Faculty of Electrical Engineering and Informatics

IMPORTANT NOTES

If for one subject you can find several different types (lecture, practice, laboratory) of courses then please choose one and only one course from each type in order to be able to perform the subject's requirements successfully.Civil Engineering courses are on the website seperately. Courses chosen from the offer of Faculty of Civil Engineering will be checked and arranged individually by the departmental coordinator.

Subject code	Subject name	Requirement	ECTS credit
BMEVIEEJV14	Optoelectronics	Exam	4

Course type	Course code	Course language	Timetable information
Lecture	a1	English	TUE:12:15-14:00; THU:12:15-14:00

The subject discusses a relatively broad range of optoelectronic devices in depth; including operating characteristics, structure, typical application areas in optical communications and in measurements. The subject is presented only in English language, primarily for foreign students, but Hungarian students may also elect it. Synopsis: Week 1 Optoelectronic semiconductor materials and their technology. Energetic interactions of light and material. The wave equation and its solution. Plane wave, phase velocity, refractive index. Refraction. Generation and recombination in semiconductors and their relationship to the light sensing and light emission. Week 2 Macroscopic solids, heterostructures, optical properties of nanometer-thick layers. Passive devices: transmission properties of optical waveguides and direction couplers. Week 3 Optical fibers in practice. Dispersion. Multipath dispersion, abrupt and gradual change of refractive index type multimode optical fibers. Material dispersion, Waveguide dispersion, single-mode fibers. Week 4 Absorption, attenuation, atomic and electron resonance, the minimum absorption wavelength. Light spillage of the optical fiber, the scattering mechanisms. Week 5 Resonators and optical sensors. Controlled passive devices: optical deflectors, modulators, switches. Week 6 Optical amplifiers. Light amplifier mechanisms in optical fibers. Rahman and Brillouin scattering. Stimulated scattering. Light-doped optical fiber amplifier. Semiconductor light amplifiers. Week 7 Photodetectors. Light Detection using pn junction. The PIN photodiode. Avalanche photodiode. Heterojunction photodiode. The detectors for optical and electrical characteristics. Week 8 Image converter, storage and dissector devices. MOS and CCD video recorders. CCD operation basics. Various CCD arrangements. Realization of the high speed shutter. Week 9 ERROR Week 10 Stimulated emission. Structure, types, and optical modulation properties of laser diodes. Cut-off frequency, transient operation modes. Week 11 ERROR Week 12 Display devices. LCD, plasma, photoluminescent displays. Week 13 Organic semiconductors, OLED light sources and displays. Week 14 Optical digital information recording. Holographic information recording, DVD-ROMs, flash EPROMs.

Subject code	Subject name	Requirement	ECTS credit
BMEVIHIAB00	Coding Technology	Exam	4

Course type	Course code	Course language	Timetable information
Lecture	EA	English	THU:14:15-16:00; THU:14:15-16:00; FRI:10:15-12:00

https://portal.vik.bme.hu/kepzes/targyak/VIHIAB00/en/ Error control coding: Basic notions of error control (code, codeword, error models, Hamming distance, error correction, error detection, code distance, code parameters). Binary linear code: generator matrix, parity check matrix, systematic codes. Hamming codes. Cyclic linear code, generator polynomial, parity check polynomial. CRC detection technique. Nonbinary linear codes. Reed-Solomon code. Data compression and source coding: Prefix code. Average codeword length and the entropy. Shannon-Fano code, Huffmann code, Lempel-Ziv code. Quantization. Uniform quantization. Lloyd-Max quantizer.. Predictive coding. Voice compression. Video compression. Cryptography and data security: Basic notions, encryption, authentication, integrity protection, access control, repudiation. Ideal encryption. Linear encryption. Public key encryption. RSA algorithm. Hash functions. Basic cryptographic protocols: party authentication, integrity protection, key distribution, digital signature, key certificate. Typical security holes in cryptographic primitives and protocols.

Subject code	Subject name	Requirement	ECTS credit
BMEVIHIAB01	Communication Networks I.	Mid-semester mark	4

Course type	Course code	Course language	Timetable information
Laboratory	LA	English	TUE:14:15-18:00
Lecture	EA	English	WED:14:15-16:00

https://portal.vik.bme.hu/kepzes/targyak/VIHIAB01/en/

Subject code	Subject name		Requirement	ECTS credit
BMEVIHIAV06	Introduction to Quantum Computing and Communication		Mid-semester mark	2
Course type	**Course code**	**Course language**	**Timetable information**	
Lecture	EA	English		

Subject code	Subject name		Requirement	ECTS credit
BMEVIHIAV35	Privacy-Preserving Technologies		Mid-semester mark	2
Course type	**Course code**	**Course language**	**Timetable information**	
Lecture	E	English		

Subject code	Subject name		Requirement	ECTS credit
BMEVIHIAV39	Administrating Computer Networks in Practice I.		Mid-semester mark	2
Course type	**Course code**	**Course language**	**Timetable information**	
Laboratory	LA1	English		

Subject code	Subject name		Requirement	ECTS credit
BMEVIHIAV43	Cybersecurity Operations Fundamentals		Mid-semester mark	4
Course type	**Course code**	**Course language**	**Timetable information**	
Laboratory	LA	English		

Subject code	Subject name		Requirement	ECTS credit
BMEVITMAK47	Engineering Management Methods		Mid-semester mark	2
Course type	**Course code**	**Course language**	**Timetable information**	
Lecture	AE1	English	THU:14:15-16:00	

Engineer as a leader (situations and solution): role of informaticians and electrical engineers in the information based society. General trends, business models and the development of value chains. Leader roles, leader tasks and situations. Management of IT based, communication related and business functions in a company. Complex engineering methods in the information transmission and processing, technological and economical optimization of the related processes. Management problems of resource and time allocation, task distribution and scheduling, and workforce placement. Decision preparation techniques: statistical and heuristics based methodologies.Innovation management: tools of innovation management, institutions of innovation management, funding models and typical calls for applications. Organizations of scientific research and technology development, business models of spin-off companies. Conception of technological visions about the future, ways to identify technological breakthroughs, management of generation changes. The process of standardization, its organization and its consequences on technological markets. Intellectual property rights during the innovation process: protection of technical creations, neighboring rights, protection of databases. New trends in IP rights: free software licensing models. Processes of product development and product introduction to the market, market study and marketing methodology. The role of IT technologies in the product and business development, their contribution to the value creation.
https://portal.vik.bme.hu/kepzes/targyak/VITMAK47/en/