

SULTAN QABOOS UNIVERSITY COURSE OUTLINE PROGRAM: B.Sc. in Computer Science

COMP5302 **1.Course Code 2.Course Title Digital Image Processing 3.Credits** 3 **COMP3203 4.Pre-requisite** Course(s) 5.Co-requisite Course(s) COMP5525 **6.Equivalent** Course(s) _ 7.Incompatible Course(s) 8. Course Category Department Elective 9.Course Owner College: Science Department: Computer Science **10.Course Type** Lecture/Lab English **11.Language of Instruction**

12.Course Description

This course provides a foundation for understanding then implementing most commonly used image processing algorithms. It covers the different aspects of the discipline such as digital image fundamentals, image transformation, image enhancement, image restoration, image segmentation and recognition and interpretation. To ensure a fast and reliable implementation of underlying algorithms, a software tool that provides a rich image processing library is adopted as a development tool.

13. Teaching/Learning Strategies

Theory part is delivered during the lectures and student programming skills are developed during the lab sessions. Moodle is used as an online platform to support student

14.Assessment Components and Weight [%]

Two homework assignments: 10%	Project: 20%
Two tests (MT 15% + LT 15%): 30%	Final test 40%

15.Grading Method

A-F Scale

16.Textbook(s) and Supplemental Material

Digital Image Processing, R. Gonzalez and R. Woods, Addison-Wesley

17.	17. Matching Course Objectives with Program Outcomes and SQU Graduate Attributes							
SQU Graduate Attributes								
А.	SQU graduates should be able to:	B.	SQU graduates possess	C. SQU graduates should				
1.	apply the knowledge and skills relevant to the specialization	1.	interpersonal communication skills and alignment with culture of international	Relish good citizenship				
2.	communicate effectively and use information and communication		labor market to assist them in practical life and in living successfully	qualities, be conscious of their national identity and be				
2	technologies	2.	skills and motivation for independent	socially responsible, engage				
3.	information and present it in simple		learning and engagement in lifelong learning and research	mindful of contemporary				
	clear manner	3.	work ethics and positive values, and	issues.				
		4.	teamwork skills and display potential					
		-	leadership qualities					

SLO #	f Student Learning Outcome			Program Educational Objectives	SQU Postgraduate Attributes			
1	Design and impl using current pro processing librar	ement image pro ogramming tools ies	ocessing solutions and image	SO2	A1			
2	Describe the mat following comm operations: inten spatial and Fouri operations, featu	thematical found only used image sity and geometrier transformatio re extraction, an	ations behind the processing ric transformations ns, morphological d segmentation.	, SO1	A1			
3	Describe the alg the following co operations: inten spatial and Fouri operations, featu	orithms involved mmonly used im sity and geometrier transformation re extraction, an	l in implementing age processing ric transformations ns, morphological d segmentation	, SO1	A1			
4	Choose the approace a required image	opriate operation processing task	SO2	A1 and A3				
COURSE INFORMATION								
Course Code COMP5302 Course Title				Digital Image Processing				
Semester/ Year Spring 2023 Section		10						
Day, Time, and Location MON & WED (12:00- 13:50)								
Course Co	oordinator	Dr. Abdelhami						
Office Loo	cation	Room #0008	Office Hours	Tue (12:00 - 13:00)				
Office Tel	. Ext.	2462	Email	ahamid@squ.edu.om				

	Tentative Schedule								
Week	Lecture Topic (Mondays)	Lab Topic (Wednesdays)	Assessed in						
1	Course Contents, and Assessment Scheme Description	Introduction to Image Processing	Midterm and or Final						
2	Pixel Transformations	Introduction to Scikit-image and OpenCV	Lab test						
3	Image Histograms	Arithmetic Operations. Thresholding. HW1 out	HW1, Midterm and or Final						
4	Geometric Transformations	Histogram based Operations	HW1, Midterm and or Final						
5	Smoothing and Noise Removal	Geometric transformations.	HW1, Midterm and or Final						
6	Sharpening and Edge Detection	Linear Filtering, Noise Removal HW2 out	HW2, Midterm and or Final						
7	Processing using Fourier Transform	Linear Filtering for Edge Detection & Edge Enhancement	HW2, Midterm and or Final						
8	Morphological Processing	2D Discrete Fourier Transforms, Filtering in the Frequency Domaine Midterm	HW2, Midterm and or Final						
9	Feature Extraction	Morphological Operations, Applications of Morphological Operations Project out	Project, Lab test, and or Final						
10	Local Feature Extraction	Statistical Moments, Texture Features, Principal Component Analysis	Project, Lab test, and or Final						
11	Image Segmentation	Key Point Detection: Harris, Sift, and Surf	Project, Lab test, and or Final						
12	Image Segmentation	Region Growing, Split & Merge Submission of Project part 1	Project, Lab test, and or Final						
13	Object Tracking	More segmentation methods	Project, Lab test, and or Final						
14	Object Tracking (lab)	Lab test	Final						
15	Project Part 2 (Presentations)	Project Part 2 (Presentations)							

ent Plan						
Items	Date Out	Due Date	Weights			
HW1	Week 3 - Monday	Week 5 (Monday)	5%			
HW2	Week 6 - Monday Week 9 (Monday) 5%					
Midterm Exam	Week 8 (Monday) 1					
		Part1(Report): Week 12 (Thursday)	5%			
Project (2 parts)	Week 9-Monday	Part2(Code + Demo+ Presentation): Week 15	15%			
Labtest	Week 14 (Wednesday)					
Final Exam	TBA					

18. Department's Late submission Policy:

(a) 1-24 hours: 25% of the mark will be deducted.

(b) > 24 hours: Not accepted.

19. Student Responsibilities

It is the student's responsibility to know and comply with all University Academic Regulations relevant to participation in this course. These regulations specifically include attendance requirement and students` academic code of conduct.

For attendance, it is the student's responsibility to be punctual and to attend all classes.

Students are expected to perform their work with honesty and avoid any academic misconduct, which is defined as the use of any dishonest or deceitful means to gain some academic advantage or benefit. This can take many forms, including but not limited to, the following: copying, plagiarism, collusion and forging documents. For full details, please refer to the Undergraduate Academic Regulations and to the Student Academic Misconduct Policy.

Additionally, this course requires that you:

20. Department's Policy for Dealing with Cheating

It is essential that each student solves all programming assignments, lab tests and exams individually unless instructed otherwise, e.g., for group projects. Copying, plagiarism, collusion, switching, and falsification are violations of the university academic regulations. Students involved in such acts will be severely penalized. The department has adopted a firm policy on this issue. A zero mark will be assigned the first time a student is caught involved in copying and his/her name will be added to a watch list maintained by the Head of Department. Further repeated involvements in copying will cause the student to get an F grade in that course. This is in line with the university academic regulations.

21. Department's Grading Scheme:

Grade	Α	A-	B+	В	B-	C+	С	C-	D+	D	F
Score	≥90	≥87	≥84	≥ 80	≥77	≥73	≥ 68	≥64	≥ 58	≥ 50	< 50

22. List of Student Outcomes (SOs) enabled in this course

SO1: Analyze a complex computing problem and apply principles of computing and other relevant disciplines to identify possible solutions.

SO2: Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.