

**Rochester Institute of Technology  
Rochester, New York**

COLLEGE of SCIENCE  
Center for Imaging Science

REVISED COURSE: 1051-402

- 1.0 **Title:** Color Science **Date:** Feb. 21, 2003  
**Credit Hours:** 4  
**Prerequisite(s):** 1051-400, Vision & Psychophysics  
1051-401, Radiometry  
**Course proposed by:** Mark D. Fairchild

2.0 **Course information:**

	Contact hours	Maximum students/section
Classroom	4	20
Lab		
Studio		
Other (specify _____)		

**Quarter(s) offered (check)**

Fall     Winter     Spring     Summer

**Students required to take this course:**

Majors in the Center for Imaging Science (3<sup>rd</sup> Year)

**Students who might elect to take the course:**

Students in other majors electing an Imaging Science Minor

3.0 **Goals of the course:**

To provide a fundamental understanding of color science, emphasizing colorimetry, and it's application to the design and analysis of imaging systems.

## 4.0 Course description

### 1051-402

### Color Science

This course presents an introduction to color perception, measurement, and reproduction. Building upon an understanding of the human visual system and psychophysics from SIMG 400 and radiometric measurements and computations from SIMG 401, this course explores in more detail the basis of color perception, applies those principles to the measurement of color stimuli, and then explores the applications of color science in imaging. (Prerequisites: 1051-400)(1051-401) **Class 4, Credit 4 (F)**

## 5.0 Possible resources

5.1 Berns, R.S., *Billmeyer and Saltzman's Principles of Color Technology, 3<sup>rd</sup> Ed.*; Wiley-Interscience: New York, (2000).

5.2 Hunt, R.W.G. *The Reproduction of Colour, 6<sup>th</sup> Ed.*; Fountain Press: England, (2003).

5.3 Assigned journal and proceedings papers.

## 6.0 Topics (outline):

### 6.1 Defining Color

6.1.1 The Physical Stimulus

6.1.2 Perceiving Color

6.1.3 Describing Color

6.1.4 Metamerism

### 6.2 Describing Color

6.2.1 Color Mixing Systems

6.2.2 Color Perception Systems

### 6.3 Measuring Color

6.3.1 Basic Principles

6.3.2 Samples

6.3.3 Visual Color Measurement

6.3.4 Instrumental Color Measurements

6.3.5 Precision and Accuracy Measurements

### 6.4 Measuring Color Quality

6.4.1 Perceptibility and Acceptability

6.4.2 Color Difference Specification

6.4.3 Color Tolerances

6.4.4 Other Metrics

### 6.5 Colorants

6.5.1 Terminology

- 6.5.2 Dyes and Pigments
- 6.5.3 Classification and Selection of Colorants
- 6.5.4 Engineering Color

6.6 Producing Colors

- 6.6.1 Color Modeling
- 6.6.2 Color Mixing Laws
- 6.6.3 Instrumental Color Matching
- 6.6.4 Color Matching Images

6.7 Current Color Science Research

- 6.6.1 Color Systems
- 6.6.2 Color and Image Appearance
- 6.6.3 Color and Image Quality
- 6.6.4 Visualization and Perception
- 6.6.5 Spectral Imaging

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

Learning outcome	Exams and quizzes	Homework/Project assignments
7.1 Concept of color order systems	X	X
7.2 Understanding of Metamerism	X	X
7.3 Fundamental colorimetric measurements (spectrophotometry)	X	X
7.4 Fundamental colorimetric computations (XYZ, CIELAB)	X	X
7.5 Applying color science to imaging systems	X	X
7.6 Research and experimental procedures	X	X

**8.0 Program or general education goals supported by this course**

8.1 Enable students to obtain an understanding of the basic concepts of color science and their application to imaging systems. (COS/Imaging Science)

8.2 Assist students in understanding the scientific research project, the completion of significant research projects, and the oral and written presentation of results. (COS/Imaging Science)

8.3 Expose students to an exciting and unique area of science and the unique facilities and opportunities present at RIT. (COS/Imaging Science, COS, COE,CCIS/ Minors from Various Programs)

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

9.1 Occasional access to RIT Munsell Color Science Laboratory instrumentation and facilities required for demonstrations and projects.

**10.0 Supplemental information - NONE**