**Basic Course Information:** CS5550

Course Title: Digital Image Processing

Units: 3 units

CS classification number: C-2

Component: Lecture

Instructional Mode: Face-to-Face and web-assisted

Grading Basis: Graded only

Repeated Basis: May be taken only once

Cross listed Course: N/A

Dual-listed Course: N/A

Major course/Service course/GE course: Major course

Date Prepared: March 31, 2015

Prepared by: Amar Raheja

# I. Catalog Description

Mathematical preliminaries for digital image processing. Digital image fundamentals – sampling and quantization. Image enhancement – spatial and frequency domain filtering. Image compression. Color image processing. Multiresolution processing.

**II. Required Coursework and Background**

Pre-requisite(s): MAT 2250 and CS 3310 or consent of instructor.

# III. Expected Outcomes

On successful completion of this course, students will be able to:

* Learn the fundamentals of digital image processing
* Gain experience in algorithms used for image enhancement in the spatial and frequency domain
* Master the concepts of image restoration
* Explain color image processing
* Learn the concepts of image compression

Outcomes of this course will build student capacity in each of the following areas as defined by programmatic objectives for the computer science major.

P-SLO 4. A breadth of advanced knowledge and skills in applied areas of computer science.

# IV. Instructional Materials

Required text:

Digital Image Processing, Third Edition

Authors: Gonzales and Wood

Publisher: Prentice-Hall, 2008

ISBN 0-13-168728-X

References:

Digital Image Processing

Authors: Kenneth Castleman

Publisher: Prentice Hall

ISBN: 0-13-211467-4

# V. Minimum Student Material

Textbook and class handouts

# VI. Minimum College Facilities

A classroom with a projection system and a computer lab

# VII. Course Outline

* Digital image fundamentals
* Image sensing and acquisition
* Image sampling and quantization
* Intensity transformations
* Spatial filtering
* Filtering in frequency domain
* Image restoration
* Color image processing
* Wavelet basics and use in image processing
* Multiresolution processing using wavelets
* Image compression fundamentals
* Various compression methods

# VIII. Instructional Methods

Lecture

In-class exercises

Hands on practice

Project-based learning

# IX. Evaluation of Outcomes

A. Student Assessment

1. Quizzes

2. Lab assignments

3. Programming projects

4. Midterm exam

5. Final exam

B. Meaningful Writing Assignment

Short answer essay questions on exams will require students to explain and justify their response in writing.

C. A Matrix of Course Student Learning Outcomes vs Methods of Assessment

If the course is being evaluated for accreditation purposes, approved department accreditation assessment tools will additionally be utilized.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Course Learning Outcomes | Methods of Assessment | | | | |
| Quizzes | Lab Assignments | Programming Projects | Midterm Exam | Final Exam |
| Learn the fundamentals of digital image processing | x | x | x | x | x |
| Gain experience in algorithms used for image enhancement in the spatial and frequency domain | x | x | x | x | x |
| Master the concepts of image restoration | x | x | x | x | x |
| Explain color image processing | x | x | x |  | x |
| Learn the concepts of image compression | x | x | x |  | x |