



## *The Hebrew University of Jerusalem*

### *Syllabus*

# **INTRODUCTION TO IMAGE PROCESSING AND ANALYSIS - 71254**

*Last update 07-10-2021*

*HU Credits:* 3

*Degree/Cycle:* 1st degree (Bachelor)

*Responsible Department:* agro informatics

*Academic year:* 0

*Semester:* 1st Semester

*Teaching Languages:* Hebrew

*Campus:* Rehovot

*Course/Module Coordinator:* yaron Michael

*Coordinator Email:* [yaron.michael@mail.huji.ac.il](mailto:yaron.michael@mail.huji.ac.il)

*Coordinator Office Hours:* by appointment

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Teaching Staff:

Mr. Yaron Michael,  
Mr. Daniel Waiger

Course/Module description:

Learning of selected topics in image processing and analysis at an introductory level.

These include the following topics: Image digitization, mathematical operations on matrices, color representations, data filtering including Fourier transforms and image segmentation. Students learn to apply the material by implementing and investigating image processing algorithms in Python and ImageJ (Fiji).

Course/Module aims:

Learning outcomes - On successful completion of this module, students should be able to:

Proper image acquisition - What are the prerequisites for a proper image/dataset?  
Read images into analysis programs and perform mathematical operations on them.

Understand and apply Fourier transform analysis to images.

To create a workflow that allows the extraction of conclusions from experimental images.

Attendance requirements(%):

none

Teaching arrangement and method of instruction: Weekly lectures and discussion, programming in class, and homework assignments.

Course/Module Content:

List of subjects:  
Introduction, Digital images  
Color Science  
Operating on Images

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*Filtering and Histograms*

*ImageJ - FIJI*

*FFT - Fourier analysis*

*Image Segmentation*

*Regions of Interest*

*Colors, and dimensionality reduction*

*Multi-image processing (Video and multiposition batch)*

*Image analysis projects*

*Required Reading:*

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*Additional Reading Material:*

*Bioimage Data Analysis Work Flows / Kota Miura, Nataša Sladoje (Editors) (Open access Online Book)*

*Course/Module evaluation:*

*End of year written/oral examination 0 %*

*Presentation 0 %*

*Participation in Tutorials 0 %*

*Project work 50 %*

*Assignments 50 %*

*Reports 0 %*

*Research project 0 %*

*Quizzes 0 %*

*Other 0 %*

*Additional information:*

*Exercises (class and home): 50%*

*Project: 50%*