

Efi Arazi School of Computer Science
Interdisciplinary Center (IDC) Herzliya

M.Sc. Program in Machine Learning and Data Science

Prof. Ariel Shamir
Dean

Prof. Zohar Yakhini
Head of Program

Dr. Elishai Ezra Tsur
Program Director

Ms. Shlomit Stern
Head of Student Administration

Ms. Efrat Tausi
Executive Administrator

A great deal of effort has been expended in preparing this handbook, in order to ensure that its content is complete and accurate. However, changes and alterations to the information are possible. The IDC Herzliya Academic Authorities may cancel, alter or add courses and/or specialization programs, and generate changes in the times of lectures or in the assigned lecturer. Such changes will be published over the course of the year by various means, such as the online handbook on the IDC Herzliya website, and will apply to all IDC Herzliya students, including students of the Raphael Recanati International School, unless specified otherwise.

Introduction

IDC's Efi Arazi School of Computer Science has built an innovative and intensive M.Sc. program aimed at providing deep theoretical and practical understanding of data science, machine learning and big-data technologies to students with a strong quantitative background and education.

The program will endow the students with knowledge, as well as skills and tools, in central fields such as machine learning, algorithms, databases, and statistical inference. Students will attend frontal lectures, seminars, and produce projects of different scales providing them hands-on experience in the data-science and machine learning domains. The conducive learning environment at the Efi Arazi School of Computer Science provides a community and team-up opportunities for students, scientists and researchers from the entire scientific spectrum.

Upon completing our M.Sc. program in data science, our graduates will have gained a strong background in the science and the technology that form the basis to the growing activity in data analysis, data collection and processing and related usage. They will also have acquired expertise in programming for data science using Python, including skills in using programming in statistical analysis and advanced machine learning. Additionally, they will have acquired deeper specialization in data science based on the elective courses of the program: infrastructure courses, big-data and databases, neural networks and deep learning, statistics, optimization, scientific computing, modern bioinformatics and environmental informatics, computer graphics and vision, numerical analysis, and biomedical data science.

The curriculum of the M.Sc. Program in Machine Learning and Data Science includes:

- 5 Mandatory core courses (16 credits)
- 1 Mandatory Applied Data Science Elective (3 credits)
- 1 Mandatory project (5 credits)
- 4 Elective courses (12 credits)

- 3 Preparatory CS courses - only for non-CS graduates

Overall, the M.Sc. students are required to complete 36 credits.

Program of Studies

Mandatory core courses –Year 1

Course No.	Course Name	Lecture Hours	Recitation Hours	Total Credit Points	Final Course Assignment
Fall Semester Courses					
3620	Probability and statistics for data science and machine learning. Prof. Zohar Yakhini	3	1	4	Exam
Spring Semester Courses					
3141	Machine Learning from Data Prof. Zohar Yakhini	3	1	3	Exam
3605	Big Data Platform Dr. Shaul Dar	3		3	Submitted work

Mandatory core courses –Year 2

Course No.	Course Name	Lecture Hours	Recitation Hours	Total Credit Points	Final Course Assignment
Annual Courses					
3624	Final Project*			5	Project
Fall Semester Courses					
3600	Deep Learning. Dr. Kfir Bar	3	1	3	Submitted work
Spring Semester Courses					
3603	Advance Machine Learning Dr. Shai Fine	3	1	3	Submitted work

* Individual meetings that will be scheduled directly with your Adviser (professor)

Mandatory Applied Data Science Elective (3 credits)

The students will select one of the following applied "Data Science" elective as a mandatory core course:

Course No.	Course Name	Lecture Hours	Total Credit Points	Final Course Assignment
Fall Semester Courses				
217	Computer Vision Prof. Yael Moses	3	3	Exam

3571	Algorithms in Computational Biology Dr. Ilan Gronau	3	3	Exam
3591	Cognitive Computing Dr. Elishai Ezra Tsur	3	3	Exam
3639	Recommendation Systems** Dr. Asnat Messica	3	3	Exam

Spring Semester Courses

3523	Natural Language Processing Dr. Kfir Bar	3	3	Submitted work
3606	Topics in Data Mining and Genomics Prof. Yaniv Erlich	3	3	Submitted work
3640	Reinforcement Learning** Dr. Moshe Butman	3	3	Submitted work

Elective courses (12 credits)

Students must select 4 elective courses out of the following list of courses, together with the applied data science list above. Many of these courses are already given as part of the school's master program courses. Student can take 1-2 electives during their first year of study and 2-3 electives during their second year, for a total of 4 elective courses.

Course No.	Course Name	Lecture Hours	Total Credit Points	Final Course Assignment
------------	-------------	---------------	---------------------	-------------------------

Fall Semester Courses

285	Audio-visual Signals Compression Mr. Nimrod Peleg	3	3	Exam
3169	Artificial intelligence and Moral● Dr. Udi Boker	3	3	Submitted work
3559	Coding Theory Prof. Elette Boyle	3	3	Exam
3604	Data Streaming Algorithms and Online Learning Dr. Aviv Yehezkel	3	3	Submitted work
3622	Seminar: advanced topics in deep-learning ■ ◆ Prof. Yacov Hel-Or	3	3	Submitted work

Spring Semester Courses

159	Cryptography Prof. Alon Rosen	3	3	Exam
287	Digital Systems Construction Prof. Shimon Schocken	3	3	Exam

3123	Databases TBD	3	3	Exam
3327	Numerical Optimization with Python Dr. Yonathan Mizrahi	3	3	Submitted work
3541	Seminar in Concurrent and Distributed Computing ■ Prof. Gadi Taubenfeld	3	3	Submitted work
3568	Topics in System Engineering Dr. Rami Marely	3	3	Submitted work
3601	Formal Verification Prof. Udi Boker	3	3	Exam
3614	Practical probability Models for Computer Science Seminar ■ Dr. Gail Gilboa Freedman	3	3	Submitted work
3616	Game Theory Prof. Gil Kalai	3	3	Submitted work
3621	Centralized and Distributed Sublinear Algorithms Dr. Reut Levi	3	3	Submitted work
3626	Blockchains and Cryptocurrencies Dr. Tal Moran	3	3	Submitted work
3647	Advanced Learning and Graphics Seminar ■ Prof. Ariel Shamir Dr. Ohad Fried	3	3	Submitted work
3655	Unsupervised Learning Methods ** Dr. Or Yair	3	3	Submitted work

** Prerequisites for this course is the course "Machine Learning from Data" (code:3141)

■ Only one of the elective courses can be a seminar.

◆ suitable for students who have taken the deep learning course or have a background in deep learning.

● Advanced undergraduate elective courses can only be enrolled during the change period.

Exam Schedule the dates of the examinations can be found on the IDC Herzliya website under Students > Student Information > Course Catalog, Student Regulations and Syllabus > Search Exams A personal examinations schedule is published at the Student's Information website (My IDC).