check which applies to this course).**
*For more information on Course Conversion Designations please see page four.

X	Semester Equivalent (SE) Please indicate which quarter course it is equivalent to: 2065-231 Film, Video Materials & Technology
	Semester Replacement (SR) Please indicate the quarter course(s) this course is replacing:
	New

2.b 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.c Student Requirements

Students required to take this course: (by program and year, as appropriate) DIGCIME-BS, IMGS-BS
Students who might elect to take the course: FILMAN-BFA

In the sections that follow, please use sub-numbering as appropriate (eg. 3.1, 3.2, etc.)

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

3.1 This course will introduce students to basic imaging science and imaging physics principles
3.2 This course will introduce basic tenets of human vision and visual perception
3.3 This course will provide foundation knowledge in motion picture imaging systems and their design
3.4 This course will offer elementary instruction in digital imaging theories, including digital image processing and compression

4.0 Course description

Course Number: SOFA-103
Name of Course: Film/Video Materials & Technology
Short course title: F/V Materials and Tech
Pre-requisite: MATH-171 Calculus A or MATH-181 Project-based Calculus 1or MATH-181 Calculus I or Instructor Permission
Class 2, Lab 3, Credit 3 (Spring)

This course provides an introductory overview of the basic engineering and scientific principles associated with motion picture technologies. Topics covered include imaging physics, photographic science, human vision and perception, image capture and display technologies (both analog and digital) and digital image processing. This course is taught using both mathematical and phenomenological presentation and prepares students to proceed with more in-depth investigation of these fields in subsequent imaging science and digital cinema courses. Accompanying laboratory exercises provide hands-on experience with the presented concepts.

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

5.1 Course Notes
5.2 "Imaging in the Physical Sciences" (not published) – Joe Pow, Maria Helguera (RIT)

6.0 Topics (outline):

6.1 Imaging Physics
- 6.1.1 Electromagnetic Radiation
- 6.1.2 Wave-Particle Duality
- 6.1.3 Interaction of Light and Matter (Speed of Light, Refraction, Diffraction, Reflection, Absorption, Transmission, Scatter)
- 6.1.4 Geometric Radiometry
- 6.1.5 Geometric Optics (Ray Tracing, Lens Equations)

6.2 Photographic Science
- 6.2.1 F/stop
- 6.2.2 Exposure Control
- 6.2.3 Depth-of-Field
- 6.2.4 Field-of-View

6.3 Image Perception and Color Science
- 6.3.1 Human Color Vision
- 6.3.2 Additive & Subtractive Color Reproduction
- 6.3.3 Psychophysics and Appearance Phenomena
- 6.3.4 Color Systems, Color Encoding, Colorimetry
- 6.3.5 Tone Reproduction

6.4 Digital Image Structure
- 6.4.1 Subsampling and Quantization
- 6.4.2 Digital Image Artifacts
- 6.4.3 Raster/Vector Graphics
- 6.4.4 Histograms, 1D Look-up Tables, Interpolation, Convolution
- 6.4.5 Aspect Ratio
- 6.4.6 Digital Image Compression

6.5 Introduction to Moving Images & Video Science
- 6.5.1 Jitter & Flicker, Human Motion Perception
- 6.5.2 Historical Motion Imaging Systems
- 6.5.3 Interlace
- 6.5.4 Video Science – Color, Resolution & Framerate
- 6.5.5 Video Capture and Transmission Standards

6.6 Introduction to Motion Picture Film
- 6.6.1 Camera, Intermediate, Print Films
- 6.6.2 Traditional Workflows
- 6.6.3 Film Structure – Color Science and Photochemistry
- 6.6.4 Sensitometry and Densitometry
- 6.6.5 Scanning & Recording

6.7 Introduction to Digital Image Capture Technology
  6.7.1 CCD & CMOS Sensors
  6.7.2 Color Filter Arrays and Sensor Architecture
  6.7.3 Image Quality Characteristics in Digital Devices

6.8 Introduction to Sound
  6.8.1 Basic Acoustics and Wave Theory
  6.8.2 Digital Sampling Theory
  6.8.3 Sound on Film

6.9 Introduction to Digital Post-Production
  6.9.1 Digital Intermediate
  6.9.2 Modern Workflows

7.0 Intended course learning outcomes and associated assessment methods of those outcomes (please include as many Course Learning Outcomes as appropriate, one outcome and assessment method per row).

Course Learning Outcome	Assessment Method
7.1 Describe basic components of the imaging chain	Homework, quizzes, exams
7.2 Demonstrate knowledge of photographic camera settings and image appearance impact	Projects
7.3 Describe interaction of light and matter in context of imaging and optics applications	Homework, quizzes, exams, projects
7.4 Distinguish human color vision and appearance phenomena that must be considered when engineering motion imaging systems	Homework, quizzes, exams
7.5 Demonstrate skills in digital image processing and digital image manipulation (color and tone, resolution, sharpness, noise)	Projects
7.6 Demonstrate understanding of digital image compression and image quality impacts	Projects
7.7 Describe application of both film and digital imaging systems in modern motion picture workflows	Homework, quizzes, exams
7.8 Demonstrate computational proficiency in modeling imaging physics phenomena	Projects
7.9 Measure densitometric, spectral and radiometric quantities in typical imaging setting	Projects
7.10 Calibrate a digital monitor	Projects

8.0 Program outcomes and/or goals supported by this course

8.1 Develop student proficiency in relevant technologies, including but not limited to image capture devices, imaging physics, image processing, post-production workflows and exhibition standards and equipment 8.2 Train students to develop analytical engineering and problem solving skills resulting from a focus on scientific theory, concept derivation and laboratory experimentation

9.0

	General Education Learning Outcome Supported by the Course, if appropriate	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		
X	Explain basic principles and concepts of one of the natural sciences	Quizzes, exams, homework
X	Apply methods of scientific inquiry and problem solving to contemporary issues	Projects
X	Comprehend and evaluate mathematical and statistical information	Projects
X	Perform college-level mathematical operations on quantitative data	Homework, projects
X	Describe the potential and the limitations of technology	Quizzes, exams, homework
X	Use appropriate technology to achieve desired outcomes	Projects
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.)
