**EE 416 Introduction to Digital Image Processing**

**Credits:** 3

**Categorization of credits:** engineering topic

**Instructor(s):** Todd R. Reed.

**Textbook and Other Required Materials:**

R.C. Gonzalez, R.E. Woods, and S.L. Eddins. *Digital Image Processing using Matlab (second edition)*, Gatesmark Publishing, 2009.

**Designation:** Elective

**Catalog Description:**

Digital Image Representation, Intensity Transformations, Spatial Filtering, Filtering in the Frequency Domain, Image Restoration, Color Spaces and Transformations, The Fast Wavelet Transform, Image Compression. Pre: 315 or consent.

**Pre- and Co-requisites:** Pre: 315 or consent.

**Class/Lab Schedule:** 3 hour lecture.

**Topics Covered:**

* Basic digital image concepts
* Fundamentals of image representation in Matlab
* Intensity Transformations and Spatial Filtering
* Frequency Domain Processing
* Image Restoration
* Color Image Processing
* Wavelets
* Image Compression

**Course Objectives and Relationship to Program Objectives:**

Students should be able to (i) understand and analyze image processing problems and (ii) design algorithms to solve image processing problems and meet design specifications [1, 2, and 4].

**Course Outcomes and Their Relationship to Program Outcomes**

The course outcomes are closely related to the topics covered

* Understand the relevant aspects of digital image representation and their practical implications [1].
* Have the ability to design pointwise intensity transformations to meet stated specifications. [1, 2, 4, 6]
* Understand 2-D convolution, the 2-D DFT, and have the abitilty to design systems using these concepts. [1, 2, 4, 6]
* Have a command of basic image restoration techniques [1].
* Understand the role of alternative color spaces, and the design requirements leading to choices of color space [1, 2, 4, 6].
* Appreciate the utility of wavelet decompositions and their role in image processing systems [1].
* Have an understanding of the underlying mechanisms of image compression, and the ability to design systems using standard algorithms to meet design specifications [1, 2, 4, 6].

**Contribution of Course to Meeting the Professional Component**

Engineering topics: 100%.

**Computer Usage:**

Matlab is used throughout the course.

**Design Credits and Features:**

EE416 has 1 design credit. Homework problems require the solution of open-ended design problems (problems for which multiple approaches can be taken to reach the stated objectives).

**Person(s) Preparing Syllabus and Date:** Todd R. Reed, 10/2/14. Y. Dong, June 14, 2021.