Course Plan

Semester: 2nd semester	**Academic Year:** 1404-1405
Level: Graduate (Master)	**Major:** Medical Physics
Course Title: Introduction to Data Processing and Computer Simulation	**Department:** Department of Medical Physics
Course Code: 1345101	**University Professor or Faculty member:** Faculty member
Class NO:	**Credit Hours:** 3
Prerequisite: • Undergraduate-level knowledge of mathematics, including linear algebra, calculus, and basic statistics. • Basic familiarity with scientific computing and data analysis concepts. • Prior exposure to at least one programming language is recommended. • Background in engineering, computer science, medical physics, physics, mathematics, or a related field.	**Credit Units:** 3 Theo
Availability of Professor: Available via the Navid cite messaging system, and other approved communication platforms for course-related inquiries and academic support.	**Tel:** 03137929074
Office Address: In Department of medical physics	**E-mail:** mahetehad@gmail.com
Name of Student Representative and Cellphone Number:	**Number of Students :** 2

The General Purpose of the Lesson:

This course provides an introduction to the fundamental concepts of data processing and computer simulation using modern computational tools. Students will learn the basics of Python programming, image processing, and deep learning, with practical exercises conducted in Google Colab. The course emphasizes the application of computational methods for data analysis and simulation in scientific and engineering problems.

Learning Outcomes (Objectives):

By the end of this course, students will be able to:

- Understand the principles of data processing and computational analysis.
- Compare MATLAB and Python for scientific computing applications.
- Use Google Colab as a cloud-based programming environment.
- Read, visualize, and process digital images using Python.
- Apply basic image processing techniques such as edge detection.

- Understand the fundamentals of deep learning and neural networks.
- Explain the structure and applications of Convolutional Neural Networks (CNNs).
- Implement basic computational and deep learning workflows for data analysis.

Assessment Methods:

(The Assessment Methods that will be Used to Test Students Learning outcomes & the Skills & Competencies Stated in learning Outcomes)

Assessment	**Score From 20**
Theory Exam	6
Assignments:	5
Final projects:	9
Total Marks	20

Main References (Text Books):

1. Python for Data Analysis – for Python programming.
2. Digital Image Processing (Gonzalez & Woods) – for image processing fundamentals.
3. Deep Learning with Python (Chollet) – for practical deep learning.
4. Hands-On Machine Learning (Géron) – for machine learning and neural networks.
5. MIT course materials (https://www.youtube.com/watch?v=oGpzWAlP5p0).

References for More Reading:

Stanford CS230: Introduction to deep learning (https://www.youtube.com/watch?v=_NLHFoVNlbg)

Student's Responsibilities:

- Review lecture materials and narrated PowerPoint presentations.
- Submit assignments and projects.
- Maintain academic integrity and adhere to university policies regarding plagiarism and ethical conduct.
- Communicate with the instructor regarding any questions or difficulties related to the course.

Department' s Attitudes :

The course integrates computational methods with medical physics principles, focusing on imaging, radiation transport, and clinical problem-solving. It aims to build students' analytical and programming skills, with emphasis on accurate, reproducible, and responsible use of computational tools. Active learning through coding and simulations is encouraged, along with strong attention to ethics, integrity, and collaboration.

Theory Exam Date:

Since international students have only recently gained access to the course materials, they are required to complete their assignments online using available internet resources. The final theoretical examination will be conducted during the last week of Shahrivar 1405.

NO of Session	Main Topic	Teacher's Name	Place & Time	Date	Method of Presentation
1	Fundamentals of Data Processing	Etehadtavakol	Navid	May 9, 2026	narrated PowerPoint presentation
2	Comparison of MATLAB and Python	Etehadtavakol	Navid	May 11, 2026	narrated PowerPoint presentation
3	How to Work with Google	Etehadtavakol	Navid	May 11, 2026	narrated PowerPoint presentation

	Colab				
4	Installing Python and Introduction to Python	Etehadtavakol	Navid	May 11, 2026	narrated PowerPoint presentation
5	Reading and Displaying Images	Etehadtavakol	Navid	May 11, 2026	narrated PowerPoint presentation
6	Edge Detection	Etehadtavakol	Navid	May 15, 2026	narrated PowerPoint presentation
7	Introduction to Deep Learning	Etehadtavakol	Navid	May 15, 2026	narrated PowerPoint presentation
8	Introduction to Deep Learning (Continued from Session 7)	Etehadtavakol	Navid	May 15, 2026	narrated PowerPoint presentation
9	Introduction to Deep Learning (Continued from Session 8)	Etehadtavakol	Navid	May 15, 2026	narrated PowerPoint presentation
10	Introduction to Deep Learning (Continued from Session 9)	Etehadtavakol	Navid	May 15, 2026	narrated PowerPoint presentation
11	Introduction to Deep Learning (Continued from Session 10)	Etehadtavakol	Navid	May 15, 2026	narrated PowerPoint presentation
12	Convolutional Neural Networks	Etehadtavakol	Navid	May 15, 2026	narrated PowerPoint presentation
13	Session 13: Convolutional Neural Networks (Continued from Session 12)	Etehadtavakol	Navid	May 15, 2026	narrated PowerPoint presentation

14	Convolutional Neural Networks (Continued from Session 13)	Etehadtavakol	Navid	May 15, 2026	narrated PowerPoint presentation