Module (Course Syllabus) Catalogue

2022-2023

College/ Institute	Erbil Technical Engineering	
Department	Information Systems Engineering	
Module Name	Digital Image and Video Processing	
Module Code	DIP503	
Degree	Technical Diploma ☐ Bachler ☒ High Diploma ☐ Master ☐ PhD ☐	
Semester	5	
Qualification		
Scientific Title		
ECTS (Credits)	6	
Module type	Prerequisite ☐ Core ☒ Assist. ☐	
Weekly hours	4	Total Workload=(161) hrs
Weekly hours (Theory)	(2)hr Class	( )Total hrs Workload
Weekly hours (Practical)	(2)hr Class	( )Total hrs Workload
Number of Weeks	15 Week	
Lecturer (Theory)		
E-Mail & Mobile NO.		
Lecturer (Practical)	Mr. Karwan muhamad muheden	
E-Mail & Mobile NO.	karwan.muheden@epu.edu.iq	
Websites		

Course Book

Course Description	This course introduces fundamentals of image and video processing, including **Fundamentals of Image processing and Image Transforms:** Basic steps of Image processing system sampling and quantization of an Image – Basic relationship between pixels Image Transforms: 2 – D Discrete Fourier Transform, wavelet and morphology.**Image Processing Techniques**: Image Enhancement: Spatial Domain methods: Histogram Processing, Fundamentals of Spatial Filtering, Smoothing Spatial filters, Sharpening Spatial filters Frequency Domain methods: Basics of filtering in frequency domain, image smoothing, image sharpening, selective filtering Image Segmentation: Segmentation concepts, point, line and Edge detection, Thresholding, region based segmentation **Image Compression** : Image compression fundamentals – coding Redundancy, spatial and temporal redundancy. Compression models.
Course objectives	The course is designed to study the image fundamentals and mathematical transforms necessary for image and video processing. **Finally, the student can:** Understanding of digital image fundamentals Understanding of image digitization Understanding of image display hardware and software Ability to understand and apply image enhancement and restoration techniques Ability to apply image processing techniques in both the (spatial and frequency Fourier domains) Image Compression Image compression fundamentals, Compression models Basic Steps of Video Processing Ability to write image processing programs using any programming language. Understanding of image segmentation approaches ,wavelet and morphology.
Student's obligation	The student must : 1 -Attendance the theoretical and practical lectures 2- completion of all homework ,tests, lab activities and exams . 3- Present the reports and seminar.
Required Learning Materials	1- Present the lecture by PowerPoint slides using data show 2-White board 3- Note Book 4- Book

Evaluation	Task	Weight (Marks)	Due Week	Relevant Learning Outcome

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		Paper Review			
	Assignments	Homework	5		
		Class Activity	2		
		Report			
		Seminar	10		
		Essay			
		Project			
	Quiz		8		
	Lab.		10		
	Theory Midterm Practical Midterm		10 15		
	Final Exam(theory) Final Exam (Practical)		20 20		
	Total		100		

Specific learning outcome:	1-The student understand some important information about Digital Image
	   2-The student understand the method of image Enhancement in frequency
	       Domain and spatial domain.
	  3- Understand the digital video processing
	  4- The student have information about image transformation(like
	        translation ,Scaling, Rotation)
	  5-Understand The image restoration, segmentation, morphology.
	   6- The student learns how to write image processing programs using any programming language.

Course References:	▪ Digital Image Processing Book by Gonzalez & Woods ▪ Digital Image Processing using matlab Book by Gonzalez & Woods ▪ Internet ▪ Note Book

Course topics (Theory)	**Week**	**Learning Outcome**
Introduction(Various applications of digital image processing techniques, history of image processing, steps involved in image processing) Digital Image fundamentals(elements of visual perception , light and electromagnetic spectrum, Image sensing and Acquisition, Image sampling and quantization)	1,2	Understand the Digital Image fundamentals

Pixels Relationships , Basic transformations	3	Know Pixels Relationships , translation ,rotation, scaling
image enhancement (point processing), histogram	4,5	Know about some image processing
Image Enhancement in spatial domain(filtering)	6	Know about filtering in spatial domain
Fourier Transform	7	Know all about Fourier transform for image processing
Image Enhancement in frequency domain	8	Know about processing in frequency domain
Image Restoration, Image Segmentation, morphology	9,10	Know about Noise models, segmentation and morphology
Image compression	11	The students know about the Image compression fundamentals
Basic steps of video processing	12	What is the important steps of video processing
Practical Topics	**Week**	**Learning Outcome**
Practical Part :Using MATLAB to write all digital image processing algorithms .	1-12	

Questions Example Design

Q2) Answer the following   (24 mark) :

a) Light with a wavelength of 525 X 10^{-8} m is green. Calculate the energy in joules for a green light photon

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(note : c = 3.00 × 10 ^{8} m/s , h = 6.63 × 10 $^{-34}$ J•s).

b) Find the number of bits required to store a binary image of size 150 x 150.

Extra notes:

External Evaluator

I confirm that the syllabus given in the attached course book is sufficient and covers the required areas needed for the students.

Signature