

The University of Jordan
Accreditation & Quality Assurance Center

Information Systems
COURSE Syllabus

1.	Course title	Digital Image Processing and Applications
2.	Course number	1902744
3.	Credit hours (theory, practical)	3
	Contact hours (theory, practical)	3
4.	Prerequisites/corequisites	N/A
5.	Program title	Computer Information Systems
6.	Year of study and semester (s)	
7.	Final Qualification	M.S. Computer Information Systems
8.	Other department (s) involved in teaching the course	N/A
9.	Language of Instruction	English
10.	Date of production/revision	September 2018/2019
11.	Required/ Elective	Required

12. Course Coordinator:

Dr. Huda Karajeh
Office number: CIS 222
Office phone: 22618
Email: h.karajeh@ju.edu.jo

Office Hours:

Sun, Thurs. : 12-1 Tue. (10-11)
Thurs.: 2 - 3 by appointment

13. Other instructors:

Office numbers, office hours, phone numbers, and email addresses should be listed.
N/A

14. Course Description:

Course Description

This course will provide the students an in-depth study of the principles and processing techniques of the following: acquisition of the digital image processing (equipment, sampling, quantization, and color representation), enhancement of digital images in spatial and in frequency domains (smoothing sharpening, edge detection, thresholding, histogram equalization, morphological operations, etc.), conversion the digital image into Fourier and other transforms, , feature identification, image compression, image segmentation and representation, and application to models of human and machine vision. In addition, the students are required to work through a case study to apply the image processing techniques to solve real-world problems in any domain.

15. Course aims and outcomes:

A- Aims:

The aim of this course is to equip students with in-depth knowledge and skills on how to manipulate process and enhance digital images. In addition, this course will able the student to apply the image processing techniques to solve real-world problems in any domain.

B- Intended Learning Outcomes (ILOs):

Successful completion of this course should lead to the following learning outcomes:

A-Knowledge and Understanding (students should)

- A1) Be able to discuss/explain the importance and applications of digital image processing.
- A2) Be able to discuss/ explain basics, concepts and methodologies of digital image processing.
- A3) Be able to discuss/explain the acquisition concepts of the digital image processing (equipment, sampling, quantization, and color representation)
- A4) Be able to discuss/explain enhancement of digital images in spatial and in frequency domains (smoothing sharpening, edge detection, thresholding, histogram equalization, morphological operations, etc.).
- A5) Be able to discuss/explain concept of image restoration and reconstruction.
- A6) Be able to discuss/explain lossy image compression techniques.
- A7) Be able to discuss/explain the concept of feature extraction, image segmentation and representation.

B-Intellectual skills-with ability to

- B1) Compare and analyze a wide range of algorithms used to solve a problem
- B2) Apply mathematical tools to algorithm verification and analysis.
- B3) Identify a range of appropriate technique to solve a problem.
- B4) Analytically recognize large projects.

C- Practical Skills-With ability to

- C1) Work on case studies to show how all the tools are used together to build a complete program.
- C2) Develop methods to reduce execution time with respect to large image, verify used algorithms, and efficiently debug programs with this respect.
- C3) Translate abstract ideas into practice.
- C4) Implement and handle large projects that use image database.

D-Transferable Skills-With ability to

- D1) Possess good image analysis concept..
- D2) Develop advanced image algorithms into complete programs.
- D3) Choose the appropriate image algorithms for a certain project.

16. Topic Outline and Schedule:

Topic	Week	ILOs	TLA (teaching, learning and Assessment)
Orientation to the course: Syllabus, textbook, supporting material and online resources. <u>The importance and applications of digital image processing</u>	1	A1, A2	T: Instructor Presentation L: Reading notes A: Class discussion
<u>Basics, concepts and methodologies of digital image processing.</u>	2 + 3	A2, A3 , B1, B2	T: Instructor Introductory Presentation L: Reading notes A: Class discussion
<u>Image enhancement in the spatial domain</u>	4 + 5	A2, A4, B1-B3, C1, C3	T: Instructor Presentation and Case Study L: Reading lecture notes and Project discussion A: Class discussion, and Creating project proposal
<u>Image enhancement in the frequency domain</u>	6	A2, A4, B1-B3, C3	T: Instructor Presentation and Demonstration L: Reading notes A: Class discussion
<u>Practice in Lab</u>	7		
<u>Mid Term Exam</u>	8		
<u>Image Restoration and reconstruction</u>	9 + 10	A2, A5, B1-B3, C3, D1	T: Instructor Presentation L: Reading notes and online resources <u>A: Class discussion</u>
<u>Image compressions</u>	11	A1-A6, B1-B3, C3, D1	T: Instructor Presentation and Examples L: Reading notes and online resources <u>A: Class discussion</u>

