The University of Texas at Tyler
Department of Electrical Engineering

EENG 4350: Special Topics: Digital Image Processing (Elective)

Syllabus

Catalog Description:

Advanced studies in electrical engineering in topics not fully covered in existing undergraduate courses. May be repeated as topics change. A maximum of nine (9) hours may be applied toward the undergraduate degree.

Prerequisites: Consent of Instructor: COSC 1336 – Programming Fundamentals and MATH 3203 – Matrix Methods and EENG 4311 – Signals and Systems

Credits: 3 ( ) hours lecture, 0 hours laboratory per week)

Text(s): Gonzalez and Woods, **Digital Image Processing, 3/E,** Prentice Hall, 2008
ISBN-10: 013168728X, ISBN: 9780131687288 **OR**
Gonzalez and Woods, **Digital Image Processing, 4/E,** Pearson, 2018
ISBN: 9780133356724

Additional Material: MATLAB Tools

Course Coordinator: Dr. Mukul V. Shirvaikar, Professor

Topics Covered: (paragraph of topics separated by semicolons)

Digital Image Processing Fundamentals: acquisition, representation, storage and processing of binary, gray scale and color images; Image enhancement in the spatial domain and frequency domain; Image transforms, filtering, compression, morphological operations and wavelets; Color image processing; Image analysis and segmentation techniques.

Evaluation Methods: (only items in dark print apply):

1. Examinations / Quizzes
2. Homework
3. Report
4. Computer Programming
5. Project
6. Presentation
7. Course Participation
8. Peer Review

Course Learning Outcomes[1]: By the end of this course students will be able to:

1. Explain digital image processing fundamentals including the acquisition, representation, storage and processing of images. [1]
2. Outline the differences between binary, gray scale and color image processing. [5]
3. Implement image processing techniques in the spatial domain. [5]
4. Demonstrate image processing techniques in the frequency domain. [1]
5. Design techniques for image compression, analysis and segmentation. [1]
6. Utilize modern software to design, debug and test image processing projects. [4]

7. Write laboratory reports with experimental results demonstrating visual and written communication skills [3]
8. Explain a contemporary issue in image processing referring to relevant codes and standards as appropriate. [3]
9. Describe the impact of image processing on society. [1]
10. Discuss relevant professional ethics related to the professional practice of modern technology e.g. product reliability. [3]
11. Incorporate information gained by independent learning from technical reference manuals and other sources to implement projects and enhance reports [4]

[1]*Numbers in brackets refer to method(s) used to evaluate the course objective.*

Relationship to Program Outcomes (Student Learning Outcomes)[2]: This course supports the following Electrical Engineering Program Outcomes, which state that our students will:

1. have the ability to apply knowledge of the fundamentals of mathematics, science, and engineering;
2. have the ability to use modern engineering tools and techniques in the practice of electrical engineering; [6]
3. have the ability to analyze electrical circuits, devices, and systems;
4. have the ability to design electrical circuits, devices, and systems to meet application requirements; [5]
5. have the ability to design and conduct experiments, and analyze and interpret experimental results; [2, 3, 4]
6. have the ability to identify, formulate, and solve problems in the practice of electrical engineering using appropriate theoretical and experimental methods;
7. have effective written, visual, and oral communication skills; [7]
8. possess an educational background to understand the global context in which engineering is practiced, including:
   a. knowledge of contemporary issues related to science and engineering; [8]
   b. the impact of engineering on society; [9]
   c. the role of ethics in the practice of engineering; [10]
9. have the ability to contribute effectively as members of multi-disciplinary engineering teams;
10. have a recognition of the need for and ability to pursue continued learning throughout their professional careers. [11]

[2]*Numbers in brackets refer to course objective(s) that address the Program Outcome.*

Contribution to Meeting Professional Component: (in semester hours)

Mathematics and Basic Sciences:		hours
Engineering Sciences and Design:	3	hours
General Education Component:		hours

Prepared By:	Mukul Shirvaikar, Professor	Date:	7 January 2014
Updated By:	Mukul Shirvaikar, Professor		16 January 2018