DATA SCIENCE
second-cycle / Master's degree studies

CURRICULUM

Data Science is an interdisciplinary degree program designed to provide an opportunity to acquire modern, up-to-date, specialist knowledge and skills in data analysis and processing.

The program offers a unique combination of theory – the foundations and operating conditions of optimal methods in statistics, machine learning, and artificial intelligence - and practice – effective application of algorithms to real data sets.

The acquisition of new, specialist competencies is based upon deepened mathematical knowledge and modern computational methods. The program allows to acquire the skills to apply data science methods and techniques learned, in standard tasks, as well as to use them creatively tackling new research problems. The program offers an opportunity to follow the latest developments in data analysis, presented at the conferences and described in scientific journals, as well as to participate in the advancement of data science, together with the Department's faculty.

The master's program in Data Science is offered jointly by the Institute of Computer Science and the Institute of Mathematics at the University of Wrocław.

1. Organization of studies

The master's program lasts for 4 semesters. It is based upon the ECTS (European Credit Transfer System) credit system.

For the completion of the master's program in Data Science it is required to obtain at least 120 ECTS credits and to complete courses in accordance with the study plan described in Section 3. The core courses are taught in English. Submission of Master's thesis and taking Master's exam is required to complete the degree program.

2. Entry and additional requirements

The Data Science program is addressed to the graduates of first-cycle studies (undergraduate studies) in exact and engineering sciences.

Entry requirements include the foundations of probability theory and statistics, as well as the foundations of computer science. In addition, documented competencies in Linear Models and in Artificial Intelligence are expected.

Students who lack these competences are obliged to complete all the requirements by the end of the second semester, following the procedure set out by the Dean.

3. Study plan

The intended learning outcomes can be achieved on the basis of the general study plan that comprises mandatory core courses as well as elective courses.

Study plan

subject/requirement	Form of classes		Exam	ECTS
	lecture	class/lab. /sem.		
Mandatory Core Courses				
Numerical Optimization	30	45	+	8
Machine Learning	30	30	+	7
Statistical Learning	30	30	+	6
Elective Courses				min. 54
Incl.: Elective Core Courses (min. 24 ECTS)				
Review Seminar				min. 2
Team Project				min. 4
English - B2+		60	+	4
Courses in Humanities or Social Sciences			+	5
Master's Thesis preparation				16
Master's exam			+	4
			Total	min. 110

Elective courses

Elective core courses. The department offers a number of elective core courses for the Data Science Program. The list of the courses is updated each year and available on datascience.uni.wroc.pl.

The elective core courses for the Data Science program are usually offered once every two years and they cover the following topics:

- Analysis of big data sets,
- Methods of classification and dimensionality reduction,
- Simulations and algorithmic applications of Markov chains,
- Neural networks,
- Advanced data exploration,
- Computational tools and methods in big data processing,
- Natural language processing,
- Text mining,
- Numerical programming tools and methods.

Other elective courses include:

- Advanced Computer Science courses - symbols I2 or K2,

- Master-level compulsory courses in Computer Science
- Advanced Math courses - symbol M

In addition, students may get credit for other courses from the supplementary list announced by the Dean.

4. Semesters and studies completion

Credits requirements. For the completion of successive semesters, a minimum of 30**k* ECTS credits should be obtained before the end of the k^{th} semester, for k = 1, 2, 3. Additionally, for the completion of the second semester, documented competencies in Linear Models and in Artificial Intelligence are required (see section 2). For the completion of the fourth semester, a minimum of 100 ECTS credits is required.

Study completion requirements. To complete the Master's program in Data Science, the following requirements should be met:

- completion of the study plan as described in Section 3;
- a minimum total of 120 ECTS credits, inclusive of 16 ECTS for thesis preparation and 4 ECTS for passing an oral degree examination; the exam covers the content of the mandatory core courses and the topic of the thesis;
- fulfillment of additional requirements specified by applicable university-wide regulations and legal acts (in particular, A1 certificate in the Polish language by foreign students).