MOHAWK VALLEY COMMUNITY COLLEGE

UTICA AND ROME, NEW YORK

COURSE OUTLINE

SCIENCE OF DIGITAL IMAGING

PH114

REVIEWED AND FOUND ACCEPTABLE  ***04/24/2017***

I. CATALOG DESCRIPTION:

PH114 SCIENCE OF DIGITAL IMAGING C-3, P-2, Cr-4

This course provides an overview of the science underlying the field of digital imaging. Topics include the historical development of digital imaging technology, introduction to computers, color theory and color calibration, how image input and output devices work, the science of digital image manipulation, computer generation and display of 3-D images, and real-world applications and their impact upon the individual and society. Image manipulation software is used to demonstrate and explore concepts.

Pre-requisites: An appropriate Mathematics Placement test result, or MA090 Essential Math Skills, or MA091 Introductory Algebra

II. STUDENT LEARNING OUTCOMES:

1. Describe the historical development of computer based imaging technology.

2. Discuss the current and future impact of digital imaging on their daily lives.

3. Explain the physical, chemical, computer and electronic principles underlying the field of electronic imaging.

4. Demonstrate many of the scientific and artistic applications and Electronic Imaging.

5. Explain the basics of color theory and will be able to relate this theory to problems associated with accurate color calibration of imaging systems.

6. Describe current areas of active research and development associated with electronic imaging and will develop an understanding of future trends in imaging.

7. Demonstrate interpersonal skills through a variety of collaborative-based learning laboratory experiences.

8. Apply the scientific method for problem solving in a final laboratory project and demonstrate their oral presentation skills by means of a presentation of their project to the other students in class.

III. DETAILED COURSE OUTLINE:

 I. Introduction

A. Historical evolution of Digital Imaging Technology

1. Current impact of digital imaging on the individual and society.

B. Introduction to Computers

 1. File Navigation

 2. Program Schema

 C. Basic Science Underlying Electronic Imaging

1. System Configuration for Computer Based Imaging

2. Introduction to Data and storage formats

3. Digital Manipulation overview

 D. Basic Mathematical Skills:

1. Graphing, Slopes

2. Graphical Arithmetic

 II. Color Theory and Image Input and Output

A. Introduction to Color Theory

 1. Color Space/Model

2. Science of B/W and Color Calibration

3. Applications

B. Image Representation Modes

C. Input Devices - The science behind the operation of:

1. Video Capture Devices

2. Digital Cameras

3. Scanners

4. Film Recorders

5. CD ROM

D. Output Devices - The science behind the operation of:

1. Laser writers

2. Ink Jet Printers

3. Photographic Quality Printers

4. Film Recorders

 III. Image Manipulation and Generation

 A. Introduction

 1. Scientific Principles involved in Image Manipulation

2. Applications

B. Image Storage

 1. Methods

2. Image Integrity and Image Compression Schemes

 3. Photo CD Technology and Applications

C. General Applications

1. Creating and Viewing 3-D Images

2. Computer Generated Holograms

3. Land Sat Imagery

4. Scientific Methods for Interfacing to Service

5. Bureaus and Printers

D. Future Trends in Electronic Imaging and their impact on the individual and society.

IV. LABORATORY TOPICS:

 1. Introduction to Computer

 2. Introduction to Image Manipulation Software 1

 3. Introduction to Image Manipulation Software 2

 4. Input and Manipulation of B/W images

 5. B/W Calibration Methods

 6. Input and Manipulation of Color Images

 7. Color Calibration Methods

 8. Image Modes and Storage Requirements

 9. Image Arithmetic and Filter Design

 10. Image Degradation and Compression

 11. Digital Stereograms

 12. Final Project work

 13. Final Project work

 14. Final Project work

 15. Project Oral reports