RIGA TECHNICAL UNIVERSITY

Faculty of Mechanical Engineering, Transport and Aeronautics

Please note! This is a preliminary list of courses. Changes may occur!

AUTUMN SEMESTER

BACHELOR COURSES

Code	Course name	CP	ECTS
MMI101	**Fluid Mechanics**	**2.0 CP**	**3.0 ECTS**
Subject gives an overview of the basic questions about liquid and gas flows and the most sufficient calculation model choice. Different kinds of flow are viewed and various processes in nature and machine industry fluid circuits are explained. Subject explains how real fluid circuits work. Mostly pneumatic and hydraulic circuits for movement and force generating are overviewed. Components of these circuits are analyzed and properties of those components are viewed. Parameters and calculation principles of hydraulic circuits are shown. Hydraulic circuits for movement generation are analyzed.			
MMP302	**Mechanics of Deformable Firm Bodies**	**3.0 CP**	**4.5 ECTS**
Deformable body. Stresses. Displacements. Mathematical model. Calculation scheme. Deformation analysis. Stress theory. Mechanical properties. The experimental tasks. The general principles and theorems. Variations method. Ritca method. Bar theory. Plates. Shells. FEM method. A computer program complexes.			
MMP343	**Mechanics of Composite and Elastic Materials**	**2.0 CP**	**3.0 ECTS**
Classification of elastomers. Creep and relaxation. Mechanical models. Walter principle. Hysteresis. Creep phenomenon for metal structures. composite material properties. Reinforcement structures. Composites manufacturing technology. Stress approaches. Strength criteria. Material structure optimization.			
MRA322	**Electronic Equipment of Production Automation**	**3.0 CP**	**4.5 ECTS**
Functional equipment of discrete electronic automation. Methods and equipment of measuring physical parameters. Evolution of information signals and their prosessing. Schematics of control systems.			
MRA353	**Electro, Pneumo and Hydro automatics**	**3.0 CP**	**4.5 ECTS**
The energy supply and processing elements of electric, pneumatic and hydroautomatic (EPH) systems, information input elements, signal processing and executive elelements, the structure and operating principle. Types of equipment operation algorithm. Operational algorithm realization with pneumatic, hydraulic and hard logic electrical elements.. Programmable controller (PLC) design and management programmes for the system's algorithm. Computer aided selection, calculation, and system performance modeling of the electric, pneumatic and hydroautomatic system components.			
MSE201	**Heat Study**	**2.0 CP**	**3.0 ECTS**
The course "Heat Study" includes topics related to the thermal phenomena in various systems, processes and power plants: Thermodynamic systems and parameters. Basic laws of thermodynamics. Specific heat, internal energy, entropy. Processes and cycles. Water and steam tables and charts. Humid air. Cycles of thermal machines. Steam power equipment. Heat transfer with conduction, convection, radiation. Complex heat transfer. Design methods of heat exchangers. Fuel and combustion theory. Water and steam boilers. Heat utilizing equipment.			
MSE305	**Hydro- and Gas Dynamics**	**3.0 CP**	**4.5 ECTS**
The subject contains consideration of properties of liquids and gases, hydrostatic forces, pressure definition. The Fluid Dynamics course is based on motion equations of liquids and gases. Real flows described in terms of border layer equations and turbulence length. Non dimensional methods used for process modeling. Heat losses and flow types are analyzed. Methods of pipe, valve, pump and fan selection. Flow parameters described in nozzles, channels, around the body.			

MTH301	Machine Dynamics and Strength	3.0 CP	4.5 ECTS
Mechanism, machine, classification. Dynamics of machines and mechanisms. Free, forced and parametric oscillations of machine elements. Vibration protection of machines. Friction in machines. Motion irregularity of machine elements. Analysis and calculations of machine elements on reliability, stability, fatigue strength, impact load. Creep and stress relaxation in machine elements. Practical application of vibration effects in engineering (technological vibromachines, vibrodiagnostics of defects, etc).			

MTH302	Methodology and Technique of Design	3.0 CP	4.5 ECTS
General concept of the main stages of design works. Formation and analysis of the consumer requirements as to the design of the object. Methods for designing the optimal machines and mechanisms. Design methods for increasing the strehgth and stiffness of typical machine elements. Unification and standardization in design works. Application of computer facilities in design works.			

