

Course title/Course Neptun ID: Python programming	Credit value: 6
Professor in charge (name, position, academic degree): Zoltán Lakner Ph.d., DSc, professor	
Professor(s) involved in teaching, if any (name, position, academic degree):	
Course category: compulsory / <u>elective</u>	
Course type: lecture/seminar/practical course/consultation, and total number of course sessions in the given semester: 5..course sessions	
Methods, (<i>specific</i>) tools, and characteristics applied to convey knowledge: e.g.: case reports, case study analyses, project work, other... Individual work with python and AI applications	
Method of assessing knowledge (<u>exam</u> / practical course grade / other): Solution of individual problems with Python applications	
Grading method(s) applied for assessing knowledge: -1-5	
The course's placement in the curriculum (in which semester the course is taken): 3	
Compulsory studies prior to the course (if any):	
Course description: a brief yet informative description of the course's objectives and the material to be covered	
The aim of this course is to develop students' analytical skills and to introduce them to a programme that enables the application of state-of-the-art data science methods based on machine learning and the use of artificial intelligence	
Course topics/semester syllabus: 1. Typology of programs, python as a high level programming language, its pros and cons 2. Development of Python, concept of ecosystem 3. The basic toolbox of data scientists: R, Python and Julia 4. Python environment, Anaconda, Miniconda, Jupiter, Spider, Pycharm 5. Environment management its importance and practice 6. Sources of learning: the sandbox system 7. Basic syntax, built-in functions 8. Data storage in Python, dataframes, lists, tuples 9. Functions in Python, looping 10. Numpy and Pandas 11. Visualisation in Python: matplotlib and Seaborn 12. AI modules of Python: Sci-kit learn 13. Sci-kit learn in practice 14. TensorFlow and its application 15. PyTorch and its applications 16. Network analysis with Python 17. Forecasting with Python application	
A list of the 2-5 most relevant <u>compulsory</u> literature (notes, textbooks) with bibliographic information (author, title, publication details, page numbers, ISBN):	

Kharwal, A. (2024). From ML algorithms to GenAI & LLMs: Master ML algorithms and generative AI & LLMs with Python from scratch! (2nd ed.). Bluerose Publishers. (285 p., ISBN 9789362624154)

Lambert, N. (2026). Reinforcement learning from human feedback: Alignment and post-training of LLMs with Python. Manning Publications. (350 p., ISBN 9781633434301)

Lerner, R. M. (2026). AI-assisted Python for nonprogrammers. O'Reilly Media. (290 p., ISBN 9781098199340)

A list of the 2-5 most relevant *recommended* literature (notes, textbooks) with bibliographic information (author, title, publication details, page numbers, ISBN):

Shaw, Z. A. (2024). Learn Python the hard way: A deceptively simple introduction to the terrifyingly beautiful world of computers and data science (5th ed.). Addison-Wesley Professional. (352 p., ISBN 9780138270711)

Turner, R. (2025). Generative AI with Python: Deep learning models, Hugging Face, and fine-tuning applications. Packt Publishing. (380 p., ISBN 9781807780210)

Umrai, S. K. (2024). Python AI programming: Navigating fundamentals of ML, deep learning, NLP, and reinforcement learning in practice. GitforGits. (184 p., ISBN 9788119177639)

Professional competencies, elements of competence, and skills to which the course typically and substantially contributes (knowledge, ability, attitude, autonomy, and responsibility):

Knowledge: use of a modern, multifunctional programming language; AI-supported programming

Ability: the conscious application of tools designed to facilitate an understanding of and the scientific analysis of socio-economic interrelationships

Attitude: perseverance, self-reflection, conscious self-development

Autonomy and Responsibility: Is able to independently select, develop, and apply Python-based solutions to their own research and data analysis tasks. Takes responsibility for the correctness of the code used, the reliability of data processing, and the appropriate interpretation of analytical results.