

Intelligent Networks specialization

MSc Electrical engineering

Objectives

The goal of the specialization is to train electrical engineers who

- have an overview of key technologies and concepts for the global networking ecosystem of the near future;
- have a modern, up-to-date, scientifically based, practical knowledge of network-integrated complex IT systems;
- know the solutions related to the design and efficient operation/maintenance of networks, performance modeling techniques, and their application methods and
- have the ability to solve the broadest scale of engineering problems related to intelligent network architectures, protocols, and systems.

Today, the high level of interoperability provided by networks is a vital part of all IT infrastructures, a fundamental component. However, the evolution of telecommunications has not stopped today due to the ever-expanding areas of applications and their increasingly complex requirements. The components of telecommunication systems are undergoing revolutionary changes, becoming multidisciplinary, and forming a complex mix of advanced mobile/wireless infrastructures, cloud services, network operations, location methods, and performance analysis. Focusing on cutting-edge solutions, the Intelligent Networks specialization will expose students to the key technologies and concepts that are expected to lead the global network ecosystem of the near future. Students graduating from this specialization will acquire up-to-date, time-tested, scientific-based, practical knowledge of network-integrated complex IT systems, their design, and operation. In each course, students will gain in-depth knowledge of the latest developments in networking, learn about the latest technologies in wireless communications, and acquire a pervasive understanding of the entire functional network architecture, from IoT cloud-based digital service environments through radio positioning implementations to different types of modern mobile networks (e.g., 5G/6G cellular, DSRC/WiGig/WiHD) and integrated network operation systems. This is complemented by an in-depth knowledge of performance modeling and its application methods for network design and efficient operation. In addition to the lectures, students will work on solving network design, analysis, operation, optimization, and modeling problems in the practical sessions and deepen their knowledge of advanced mobile and wireless architectures and cloud services by performing measurements in the laboratory courses of the specialization.

The specialization programme

Advanced Mobile and Wireless Networks (BMEVIHIMA16) + laboratory (BMEVIHIMA17)

A

mission- and resource-critical use cases (e.g., self-driving, vehicular networks, machine-to-machine communication); advanced mobile cellular and Wi-Fi-based networks (e.g., 5G/6G, DSRC/WiGig/WiHD); advanced technologies (e.g., V2X, SDN/NFV, IoT, slicing, MEC)

Cloud Services integration for Intelligent Devices (BMEVITMMA14) + Laboratory (BMEVITMMB06)



cloud-based systems (e.g., AWS); alternatives for smart device integration; cloud native solutions; container-based systems (e.g., Kubernetes); service models and orchestration; IoT applications; platforms; case studies

Network Planning and Operations B (BMEVIHIMB04)

B

task-oriented network modelling based on standardized approaches; efficient design and analysis methods; network inventory, configuration and operation; DevOps approaches to automatic orchestration

Performance Evaluation of Communication Networks (BMEVIHIMB05)

C

performance modelling skills and practical applications; typical queuing models; methods for determining performance characteristics; exact and approximate solution techniques of complex network models

Radio-based Localization Technologies (BMEVITMMB07)



radio propagation, bearing, and range estimation fundamentals; radio technologies and solutions for indoor and local environments; urban and global positioning; BT, Wi-Fi, 4G/5G positioning methods



Specialization coordinator

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HIT Information Event

date: **7th of May 2024, 13:00-17:00**

room: **IB. 110.**



<https://www.hit.bme.hu/page/intelligenshalozatok>

