COMPUTER ENGINEERING
MSC SPECIALIZATION

SOFTWARE ENGINEERING
SPECIALIZATION

HTTPS://SPEC.VIK.BME.HU

During the Master's program, we focus on problems that go beyond coding to support students who tend to move into leadership and decision-making roles in the industry after graduation. Therefore, the emphasis is placed on widespread and efficient software design solutions, common code libraries and the application of new, artificial intelligence-based procedures. In addition, we provide the opportunity to use the project subjects to experiment with the latest technologies and software solutions. The goals of the specialization include acquainting colleagues with the skills used in industry modern, maintainable software development principles and methods that contribute to a significantly extension the lifespan of the finished software as well as being easy to develop, refactor, extend and scale.

MAIN TOPICS OF THE SPECIALIZATION:

- Modern software development tools and methods, DevOps, MLOps approach, CoPilot Solutions
- Client and server side software, modern frameworks, mobile solutions
- Applied artificial intelligence, machine learning, business intelligence
- Software projects, software companies, cooperation between industry and development teams
- Modern software development, data visualization technologies
- Domain-specific languages, compiler construction, software modeling
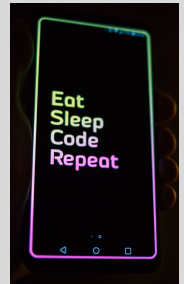
SUBJECTS

Model-based software development (BMEVIAUMA22) (Subject A1):

The focus of the course is on creating highly configurable software frameworks to support an entire product family or domain. Steps to create and process specialized, highly efficient custom programming, scripting, and specification languages. Introduction to the world of compilers and interpreters, how does a text become binary code? Textual and visual languages, language design, metamodeling. Low-code and no-code approaches in practice. Model processing and model-driven testing. Pattern search, graph transformations.


Business Intelligence (BMEVIAUMA24) (Subject A2)

Unlock the power of data-driven decision-making with the Business Intelligence course, where insights meet innovation to shape the future of business success. The goal of the course is to acquire competitive knowledge for which there is a continuous demand in the industry: building a modern data-warehouse, designing business intelligence systems, data transfer, preparation of reports, development of diagrams, dashboards, data visualization, analyzation and visualization of data based on geo-location, explore and apply KPIs, and detection of anomalies. The course drives students into the realms of ETL processes, expert report and dashboard design, advanced data analytics techniques, and the practical application of artificial intelligence.

Software Development in Industry (BMEVIAUMB10) (Subject B)

The course integrates technical aspects of software development with business approaches. It presents management methods and tools related to software projects, business processes. It provides insight into how the software industry works, how software projects are organized and managed, how software companies operate and shows the details of software roles such as software architect and product manager.
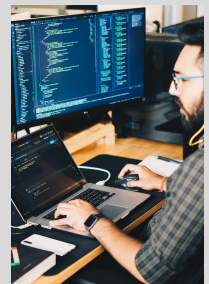
Trustworthy AI and Data Analysis (BMEVIMIMB10) (Subject C)

The objective of this course is to introduce the approaches, concepts, and engineering best practices of trustworthy data analysis, machine learning, and artificial intelligence. The course will also review issues related to the integration of intelligent algorithms into IT systems, methods for data-driven solutions to technical problems, and integration of these into development/operations processes.

The course describes the comprehensive formalization of the data analysis workflow and the lifecycle of creating an AI service/product and a validated documentation (with the potential of using blockchain tools) and auditing of the result.

Model-driven software development laboratory (BMEVIAUMA23) (Lab A1)

Students experiment the process of creating a domain-specific language and a framework for it. Modeling the elements of the domain using metamodeling. Defining a textual language, a specialized code editor and creating a compiler. Efficient processing of models using graph transformation, code generation.

Business intelligence laboratory (BMEVIAUMB09) (Lab A2)

Practical mastery of the topics described in Business Intelligence subjects:
- Using Open-source BI tools, data loading, reporting
- MSSQL-based business intelligence solution development, PowerBI in practice
- Use of data analysis, statistical and data mining tools

Development of your own BI solution: connection of data source(s), ETL building processes, displaying and calculating reports and decision preparation KPIs.

Project Laboratory 1-2

Independent work carried out in the subject area determined by the student and the advisor. The subject provides an opportunity for an in-depth study of a topic gaining practical experience in a narrower field corresponding to individual interests. Our goal is for students to acquire thorough knowledge and competencies of market value in this narrower field.

Diploma Thesis Design 1-2

Design and development of an advanced software development task proving suitability for independent engineering under the supervision of an advisor. By completing the theis, the student proves that he/she can do independent engineering work, apply engineering methods and is capable of understanding the task, and to interpret and analyze the chosen solution.