Langu	Course name	Neptun code	Institute	Webpage	Teacher	Email	Level	Credit	Semester	Parameters	Short description
EN	Communication Theory	GEVAU212M-A	Automation and Comr	http://geik.uni-m	Dr. Ahmed Bouzid	qgebouzid@uni-miskolc	Master	5	spring	3e/1g/k	Fourier Series. Fourier Transforms. Sampling and Bandlimited Signals. Discret Fourier Transforms. Amplitude Modulation. Frequency Modulation. Serial Communication.
EN	Fire safety design of steel structures	GEVGT607M-a	Energy Engineering an	http://geik.uni-m	Prof. Dr. Károly Jármai	karoly.jarmai@uni-misk	Master	5	both	2e/1g/gy	Fire safety design of steel structures. Design rules. Material properties calculation. Fire protections. Optimization techniques. Cost calculations. Optimization for fire safety. Applications: frames, trusses, columns, beams.
EN	Life cycle assesment of steel and compo	GEVGT608M-a	Energy Engineering an	http://geik.uni-m	Prof. Dr. Károly Jármai	karoly.jarmai@uni-misk	Master	4	spring	2e/1g/gy	Sustainable development and life cycle thinking. Life cycle assessment. Scales of assessment. Environmental product declarations. CEN TC350: Context, main concepts. The cycle of steel. Comparison using steel-concrete and steel materials. Benefits of recycling. Applications.
EN	Modern Database Systems	GEIAL521-Ma	Information Science	http://geik.uni-m	Prof. Dr. László Kovács, E	kovacs@iit.uni-miskolc.l	Master	5	spring	2e/2g/k	Overview of RDBMS API interfaces, programming of JDBC, PL/SQL language, strored procedures and functions, Hierarchical data model, LDAP system , LDAP API, Object-relational models, Oracle ORDBMS, UDT , complex structures and methods, noSQL, docuent databases, MongoDB, Mongodb commands, Mongodb API, Graph databases, Neo4J commands and API
EN	Data Analysis And Data Mining	GEIAL526-Ma	Information Science	http://geik.uni-m	Prof. Dr. László Kovács	kovacs@iit.uni-miskolc.l	Master	5	autumn	2e/2g/gy	Overview of data analysis tools and levels, basic statistical tools, Bayesian network, comparison of OLAP and OTLP; decision support tools, MD data model, semantic MD models, MD algebra, Oracle PE OLAP commands, programming MD databases in PE, Architecture of MS SQLServer OLAP DW, overview of MDX language; basic MDX queries, derived sets and measures; complex MDX functions; building a data warehouse; schema integration, ETL processes, Transformation methods; M Integration server, overview of data mining, data clustering methods, SOM, data classification methods, BPNN, SVM, mining association rules, detection of outliers, dimension reduction methods, PCA, SVD.
EN	Digital Manufacturing	GEIAK205M-a	Information Science	http://geik.uni-m	Dr. Samad Dadvandipou	samad.dadvandipour@u	Master	5	both	3e/1g/k	The idea of digital manufacturing was prominent the 1980s when computer-integrated manufacturing was developed and promoted by machine tool manufacturers the Computer Automated Systems Associated and Society of Manufacturing Engineering (CASA,SME). Computer Integrated Manufacturing CIM is an example of the implementation of information and communication technologies (ICTs) in manufacturing. There are two main topics in CIM. They are complete automation of a manufacturing and production control systems. The subsystems in computer aided manufacturing involves CAD CAE CAM CAPP CAQ PPC and business system integrated by a common database which would be run with the intervention of human. The technologies which cover the system as a whole may be FMS (flexible manufacturing system) ASRS (automated storage and retrieval system) AGV (automated guided vehicle) Robotics Automated conveyance systems and Lean manufacturing.
EN	Operating Systems and Networks	GEIAL501M-a	Information Science	http://geik.uni-m	Dr. Baksa Attila	attila.baksa@uni-miskol	Master	5	autumn	3e/1g/k	Introduction to mainframe architectures and technologies (Massive Parallel Processing, hardware redundancy, RAID technologies, clustering, storage networks, managing backups), basics of embedded operation systems, real-time operating systems, details of virtualization technologies, overview of modern file system structures, and also presentation of common OS security mechanisms. Introduction to the basic concepts of Computer Networks. Theoretical and design aspects. OSI and TCP/IP network models. Medias of physical layer; Data link layer protocols; Media Access Control sublayer (802.3, 802.11); Network layer (IPv4 and IPv6), addressing schemes, devices of the network extension; Transport layer (UDP, TCP), congestion control schemes.
