University of Mosul
Computer Engineering Department

Subject: Image processing
Class: MS.c
Teaching Language: English
Lecturer: Dr. Ahlam Fadhil Mahmood

Course 2		
No.	**Article**	**Week**
1.	**lntroduction: Digital Image Processing – Fields that Use Digital Image Processing – Fundamental Steps in Digital Image Processing – Components of an Image Processing System – Digital Image Fundamentals: Image Sensing and Acquisition – Image Sampling and Quantization – Some Basic Relationships between Pixels – Image Files format – Matlab instructions.**	**1**
	Seminar: Groups	
2.	**Basic Transformations: Image Negatives – Log Transformations – Exponential Transformations – Power-Law Transformations – Histogram Equalization – Histogram Specification**	**1**
	Seminar 1: **1- Coverless Information Hiding Based on the Molecular Structure Images of Material** **2- Classification of Diabetic Retinopathy Images by Using Deep Learning Models** **3- An Efficient Citrus Canker Detection Method based on Contrast Limited Adaptive Histogram Equalization Enhancement**	
3.	**Image Restoration: System model – Noise Distribution (Gaussian, Uniform, Rayleigh, Impulse, Negative Exponential, Gamma) – Spatial Filters(Order, Median, Midpoint, adaptive filter)**	**1**
	Seminar 2: **1- Evaluation of Spatial Filtering Techniques in Retinal Fundus Images** **2- Techniques for De-noising of Bio-Medical Images** **3- Digital Image Restoration in Matlab: A Case Study on Inverse and Wiener Filtering**	
4.	**Image Restoration: Frequency domain filters – Inverse Filter – Wiener Filter – Constrained Least-Squares – Geometric Mean – Notch Filter**	**1**
	1- Seminar 3: A Survey on Recovering High-Resolution Images by Using Various Image Restoration Techniques **2- Accurate Image Restoration with Attention Retractable Transformer**	
5.	**Fourier Transform: Fourier Series - Fourier Transform- Discrete Fourier Transform, 2-D Fourier Transform, properties- Fast Fourier Transform- Inverse Fast Fourier Transform**	**2**
	Seminar 4: SpectFormer: Frequency and Attention is what you need in a Vision Transformer	

6.	**Image Compression: JPEG compression-Discrete Cosine Transform-Huffman coding-JPEG Encoder- JPEG Decoder- Arithmetic Coding-LZW (Dictionary Coding).**	**1**
	Seminar 5: Learned Image Compression with Mixed Transformer-CNN Architectures	
7.	**Wavelet Transform: Short Time Fourier Transform(STFT)- Wavelet Properties- Discrete Wavelets Transform- Haar Transform- Fast Wavelet Transform- inverse Fast Wavelet Transform- 2D Discrete Wavelets Transform.**	**2**
	Seminar 6: Retracted: Wavelet Transform-Based 3D Landscape Design and Optimization for Digital Cities	
8.	**Wavelet Compression Algorithm: Zero-tree wavelet algorithm (EZW)-Set Partitioning in Hierarchical Trees (SPIHT).**	**1**
	Seminar 7: Compression of Bio-Signals Using Block-Based Haar Wavelet Transform and COVIDOA for IoMT Systems	
9.	**Wavelet Denoising: Soft or Hard Thresholding**	**1**
	Seminar 8: Application of Weak Signal Denoising Based on Improved Wavelet Threshold	
10.	**Karhaunen-Loeve(KL) Transform: Eignvectors and Eignvalues - PCA in the Face Recognition.**	**1**
	Seminar 9: Feature Extraction and Reconstruction of Medical Images using Two-Dimensional Principal Component Analysis	
11.	**Image Segmentation: Edge Detection- Hough transform– Clustering-K-Mean Clustering-**	**1**
	Seminar 10: Techniques and Challenges of Image Segmentation: A Review	
12.	**Image Representation: Chain Code(Boundary Representation)-Statistical moments(shape) - Fourier Descriptors.**	**1**
	Seminar 11: K-mean clustering and local binary pattern techniques for automatic brain tumor detection	
13.	**High-resolution Images: Analysis and processing**	**1**
	Exam.:	

1- Book1: “Digital Image Processing”. R. C. Gonzalez and R. E. Woods. Pearson-Prentice-Hall, 2008.
2- Book2: “Computer vision Image processing”, Scott E.Umbaugh, 1998.
3- Book3: “Digital Image Processing using Matlab”. R. C. Gonzalez, R. E. Woods, S. L. Eddins. Pearson-Prentice-Hall, 2004 ISBN: 0-13-008519-7 Edition: 2nd.
4- Papers related to seminar topics.