MTH303	Automatization of Calculation of Construction Durability (Basic Course)	3.0 CP	4.5 ECTS
Calculations of design strength as the integral part of computer aided design and analysis (CAD/CAE). An overview of numerical techniques for CAE: matrices, eigenvalue problems, differentiation, integration, linear algebraic equations. Finite element method (FEM). Applying FEM for solution of the elasticity theory problems. Geometric modelling. Discretization of the real structures. Review of general purpose FEM programs. Capabilities of the strength analysis programs. FE libraries, solution methods and commands. Preprocessing, postprocessing and other special capabilities.			

MTM341	Numerical Analysis in Engineering Mechanics	2.0 CP	3.0 ECTS
Analysis of functions and functionals. Extreme values. Optimisation tasks. Numerical analysis of simple analytical expression and experimental data. Analysis and operation of physical and engineering systems by using mathematical techniques. Dynamic analysis of mechanical, hydraulical and thermal systems. Response of these systems to inital conditions, and to transient, steady and random inputs. Stability. Analysis of simple feedback systems.			

Note! Full course description available by clicking on the course code!

MASTER COURSES

Code	Course name	CP	ECTS
MMP510	Experimental Mechanics and Technical Diagnostics	4.0 CP	6.0 ECTS
The energy supply and processing elements of electric, pneumatic and hydroautomatic (EPH) systems, information input elements, signal processing and executive elelements, the structure and operating principle. Types of equipment operation algorithm. Operational algorithm realization with pneumatic, hydraulic and hard logic electrical elements.. Programmable controller (PLC) design and management programmes for the system's algorithm. Computer aided selection, calculation, and system performance modeling of the electric, pneumatic and hydroautomatic system components.			

MMP532	Mechanics of Composite Materials	3.0 CP	4.5 ECTS
Composite materials. Fibers. Matrix materials. Types of composite materials. Calculation of the streses and strains in composite materials. The methods and models of micromechanics of composites. The model of the unidirectional composite. The model of the composite, armed with short fibers. FEM apliccation in the micromechanics of composite materials. Macromechanics of composites. Strength and fracture in composites.			

MSE432	Thermodynamics and Gas Dynamics	3.0 CP	4.5 ECTS
The subject covers different thermodynamic systems and their characteristics. Energy transition types. Simple and complicated thermodynamic systems.			

MSE535	Non-Standard Sources of Energy	3.0 CP	4.5 ECTS
The subject gives basic knowledge in matters of non-standard and alternative energy sources, sustainable development theory, legislative acts and strategies on different levels that support and promote use of such energy sources and the modernization of utilization technologies. Huge attention is given to energy sources that have been used already for several centuries – solar, wind, running water (oceans, sees, rivers, tidal and ebb energy), biomass. The potential and the level of the utilization technology of every source is carefully evaluated according to technical, economic, environmental aspects. Emphasis is put on efficiency of energy conversion and total profitability. From the same aspects household and industrial waste, sludge from water treatment plants is considered. Interest is also built towards nuclear energy and hydrogen technologies. All sources are evaluated on the level of EU and the Republic of Latvia development plans.			

MTH507	Lifting and Transporting Machines	4.0 CP	6.0 ECTS
Ways of transferring/shifting hard objects, liguids, loose and other materials, the physical and mechanical issues of their transfer. Desing and exploitation of the machines used in the agriculture, processing industries (mainly food, woodprocessing, construction materials) and service industries (mainly cargo transit, transport, seaport).			

MTM409	Technical System Vibration and Stability	4.0 CP	6.0 ECTS
Composition of motion differential equations for technical systems. Stability of equilibrium. Vibration of linear discreet systems. Parametric vibrations. Stability. Free and forced vibration of rods, shafts, beams. Non-linear cases. Simple vibrations of discs plate and shells. Vibration of rotors. Stability.			

MTM411	Shock Theory	4.0 CP	6.0 ECTS
Direct and oblique impact. Impact with rotation. Collision of two bodies. Restitution of impulse. Area of friction. Models with dissipated parameters. Effect of configuration of rod. Hydraulic impact. Impact against elastic beam. Impact in bodies system. Impact in constrained systems.			

MRA253	Basics of Technical Design	2.0 CP	3.0 ECTS
Marketing demands, fashion and style. The human potential and willingness to use a particular object (ergonomics). Technical aesthetics. Fundamental concepts of design: composition, form, colour. Laws of the design form development in the historic perspective.			

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