EN	Protection of Information Systems	GEIAL506M-a	Information Science	http://geik.uni-m	György Wágner	wagner@iit.uni-miskolc	Master	4	autumn	2e/2g/k	Protection from physical damage, unauthorized access. Data loss; intruders; attack against security systems; advice from DEC; source of danger, risks, threats, costs; Confidentiality, integrity, availability, functionality. concept of protection, expand concept of protection; „Need to Know"; protection domain; Access Matrix and permissions; implementation of Access Matrix: Global Table, Access Control List, Capability List; Formal methods: Bell LaPadula, Biba; MAC, DAC; Firewalls; components of firewalls; Packet filtering firewall; Circuit level gateway; Application level gateway; stateless and stateful packet filtering firewall; High Availability firewalls; VPN; Deep Packet Inspection Firewall; TCSEC, ITSEC, Common Criteria; Attack methods: DoS, SYN flood, ICMP flood, OOB Nuke, sniffer, address spoofing, DDoS; steganography, cryptography; Kerckhoff; symmetric and asymmetric cryptography; problems of key share; solutions: Diffie-Hellman-Merkle, public key infrastructure; PGP, NTFS-EFS, digital signature and the Hash; the certificates: virus search methods.
EN	Machine Structures and Design	GEGET501-Ma	Machine and Product	http://geik.uni-m	Dr. Ferenc Sarka	ferenc.sarka@uni-miskc	Master	5	spring	2e/2g/k	Fundamentals of machine components design. Review of mechanics and strength of materials. Simple stresses. Stress-strain diagram. Factor of safety. Fatigue, basic concepts. Standard fatigue strength for rotating bending. Influence of surface and size on fatigue strength. Spur and bevel gears. Gear geometry. Gear force analysis. Surface fatigue strength. Bevel gear geometry and force analysis. Epicycle gear drive and flexible gear drive. Nomenclature and Geometry. Degree of Freedom. Speed Ratio. Geometry. Force Analysis. Efficiency.
EN	Tribology	GEGET311M-a	Machine and Product	http://geik.uni-m	Dr. Ferenc János Szabó	ferenc.szabo@uni-miskc	Master	3	autumn	2e/1g/k	Description and governing equations of hydrodynamic (HD), Thermo- Hydrodynamic (THD) and the Thermo- Elasto- Hdrodynamic (TEHD) state of most important machine elements (gears, sliding bearings, journal bearings). Iterative calculation of the operational temperature of the lubricant, comparison and selection of the lubrication systems and cooling systems for lubricated machine elements. Seizuire and design to avoid failures. Calculation of safety factor aginst sezure. FZG test, application of its results during the calculations and lubricant selection. Demonstration of Multidisciplinary Optimization of lubricated machine elements for different objective functions (minimum friction coefficient, maximum load carrying capacity).
EN	Fusion Welding	GEMTT302M-a	Materials Science and	http://geik.uni-m	Raghawendra P. S. Sisod	raghawendra.sisodia@u	Master	4	autumn	2e/1g/gy	Fundamentals of joining. Theoretical bases of welding. Energy sources. Heat flow. Fluid flow phenomena. Transfer of heat and mass. Fundamentals of weld solidification. Solid-state transformations. Short overview of principal fusion welding processes: GTAW, SMAW, GMAW, SAW, FCAW and PAW. Advanced fusion welding processes: electron beam and laser beam welding. Application. Process planning.
EN	Heat Treatment and Surface Engineering	GEMTT113M-a	Materials Science and	http://geik.uni-m	Dr. László Kuzsella	laszlo.kuzsella@uni-m	Master	3	autumn	2e/1g/k	Review of theoretical background: structure, equilibrium and non-equilibrium phase transformations, and their mechanisms. General characteristics and classification of Heat Treatment processes. Bulk heat treatment processes: annealings, stress relieving, recrystallisation and spheroidization, homogenising annealing, normalising. Strengthening mechanisms and technological processes: transformation hardening, precipitation hardening. Isothermic heat treatment processes. Definition scope and range of Surface Engineering, and its historical background. Surface related phenomena - wear corrosion fatigue - in engineering practice, their importance in failure of engineering components. Residual stresses and their influence on service properties. General overview of SE processes. Testing and characterization of engineered surfaces. Surface Modification Technologies based on structural and/or chemical changes - traditional and advanced processes. Coating (PVP and CVP), thermal spraying.
