UNIVERSITY OF DEBRECEN, FACULTY OF INFORMATICS

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Data Science MSc

curriculum – 2023

Debrecen
2025/2026.

DATA SCIENCE MSC CURRICULUM

Mode:	Full-time training
Program Coordinator:	Dr. András Hajdu (hajdu.andras@inf.unideb.hu)
Mentor:	Dr. János Tóth (toth.janos@inf.unideb.hu)

Qualification requirements

General requirements of the diploma are regulated by The Rules and Regulations of The University of Debrecen.

Work and Fire Safety and Physical Education

The courses of „Work and Fire Safety" and „Physical Education" are worth 1 - 1 credit, which must be completed in excess of the number of credits required for the diploma as specified in the training and outcome requirements of the degree.

Diploma credit requirements:

Basic knowledge related to the theoretical background of data science:	24 credits
Basic skills related to the practical background of data science:	15 credits
Differentiated knowledge topics:	45 credits
Professional Training:	9 credits
Thesis work:	30 credits
Free choice:	6 credits
Total	**120 credits**
Work and Fire Safety Training:	1 credit
Physical Education (1 semester):	1 credit

Professional training/Internship requirements

Professional training is a practice which is completed at a competent training place. It lasts for at least 6 weeks and 240 work hours.

It is a must to complete Professional training subject to issue the absolutorium (pre-degree certificate).

https://inf.unideb.hu/en/professional-training

Student can apply for Professional training after completing at least one semester.

Faculty of Informatics annex to the Academic and Examination Rules and Regulations of the University of Debrecen contains the procedure of the professional training.

The Thesis

During the studies, Student must write a thesis. Writing a thesis is a diploma requirement.

Thesis subject is mandatory to complete. The prerequisites to register for the Thesis subject are the followings:

- chose a thesis topic by the deadline.

  (Together with the supervisor the candidate writes a work plan in the maximum of two pages. The work plan describes the aim of the work, areas of expertise and the scheduling of the work.)

- the chosen topic is approved by the Educational Committee
- at least 30 completed credits.

Final Exam / State Exam

a., Requirements for Final Exam

1. Complete all the 120 credits required by the curriculum of program specialisation to have the degree of MSc program
2. Carry out the internship
3. Write and submit the Diploma Thesis

b., Process of the Final Exam

The Final Exam consists of an oral part only and the purpose is to examine the coherence of the professional knowledge.

F. The average from the grades of the oral exam (rounded to a whole number). If the grade for any item is failed, the grade is failed, and the final examination is failed.

D1. Thesis defence. During the defence the candidate has to sum up the Thesis in a short presentation then s/he answers the questions from the referee of the Thesis and the members of the Committee.

D2. The grade for the thesis, which is determined by the Final Examination Committee taking into account the grade proposed by the thesis assessor.

Calculation of the final examination grade (**ZV**): ZV = (F+D1+D2)/3

If the grade D2 is failed, the candidate will not be allowed to sit the final examination.

If any of the grades of F or D1 are unsatisfactory, the final exam is also unsatisfactory. Only the component graded as unsatisfactory must be retaken in the retake of the final examination.

Grade of Diploma:

Diploma grade: in the case of a successful final examination, it is determined based on the average of the following results:

a) **SZ**: Average of the grades for the Thesis subject, the grade for the thesis assessment and the grades for the thesis defence in the final examination, rounded to two decimal places.

b) **F**: Average of the grades obtained in the final examination, rounded to a whole number.

c) **T**: the credit-weighted average of all compulsory and optional professional subjects completed during the course, except for 'Thesis 1' and 'Thesis 2', rounded to two decimal places

Diploma grade = (0,3*SZ+0,2*F+0,5*T)

Based on the above average result, the qualification of the diploma is determined by the University of Debrecen's Academic and Examination Regulations, Section 31 (7).

The diploma shall be assessed based on the calculation of the grade average as follows:

outstanding	4,81-5,00
excellent	4,51-4,80
good	3,51-4,50
satisfactory	2,51-3,50
pass	2,00-2,50

Basic knowledge related to the theoretical background of data science – needed 24 credits

Code	Subject name	Credit	Type and number			Assessment	Prerequisites	Period	Semester
			lec.	practice					
				sem.	lab				
INMAA0101-23 INMAA0101E INMAA0101L	Information Security	6	2		2	E S			1
INMAA0102-23 INMAA0102E INMAA0102L	Fundamentals of Machine Learning	6	2		2	E S			1
INMAA0103-23 INMAA0103E INMAA0103L	Statistics for Data Science	6	2		2	E S			1
INMAA0207-23 INMAA0207E INMAA0207L	Optimization for Data Science	6	2		2	E S			2

Basic skills related to the practical background of data science – needed 15 credits

Code	Subject name	Credit	Type and number			Assessment	Prerequisites	Period	Semester
			lec.	practice					
				sem.	lab				
INMAA0104-23 INMAA0104E INMAA0104L	Cloud Computing	6	2		2	E S			1
INMAA0105-23 INMAA0105L	Data Visualization Methods	3			2	PM			1
INMAA0106-23 INMAA0106L	Programming for Data Science	3			2	PM			1
INMAA0208-23 INMAA0208E	Data Ethics	3	2			E			2