<u>Morphological operations</u>	11 + 12	A1-A7, B1-B3, C3, D1	T: Instructor Presentation and Examples L: Reading notes and online resources A: <u>Class discussion</u>
<u>Image segmentations</u>	13	A1-A7, B1-B3, C3, D1	T: Instructor Presentation L: Reading notes and online resources A: <u>Class discussion</u>
<u>Image representation and descriptions</u>	14	A1-A7, B1-B3, C3, D1	T: Instructor Presentation and Examples L: Reading notes and online resources A: <u>Class discussion</u>
<u>Case Studies: Submit Research Papers and Final Project for grading and presentation</u>	15	A1-A7, B1-B4, C1-C4, D1-D3	T: Project Demonstration and Research Paper presentation L: Observation and discussion A: Evaluation of the project documentation and research paper presentation
<u>Final Exam</u>	16		

17. Evaluation Methods and Course Requirements (Optional):

Opportunities to demonstrate achievement of the ILOs are provided through the following assessment methods and requirements:

Assessment (A) Methods: There will be several assessment methods of evaluation the performance of the students such as class participation and discussions, grading assignments and research papers, group project demonstrations and conducting exams. Every student is expected to completely adhere to the presentation and project strict deadlines, absolutely no exceptions will be given.

Assessment Weights:

Midterm Exam	30 Points
Presentation	15 Points
Project	15 Points
Final Exam	40 Points

18. Course Policies:

Regulations:

Every student is expected to attend all classes and completely adhere to the presentation and project strict deadlines, absolutely no exceptions will be given.

Presentation and projects are individual. While students are free to discuss their individual project and presentation with anybody, including fellow students, individual assignments are expected to show the expertise, creativity and critical faculty of the individual student. Virtually identical individual assignments (in the judgment of the instructor) are not acceptable. Plagiarism is unacceptable and will be punished with an F for the full course. References to all source materials are necessary

19. Required equipment:

Online Course Site

Every student should visit the following site for course material, handouts and announcements.

Site address: elearning.ju.edu.jo

User name: Your university internet id

Password: Your university internet password

20. References:

Recommended Text and References:

A) Textbook

R. Gonzalez & R. Woods, Digital Image Processing 4th Edition, 2008, Prentice Hall.

B) Addition resources

1. Digital Picture processing, pratt.
2. IEEE TRANS- Image Processing
3. Computer Vision and Image Understanding
4. **Computer Vision coauthored with Prof. Linda Shapiro, University of Washington Prentice Hall**

C) Website

www.imageprocessingplace.com / gonzalezwoods

5. Additional information:

Students are encouraged to take initiatives and make heavy use of the library, E-LIBRARY <http://ezlibrary.ju.edu.jo/login> or from within the university using (<http://e-library>)

Note:

- This course is a Masters level course. It will be conducted as a lecture and a seminar. Students are expected to come to each session prepared to participate and even lead the discussions.
- The instructor can make changes to this syllabus when necessary.
- University regulations will be preserved at all times.

Date: -----September 2018-----

Name of Course Coordinator: -----**Dr. Huda Karajeh**-----

Signature: ----- **Dr. Huda Karajeh** -----

Head of curriculum committee/Department: ----- Signature: -----

Head of Department: ----- Signature: -----

Head of curriculum committee/Faculty: ----- Signature: -----

Dean: ----- Signature: -----

Copy to:

Head of Department
Assistant Dean for Quality Assurance
Course File