EN	Polymer Processing	GEMTT080M-a	Materials Science and	http://geik.uni-m	Dr. Péter Kovács	peter.kovacs@uni-mis	Master	4	autumn	2e/1g/gy	Having mastered the basics of polymer processing, students are prepared to master computer-aided design of plastic forming tools, and can become involved in the work of plastic processing industry. They are discussing: The material properties of plastics, their special formability properties. A detailed discussion of the technological variants of plastics forming, taking into account the specific characteristics of plastics, affecting the basic designs of machine and tool solutions. The technology of injection molding will be analyzed in detail.
EN	Pressure Welding	GEMTT303M-a	Materials Science and	http://geik.uni-m	Dr. Raghawendra Pratap	raghawendra.sisodia@	Master	3	spring	2e/1g/gy	History. Classification. Theoretical background. Sheet welding processes. Resistance spot welding, seam welding, projection welding, foil butt welding. Bar welding processes. Flash welding. Stud welding. Friction welding. Diffusion welding. Explosion welding. Alliances of welding processes.
EN	Geometric modeling	GEAGT232M-A	Mathematics	http://geik.uni-m	Dr. Imre Juhász	imre.juhasz@uni-misk	Master	4	spring	2e/2g/k	Coordinate systems, homogeneous coordinates, matrix representation of point and coordinate transformations. Description of curves, interpolating and approximating curves, spline curves. Osculating plane, arc length, curvature, torsion, Frenet frame. Definition and properties of Hermite arc, Ferguson and Overhauser splines. Parametric description and properties of Bézier curves, de Casteljau algorithm. Parametric form and properties of B-spline curves. Description of surfaces, tangent plane, normal, surfaces swept by a moving curve. Interpolating and approximating surfaces: Coons patch, Bézier and B-spline surfaces. Generation of rational Bézier and B-spline surfaces and their properties. Surface and solid modeling in CAD systems.
EN	Probability Theory & Mathematical Stati	GEMAK629-Ma	Mathematics	http://geik.uni-m	Dr. József Túri	jozsef.turi@uni-miskolc.	Master	5	both	2e/2g/k	Part 1: Probability Theory. Elements of Probability: sample space and events, venn diagrams and the sigma-algebra of events, Kolmogorov type of probability space, sample spaces having equally likely outcomes, conditional probability, Bayes' formula, independent events. Random variables and its characteristics: definition, types of random variables, probability distribution function, probability mass function for discrete random variables, probability density function for continuous random variables; joint probability distribution function, joint probability mass function, joint probability density function, conditional distribution and independence. Expectations and moments: mean, median, and mode, central moments, variance, and standard deviation, conditional expectation, Chebyshev inequality, moments of two or more random variables, covariance and correlation coefficient, Schwarz inequality. Some important discrete distributions: Bernoulli trials, binomial distribution, geometric distribution, negative binomial distribution, multinomial distribution, Poisson distribution, special distributions, approximations of the binomial distribution. Some important continuous distributions: uniform distribution, bivariate uniform distribution, Gaussian or normal distribution, exponential distribution, chi-squared distribution, conditional expectation, the laws of numbers, the central limit theorem. Part 2: Mathematical Statistics. Statistical inference, histogram and frequency diagrams, parameter estimation. Parameter estimation: samples and statistics, sample mean, sample variance, sample moments, order statistics, quality criteria for estimates, unbiasedness, minimum variance, consistency, sufficiency, methods of estimation, point estimation. Methods of Estimation: point estimation, interval estimation. Hypothesis testing (based on rejection region and the P-value): tests concerning the mean of a normal population, case of known variance (the z-test), case of unknown variance (the t-test), testing the equality of means of two normal populations, case of known variances (the paired z-test), case of unknown but equal variances (the paired t-test), case of unknown and unequal variances (the Welch- test), Kolmogorov–Smirnov test. Linear models and linear regression: Simple Linear Regression; Least Squares Method of Estimation; Properties of Least-Square Estimators; Confidence Intervals for Regression Coefficients.
