

**The University of Jordan**  
**Computer Engineering Department**

**Digital Image Analysis & Processing**  
**CPE0907544**  
**COURSE OUTLINE**

<http://www.driyad.ucoz.net>

## **I. Course Description**

This course introduces the basics of digital image analysis and processing with emphasis on both theory and implementation. Image representation, image types, intensity transformations and spatial filtering, image enhancement, frequency domain processing, image restoration, geometric transformations and image registration, color image processing, image compression and vector quantization, morphological image processing, image segmentation, edge detection, line detection using the Hough transform, representation and description, object recognition. Hands-on computer work using **MATLAB** will be a major part of the learning experience.

## **II. Required Background or Experience**

### ***Prerequisites by course:***

1. 1901231 Data Structures

### ***Prerequisites by topic:***

1. Computer skills.
2. Linear algebra, probability, and calculus
3. Knowledge of Matlab is a plus

### ***Post-requisites:***

None

## **III. Course Objectives**

This course introduces the students to the basic concepts of digital image analysis and processing at a number of different levels:

1. Human visual system and image perception
2. Overview of digital image processing applications and fields
3. Understanding digital image acquisition, sampling, quantization, and representation
4. Image enhancement and filtering in the spatial and frequency domain
5. Image restoration and noise models
6. Digital color image models and processing
7. Concepts of image segmentation
8. Morphological image processing

## **IV. Expected Outcomes**

Upon completion of this course, the students will know how

1. Digital images are represented in computers.
2. To perform simple operations on digital images in terms of contrast enhancement, filtering, and object segmentation.

## **V. Textbook(s) and Readings**

1. Gonzalez and Woods, Digital Image Processing, 3<sup>rd</sup> edition, Prentice Hall, 2008.

2. Gonzalez, Woods, and Eddins, Digital Image Processing Using MATLAB, 1<sup>st</sup> edition, Prentice Hall, 2004.
3. Anil K. Jain, Fundamentals of Digital Image Processing, Prentice Hall Information and System Sciences Series, 1<sup>st</sup> edition, 1988.

## VI. Student Materials

Text book, class handouts, lecture notes, power point slides, announcements, and other resources posted regularly on website of the course that is available at <http://www.driyad.ucoz.net>.

## VII. College Facilities

A classroom with whiteboard and projection facilities, library and computer lab.

## VIII. Course Topics

1. Origins and Fundamentals of Digital Image Processing
2. Components of a Digital Image Processing System
3. Image Sampling and Quantization
4. Intensity Transformation and Spatial Filtering
5. Filtering in the Frequency domain
6. Image Restoration and Reconstruction
7. Color Image Processing
8. Image Segmentation
9. Morphological Image Processing
10. Representation and Description

## IX. Evaluation of Outcomes

Evaluation will be done based on the following:

- |                                     |     |
|-------------------------------------|-----|
| 1. Class Attendance & Participation | 0%  |
| 2. Homework, Quizzes, & Project     | 20% |
| 3. Midterm Exam:                    | 30% |
| 4. Final Exam                       | 50% |

## X. Instructional Methods

Lectures, homeworks, quizzes, and exams.

## XI. Professional Component Contribution

The student learning experience in this class will be of great use in designing computer vision systems at different levels.

## XII. Course Information

### Instructor

Dr. Iyad Jafar

Room 402, Computer Engineering Department

*Email:* [iyad.jafar@ju.edu.jo](mailto:iyad.jafar@ju.edu.jo)

*Office Hours:* Sunday, Tuesday, and Thursday 8:00 – 9:00

Monday and Wednesday 11:00 – 12:00

### Class Meeting Time and Location

*Section 1:* Sunday, Tuesday, and Thursday 9:00 AM – 10:00 AM in Computer 001

### XIII. Class Policies

- **Team Work:** Students should form groups of **3 to 4** members to work on the homework assignments. The names of the members in each group should be sent to the instructor by the beginning of the third week of the semester. Students are not allowed to move between groups.
- **Exams:** All exams (including the final exam) will be closed book exams. The final exam will be comprehensive, covering material from the entire course material, although the material after the midterm will have more weight.
- **Makeup Midterm:** **There will be no make-up for the midterm.** In case of medical/ or other disabling emergencies, the instructor should be notified *before* the midterm and his approval for missing the midterm should be obtained before the midterm. If for any reason the instructor could not be reached, the department secretary should be notified before the midterm. The phone number is 535-5000 Extension 23000.
- The exact dates for the quizzes, midterm, projects, and final exam will be announced later.
- **Grading Corrections:** Ask the instructor for any grading correction requests **within a week of returning the exam/quiz papers.** After that, your grade will not be adjusted. If you find any mistake in grading, please let the instructor know. Your grade will not be lowered.
- **Class Attendance:** Class attendance will be taken. **University regulations regarding attendance will be strictly enforced.** If you miss class, you must obtain the covered material from a willing classmate and or the course web site. The instructor will not be available (during office hours or other times) to repeat material covered in class.