Thesis work – needed 30 credits

Code	Subject name	Credit	Type and number			Assessment	Prerequisites	Period	Semester
			lec.	practice					
				sem.	lab				
INMAA0309-23 INMAA0309G	Thesis 1	15				PM			3
INMAA0410-23 INMAA0410G	Thesis 2	15				PM			4

Differentiated knowledge topics – needed 45credits

Advanced Machine Learning block

Code	Subject name	Credit	Type and number			Assessment	Prerequisites	Period	Semester
			lec.	practice					
				sem.	lab				
INMAA9911-23 INMAA9911E INMAA9911L	Advanced Natural Language Processing	6	2		2	PM			2
INMAA9916-23 INMAA9916E INMAA9916L	Social and Technological Networks	6	2		2	E S			3
INMAA9917-23 INMAA9917L	Modern Deep Learning Frameworks	3			2	PM	INMAA0106		3
INMAA9918-23 INMAA9918L	Generative Networks	3			2	PM			3
INMAA9932-23 INMAA9932E INMAA9932L	Advanced Machine Learning	6	2		2	E S	INMAA0102		4
INMAA9933-23 INMAA9933E INMAA9933L	Advanced Reinforcement Learning	6	2		2	PM	INMAA0102		4

Machine Learning System Design block

Code	Subject name	Credit	Type and number			Assessment	Prerequisites	Period	Semester
			lec.	practice					
				sem.	lab				
INMAA9912-23 INMAA9912E INMAA9912L	Docker and Kubernetes in ML	6	2		2	PM			2
INMAA9919-23 INMAA9919E INMAA9919L	Extreme Computing	6	2		2	E S			3
INMAA9920-23 INMAA9920E INMAA9920L	Design of Big Data Systems	6	2		2	E S	INMAA0104		3
INMAA9921-23 INMAA9921L	Big Data Technologies	3			2	PM	INMAA0106		3

AI in Industry block

Code	Subject name	Credit	Type and number			Assessment	Prerequisites	Period	Semester
			lec.	practice					
				sem.	lab				
INMAA9913-23 INMAA9913L	Geometric Data Analysis	3			2	PM			2
INMAA9914-23 INMAA9914L	Processing Large Amounts of Sensor Data	3			2	PM			2

Code	Subject name	Credit	Type and number			Assessment	Prerequisites	Period	Semester
			lec.	practice					
				sem.	lab				
INMAA9922-23 INMAA9922E INMAA9922L	Advanced robotics	6	2		2	E S			3
INMAA9923-23 INMAA9923E INMAA9923L	Autonomous Vehicles	6	2		2	PM			3
INMAA9924-23 INMAA9924E INMAA9924L	Theoretical and Neural Models in the Industry	6	2		2	PM	INMAA0102		3
INMAA9925-23 INMAA9925L	Parallel computing with CUDA	3			2	PM			3

Security block

Code	Subject name	Credit	Type and number			Assessment	Prerequisites	Period	Semester
			lec.	practice					
				sem.	lab				
INMAA9926-23 INMAA9926E INMAA9926L	Cryptography	6	2		2	E S			3
INMAA9927-23 INMAA9927E INMAA9927L	AI Security	6	2		2	PM	INMAA0101 INMAA0102		3
INMAA9934-23 INMAA9934E INMAA9934L	Secure Coding	6	2		2	PM			4

Stochasticity block

Code	Subject name	Credit	Type and number			Assessment	Prerequisites	Period	Semester
			lec.	practice					
				sem.	lab				
INMAA9928-23 INMAA9928E INMAA9928L	Time Series Analysis	6	2		2	E S			3
INMAA9929-23 INMAA9929E INMAA9929L	Financial Modelling	6	2		2	PM			3
INMAA9930-23 INMAA9930E INMAA9930L	Stochastic Data Mining	6	2		2	E S			3

AI in Medicine block

Code	Subject name	Cre-dit	Type and number			Asses-ment	Prerequisites	Period	Semes-ter
			lec.	practice					
				sem.	lab				
INMAA9915-23 INMAA9915E INMAA9915L	Clinical Big Data	6	2		2	E S			2
INMAA9931-23 INMAA9931E INMAA9931L	Genetics and BigData	6	2		2	E S			3

Professional Training

Code	Subject name	Cre-dit	Type and number			Asses-ment	Prerequisites	Period	Semes-ter
			lec.	practice					
				sem.	lab				
INMAA9997-23 INMAA9997G	Professional Training	9				PM			3

Free choice – needed 6 credits

Code	Subject name	Cre-dit	Type and number			Asses-ment	Prerequisites	Period	Semes-ter
			lec.	practice					
				sem.	lab				

* "Free choice" - Professional electives offered by the Faculty of Informatics and institutional electives offered by other faculties of the University of Debrecen.

Work and Fire Safety and Physical Education – needed 2 credits

must be completed in excess of the number of credits required
for the diploma as specified in the training and outcome requirements of the degree

Code	Subject name	Cre-dit	Type and number			Asses-ment	Prerequisites	Period	Semes-ter
			lec.	practice					
				sem.	lab				
	Work and Fire Safety	1				PM			1
	Physical Education	1				PM			

Exam types:
E exam
S signature
PM practical mark