Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

COURSE SPECIFICATION

14034303-3 Digital Image Processing

Course Specification

Institution	Umm Al-Qura University
College/Department	Computer Engineering Department, College of Computer Information Systems

A Course Identification and General Information

1. Course title and code: 14034303-3 Digital Image Processing

2. Credit hours   3

3. Program(s) in which the course is offered.
(If general elective available in many programs indicate this rather than list programs)

4. Name of faculty member responsible for the course

Dr. Maher Rajab

5. Level/year at which this course is offered Level 9 or 10

6. Pre-requisites for this course (if any)

Signal and Systems

7. Co-requisites for this course (if any)

N/A

8. Location if not on main campus

B Objectives

1. Summary of the main learning outcomes for students enrolled in the course.

    Introduction to the field of image processing and give some idea to its scope and areas of practice. Images and MATLAB, image display, resolution and quantization. Powerful and widely used image-processing algorithms. Introduce spatial filtering for a vast range of image-processing operations. Addresses the problems of thresholding and finding edges in an image. Color processing; definition of color from physical and digital perspectives.

2. Briefly describe any plans for developing and improving the course that are being implemented. (eg increased use of IT or web based reference material, changes in content as a result of new research in the field)

    1. Involving students in presentation of advance topics in digital image processing to know current research in the field.

    2. Lecture slides and tutorials, Animations to further clarify the theoretical concepts

    3. Use of MATLAB for simulating different image processing problems

C. Course Description (Note: General description in the form to be used for the Bulletin or Handbook should be attached)

1 Topics to be Covered

List of Topics	No of Weeks	Contact hours
• Introduction		
• Images with MATLAB		
• Image Display: Bit Planes, Spatial Resolution, Quantization and Dithering		
• Arithmetic Operations, Histograms, Lookup Tables		
• Point Processing: Lookup Tables LUT		

• Neighborhood Processing: Linear and Nonlinear Filters in MATLAB		
• Image Segmentation		
• Color Processing		

2 Course components (total contact hours per semester):				
Lecture: 39 hrs	Tutorial:	Laboratory	Practical/Field work/Internship	Other:

3. Additional private study/learning hours expected for students per week. (This should be an average for the semester not a specific requirement in each week):

3 x 50 mins

4. Development of Learning Outcomes in Domains of Learning

For each of the domains of learning shown below indicate:

- A brief summary of the knowledge or skill the course is intended to develop;

- A description of the teaching strategies to be used in the course to develop that knowledge or skill;

- The methods of student assessment to be used in the course to evaluate learning outcomes in the domain concerned.

a. Knowledge

(i) Description of the knowledge to be acquired

1. The students will gain a solid knowledge with hands on experience in a number of key Digital Image Processing problems.
2. The students will learn about the challenges of designing a image processing system and will gain a practical insight in trading off between system requirements (e.g. full automation or invariance versus system performance or complexity).

(ii) Teaching strategies to be used to develop that knowledge 1. Assignments and solutions to the assignments, so that student can know their problems 2. Open-communication with students – show willingness to assist and take questions from students and   clarify explanations in the class 3. Students presentations 4. Practical problems using MATLAB
(iii) Methods of assessment of knowledge acquired 1. Exercises & Home works , Quizzes, Midterm, Project , Final Exam 2. Review outputs from the assignments in the computer lab and also from their assignments and projects.
b. Cognitive Skills
(i) Description of cognitive skills to be developed 1. Ability to solve real world problems in the area of Digital Image Processing. 2. Ability of deduction and inference. 3. Ability of analysis and design image processing projects.
(ii) Teaching strategies to be used to develop these cognitive skills 1. Assignments. 2. Quizzes
(iii) Methods of assessment of students cognitive skills 1. Assignments in algorithm understanding and MATLAB implementation. 2. Labs (officially lab is not associated with this Course)
c. Interpersonal Skills and Responsibility

(i) Description of the interpersonal skills and capacity to carry responsibility to be developed

Students should be able to

1. Understand and communicate to others the importance and relevance of statistics in the modern world
2. Be an independent learner, able to acquire further knowledge with some guidance or support.
3. Participate in group discussions
4. Manage time and meet deadlines.

(ii) Teaching strategies to be used to develop these skills and abilities

1. Assignments (Research topics)
2. Students Presentations of current research topics
3. Digital image processing problems

(iii) Methods of assessment of students interpersonal skills and capacity to carry responsibility

1. Mid and Final Exams

d. Communication, Information Technology and Numerical Skills

(i) Description of the skills to be developed in this domain.

1. Case studies: the key method of discovering a student's dexterity in analyzing
2. Their recommendations, opinions and suggestions
3. Assignments, exams, reports, presentations and quizzes will test their analytic skills and communication skills
4. Class discussions should indicate a student's prowess in responding

(ii) Teaching strategies to be used to develop these skills

1. Written Examinations
2. Assignments
3. Quizzes

(iii) Methods of assessment of students numerical and communication skills

4. Assignments, exams, reports, presentations and quizzes will test their analytic skills and communication skills
5. Class discussions should indicate a student's prowess in responding

e. Psychomotor Skills (if applicable)

(i) Description of the psychomotor skills to be developed and the level of performance required

(ii) Teaching strategies to be used to develop these skills

(iii) Methods of assessment of students psychomotor skills

5. Schedule of Assessment Tasks for Students During the Semester			
Assessment	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Proportion of Final Assessment
1	Attendance, Participation and Labs evaluation	Through out semester	25
2	Quiz	3	5
3	Mid term 1	4	10
4	Home work	Through out semeseter	10
5	Mid Term II	10	10
6	Final Exam	16	40

7			
8			

D. Student Support

1. Arrangements for availability of teaching staff for individual student consultations and academic advice. (include amount of time teaching staff are expected to be available each week)

Faculty is available 10 hours per week for student help and consulting.

E Learning Resources

1. Required Text(s)

Alasdair McAndrew, Introduction to Digital Image Processing with MATLAB, Thomson, 2004.

2. Essential References

3- Recommended Books and Reference Material (Journals, Reports, etc) (Attach List)

4-.Electronic Materials, Web Sites etc

5- Other learning material such as computer-based programs/CD, professional standards/regulations

Matlab 2014, OpenCV

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (ie number of seats in classrooms and laboratories, extent of computer access etc.)

1. Accommodation (Lecture rooms, laboratories, etc.)

1. A Lecture room having Multimedia projector for lectures and students presentation. 2. Lab with MATLAB installed on all computers 3. Internet
2. Computing resources 1. There is computer lab available for Simulations. 2. Students are encouraged to bring in their laptops and use them in solving problems in the class room
3. Other resources (specify --eg. If specific laboratory equipment is required, list requirements or attach list)

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching   1. Course Survey and students Feedback for each learning outcome of the course.
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department 1. Faculty meetings to discuss best practices and issues related to the course 2. Comparison of the course content with similar courses offered in others colleges 3. Updating course curriculum according to latest research done in the field.
3 Processes for Improvement of Teaching

1. Departmental Meetings

2. Faculty Trainings

4. Processes for Verifying Standards of Student Achievement (eg. check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution)

1. Departmental Meetings

5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.