EN	Industrial applications of statistical meth	GEMAK134-Ma	Mathematics	http://geik.uni-m	Dr. József Túri	jozsef.turi@uni-miskolc.	Master	5	both	2e/2g/k	Bootstrap uses sampling with replacement to estimate the sampling distribution for a desired estimator. The Jackknife works by sequentially deleting one observation in the data set, then recomputing the desired statistic.
EN	The martingal method and its applicatio	GEMAK136-Ma	Mathematics	http://geik.uni-m	Dr. József Túri	jozsef.turi@uni-miskolc.	Master	5	both	2e/2g/k	At the beginning of the course, we introduce the concept of martingale: a martingale is a sequence of random variables (i.e., a stochastic process) for which, at a particular time, the conditional expectation of the next value in the sequence is equal to the present value, regardless of all prior values. During the course, we review the basic concepts and application possibilities.
EN	Continuum Mechanics	GEMET206M-a	Mechanics	http://geik.uni-m	Prof. Dr. György Szeidl	gyorgy.szeidl@uni-mis	Master	3	autumn	3e/0g/k	A short introduction to tensors. Kinematics of continua. State of velocity. Nonlinear theory of deformations (deformation gradients, strain tensors). State of velocity. (Velocity gradient, rate of deformation tensor, vorticity tensor, vorticity vector). Variation of tensor fields with time (material time derivatives, objective time derivatives). Linear theory of deformations. Fundamental laws of continuum mechanics in spatial and material descriptions. Stress tensors (Cauchy, Piola Kirchoff I. and II.). Equation of continuity. Equations of motion. Moment of momentum. The fundamental principles of thermodynamics. Special vector fields in continuum mechanics (various admissible tensor fields). Principle of virtual power. Principle of virtual work. Constitutive equations: (thermo)elastic viscoelastic and elastic-plastic bodies. Fundamentals of linear elasticity: Energy theorem. Navier equation. Principles of minimum potential energy. The dual system of elasticity. Equations of compatibility. Castigliano's principle. Variational principles (the whole system of these principles). Book recommended: György Szeidl: Continuum mechanics. Lecture notes. 2016. Provided free to the students in pdf format.
EN	Mechanical Vibrations	GEMET101-Ma	Mechanics	http://geik.uni-m	Dr. László Kiss	laszlo.kiss@uni-misko	Master	5	autumn	2e/2g/k	Principles of modelling dynamical systems. Centric and eccentric impact of rigid bodies, the Maxwell-diagram. Modelling of mechanical vibrations, methods for the derivation and solution of the equations of motion. Vibrating systems with one degree of freedom (free vibrations, forced vibrations, damped free- and forced vibrations). Vertical vibrations of machine foundations. Active systems of vibration protections. Vibration of discrete systems with more degrees of freedom (equations of motion, natural frequencies, vibration modes). Eigenvalue-problems and their solutions, properties of the eigenvalues and eigenvectors. Rayleigh quotient. Critical angular speed of rotating shafts. Laval problems. Bearing reactions of rotating shaft-bearings systems. Dynamic analysis of slider-crank mechanisms. Balancing a multi-cylinder engine. Vibration of continuous systems. Longitudinal, bending and torsional vibrations of elastic beams. Vibration of plates. Introduction to the measurement of dynamical parameters. Book recommended: György Szeidl - László Kiss: Mechanical Vibrations, Miskolc, University Press. 2016. Provided free to the students in pdf format.
EN	Mechatronics in material flow	GEALT180M-a	Logistics	http://geik.uni-m	Dr. Ákos Cservenák	akos.cservenak@uni-miskolc.hu		3	both	2e/1g/gy	Connection between mechatronics and logistics. Material handling devices (forklifts, carriers, cranes, conveyors, etc.). Mechatronical elements (sensors, actuators) used in these devices. Industry 4.0 techniques.
EN	Automated material handling	GEALT026B-a	Logistics	http://geik.uni-m	Dr. Ákos Cservenák	akos.cservenak@uni-miskolc.hu		3	both	1e/2g/gy	Basic of automatization, and its connection to logistics. Automated material handling devices (AGVs, automated cranes, conveyors, etc.). Robotization. Robot programming. Robot simulation in Visual Components.