Arab Academy for Science and Technology and Maritime Transport
Computer Science Curriculum
Course Syllabus

Course Code: CS455	Course Title: Digital Image Processing	Classification: E	Coordinator's Name: Prof. Dr. Aliaa Youssif Lecturer's name: Dr. Aliaa Youssif	Credit Hours: 3
Pre-requisites: • CS212 (Data Structures and Algorithms) • BA201 (Calculus III)	**Co-requisites:** None	**Schedule:** Lecture: 2 hours Tutorial-Lab: 2 hours		

Office Hours:

Course Description:
This course emphasizes general principles of image processing, rather than specific applications. It covers topics such as image sampling and quantization, color, point operations, segmentation, morphological image processing, linear image filtering and correlation, image transforms, eigenimages, multiresolution image processing, wavelets, noise reduction and restoration, feature extraction and recognition tasks, and image registration.

Textbook:
Rafael C. Gonzalez , Richard E. Woods, *Digital Image Processing*, Pearson.

References:
- Rafael Gonzalez, Richard Woods, and Steven Eddins, *Digital Image Processing using Matlab*, Gatermark Publishing.

- Chris Solomon & Toby Breckon*, Fundamentals of Digital Image Processing: A Practical Approach*,Wiley.

Course Objective/Course Learning Outcome:	Contribution to Program Student Outcomes:
1 Understand image processing, computer imaging systems, resolution concerns, and image formats.	(SO1) Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
2 Illustrate image digitization, image properties, and noise in images.	
3 Apply Fourier, discrete cosine, and hotelling (Karhunen-Loeve) transforms to images.	(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.
4 Realize image pre-processing: pixel brightness transformation, geometric transformations, and local filtering using masks.	

5	Apply image segmentation: threshold based, edge-based, region based, and matching.	(SO6) Apply computer science theory and software development fundamentals to produce computing-based solutions.
6	Understand shape representation and description.	
7	Apply mathematical morphology	

Course Outline:

1- Image sampling and quantization
2- Grey scale and color images representation
3- Image enhancement in spatial and frequency domains
4- Image segmentation

5- Morphological image processing
6- Feature extraction
7- Recognition tasks
8- MATLAB for projects implementation

Grade Distribution:

7th Week Assessment (30%)

12th Week Assessment (20%)

Year Work (10%)

Final Exam (40%)

Policies:

Attendance:
AASTMT Education and Study Regulations (available at aast.edu)

Academic Honesty:
AASTMT Education and Study Regulations (available at aast.edu)

Late Submission:
Late submissions are graded out of 75% (1 week late), 50% (2 weeks late), 25% (3 weeks late), 0% (more than 3 weeks late)