



Update: 6/1/2024

Winter Semester 14/1/2024-8/4/2024

Course number: 336027

Course's name: Introduction to Medical Image Processing

Course teaching staff

Main teacher:

Name: Moti Freiman

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Teacher Assistance:

Name: Nitzan Avidan

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Syllabus and Details

Academic Credits: 2.5

Teaching Language: Hebrew

Pre-required courses:

1. אותות ומערכות 044131
2. אלגברה מ1 104016
3. סטטיסטיקה 094423
4. הסתברות 104034

Syllabus:

Introduction to the field of medical image processing and its applications, 2D signal processing, 2D discrete Fourier transform and its application in medical imaging (MRI and CT reconstruction), Image enhancement (histograms, denoising, sharpening), Image quantization, Image Restoration, compression, DICOM format, Deep-learning methods for medical images, Python programming language for medical image processing.

Teaching Methods

Lecture weekly day and hours: Monday, 13:30-15:30

Exercise weekly day and hours: Thursday 10:30-11:30 / Tuesday 9:30-10:30





Assessment Methods

Final exam/middle tests/project/other (specify a date for submitting the project or dates of exams)

Exams:

Date of Session A: **1/5/2024**

Date of Session B: **3/6/2024**

Grade structure:

Final exam % of final grade: 50%-100%

*Due to special circumstances, assignments can be considered up to 50% of the final grade.

Notes if needed:

Tentative schedule

Date	class number	Lecture topic	Assignment
15/1/24	1	Intro/ Intensity transformations, histogram equalization	HW0 warm-up
22/1/24	2	Filtering (mean/median), bilateral, sharpening/Gibbs artifact/morphological	HW1 histogram equalization, mean filter, bilateral filter
29/1/24	3	Edge detection	
5/2/24	4	Hough transform	HW2 Hough transform and edge detector
12/2/24	5	Geometrical transformations/interpolation	
19/2/24	6	2d Fourier/Separability/Convolution theorem/Nyquist sampling	HW3 bilinear interpolation and Fourier
26/2/24	7	Fourier-based image filtering/processing	
4/3/24	8	Image restoration (mle/map/tv)	HW4 image restoration
11/3/24	9	Compression - Huffman/DCT	
18/3/24	10	compression - image quantization/k-means/EM	
25/3/24	11	Gaussian/Laplacian pyramids/wavelets	HW5 k-means and EM
1/4/24	12	TBD	

Assignments

- The assignments in this course will include both theoretical questions and programming assignments in Python. Submitting assignments 1-5 is optional; each assignment will account for 10% of the final grade. Assignments can be submitted in pairs or individually (per assignment).
- Usage of AI (ChatGPT, etc.) tools: Using AI tools to completely solve the assignments is **not permitted**. However, we may ask you specifically to leverage AI tools to enhance your solutions.
- Students who are in active reserve duty (proof required) can submit their assignments by the end of the first exam period (3.5.24).

