

Course title/Course Neptun ID: Science and AI	Credit value: 8
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... Data science tasks and AI-supported data science solutions based on one's own research problems	
Method of assessing knowledge (<u>exam</u> / practical course grade / other): Solution of individual problems with AI 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 module is to familiarise our students with the potential applications of AI in cutting-edge research, from literature review to data analysis, with a particular focus on developing critical thinking skills.	
Course topics/semester syllabus: 1. Basic concepts of artificial intelligence and machine learning 2. The use of large language models, Scopus and WoS AI systems 3. AI applications in literature review and the formulation of research hypotheses 4. Methods of AI-assisted data analysis 5. The concept of data science 6. Data science tools 7. Using free data analysis software: Jamovi and Jasp 8. The world of R, basic R syntax 9. Importing and exporting data to and from R 10. Data structures in research: searching for data 11. Data cleaning and management; AI-compatible data recording and manipulation 12. Descriptive statistics, supported by AI 13. Questionnaire validation 14. Computer-assisted macroeconomic analysis and planning methods 15. Network analysis using AI 16. Artificial intelligence applications in R, automatic classification 17. Text analysis using AI, 18. AI-supported geoinformatics structures, 19. Neural network models: theory and practice	

Large language models and their use in the evaluation of research data
A list of the 2-5 most relevant <i>compulsory</i> literature (notes, textbooks) with bibliographic information (author, title, publication details, page numbers, ISBN):
Al-Aswadi, F. A., & Al-Tashi, Q. (Eds.). (2026). Data science and exploration in artificial intelligence (Vol. 2). Springer Nature. (407 p., ISBN 9783032193209) Arbuckle, D. (2024). Powerful analytics: Patterns and strategies with modern R. O'Reilly Media. (210 p., ISBN 9781098175719) Barale, A. (2024). The art of artificial intelligence: Philosophical keywords. Routledge. (180 p., ISBN 9781032514932) Becker, A. (2025). More everything forever: The algorithmic push for general intelligence. Hachette. (340 p., ISBN 9781541619593) Boddington, P. (2024). AI ethics and responsible data exploration. Springer. (215 p., ISBN 9789811993815)
A list of the 2-5 most relevant <i>recommended</i> literature (notes, textbooks) with bibliographic information (author, title, publication details, page numbers, ISBN):
Jones, B. (2025). AI literacy fundamentals: Recognizing, understanding, and assessing intelligent systems. Data Literacy Press. (290 p., ISBN 9781734914450) Lambert, N. (2026). Reinforcement learning from human feedback: Alignment and post-training of LLMs. Manning Publications. (350 p., ISBN 9781633434301) Lidströmer, N. (2026). The AI ideal: AI idealism and the governance of AI. Cham: Palgrave Macmillan. (310 p., ISBN 9783031445012) Mollick, E. (2024). Co-intelligence: Living and working with AI. Portfolio/Penguin. (256 p., ISBN 9780593716717) Muddana, A. L., & Vinayakam, S. (2024). Statistical learning and foundations for data science. Springer Nature. (392 p., ISBN 9783031524721) Nathanael, N. (2026). R for data science projects 2026: Real-world case studies for practical analytics. Independently Published. (245 p., ISBN 9798349586111) Sreenivasa, R. (2024). The AI playbook: Mastering the rare art of machine learning deployment. The MIT Press. (256 p., ISBN 9780262048903)
Professional competencies, elements of competence, and skills to which the course typically and substantially contributes (knowledge, ability, attitude, autonomy, and responsibility):
Knowledge: Data assets, the concept of data management, machine learning, fundamental concepts of artificial intelligence, familiarisation with a specific programming environment that integrates artificial intelligence, preparation, analysis and interpretation of AI-compatible data Ability: critical thinking, knowledge of modern social science research methods and the ability to apply them at a practical level Attitude: commitment, open-mindedness, creativity, constructive and critical thinking Autonomy and Responsibility: Is able to independently and critically select and apply artificial intelligence-based tools in their own research activities. Takes responsibility for the scientific validity and verification of AI-assisted data processing, analysis, and interpretation of results.