Course Title:	**AI in Databases and Data Analysis**
Institute/Division:	Department of Automation and Computer Engineering Faculty of Electrical and Computer Engineering
Course code:	**E-AID**
Erasmus subject code:	0612 Database and network design and administration
Number of contact hours:	45
Course duration:	1 semester (Spring/Summer)
ECTS credits:	6
Course description:	Course Description The course explores the transformative role of Artificial Intelligence (AI) and Large Language Models (LLMs) in modern database management and data analysis. Students will learn how to leverage cutting-edge AI tools to automate, optimize, and enhance various aspects of database systems and data exploration. The program combines theoretical insights with practical applications, enabling participants to gain hands-on experience in using AI for SQL code generation, validation, data visualization, anomaly detection, and predictive analytics. Learning Objectives By the end of this course, students will be able to: • Understand the principles of relational database systems and their integration with AI technologies. • Utilize AI tools, such as ChatGPT and LLMs, for generating SQL queries, debugging code, and analyzing database diagrams. • Apply machine learning algorithms for anomaly detection, predictive maintenance, and performance optimization in databases. • Explore large datasets using AI-driven techniques to uncover patterns, trends, and actionable insights. • Automate routine database management tasks such as indexing, query optimization, and data cleaning using AI-powered tools. Course Structure The course is divided into three components: 1. Lectures: • Introduction to relational databases and SQL fundamentals. • Overview of AI technologies in database management. • Machine learning applications in data analysis. • Advanced topics: predictive analytics and anomaly detection.

	2. Laboratory Exercises: • Hands-on practice with AI tools for SQL code generation and debugging. • Using AI for data visualization and exploration. • Implementing machine learning models for database optimization. 3. Project Work: • Collaborative projects focusing on real-world applications of AI in databases. • Designing AI-driven solutions for complex data analysis challenges. <u>Key Topics Covered</u> • AI in SQL Code Generation: Learn how LLMs can assist in writing efficient SQL queries tailored to specific datasets. • Data Cleaning & Preparation: Use AI algorithms to automate the cleaning and standardization of structured and unstructured data. • Query Optimization: Explore how AI-powered systems improve query execution plans through adaptive techniques. • Anomaly Detection: Implement machine learning models to identify irregularities in database operations or datasets. • Predictive Analytics: Apply AI tools to forecast trends based on historical data patterns. • Data Visualization: Utilize NLP-based AI tools to interpret complex datasets into intuitive visual formats. Students will develop: • Proficiency in SQL programming enhanced by AI-driven methods. • Practical knowledge of integrating machine learning models into database workflows. • Expertise in using advanced tools for data exploration and visualization. • Ability to design scalable solutions for managing large datasets using AI. This course prepares students for careers in data engineering, database administration, or advanced analytics by equipping them with essential skills at the intersection of AI and databases.
Course type:	Lectures (20h), Computer laboratory (20h), Project (5h)
Literature:	https://platform.openai.com/docs https://docs.perplexity.ai/home
Assessment method:	Laboratory exercises and project
Prerequisites:	Any programming language
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