Please note! This is a preliminary list of courses for the study year 2017/2018. Changes may occur!

AUTUMN 2017

BACHELOR COURSES

MTH303 Automatization of Calculation of Construction Durability (Basic Course)
3.00 CP (4.5 ECTS)

MRA353 Electro, Pneumo and Hydro automatics
3.00 CP (4.5 ECTS)
The energy supply and processing elements of electric, pneumatic and hydro-automatic (EHP) systems, information input elements, signal processing and executive elements, 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 modelling of the electric, pneumatic and hydro-automatic system components.

MTM205 Engineering Mechanics Problems
3.00 CP (4.5 ECTS)
Use of theoretical laws and engineering methods for investigation of real typical systems. Role of choices of a precision of calculation of model in a case of incomplete model parameter information. Tasks on static and dynamic loading and mechanical stresses. Problems of optimisation in a pneumatics and electromechanical systems.

MMI101 Fluid Mechanics
2.00 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 analysed and properties of those components are viewed. Parameters and calculation principles of hydraulic circuits are shown. Hydraulic circuits for movement generation are analysed.

MSE201 Heat Study
2.00 CP (3.0 ECTS)

**MSE305 Hydro- and Gas Dynamics**  
3.00 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 modelling. Heat losses and flow types are analysed. Methods of pipe, valve, pump and fan selection. Flow parameters described in nozzles, channels, around the body.

**MTH301 Machine Dynamics and Strength**  
3.00 CP (4.5 ECTS)  

**MMP343 Mechanics of Composite and Elastic Materials**  
2.00 CP (3.0 ECTS)  

**MTH302 Methodology and Technique of Design**  
3.00 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 strength and stiffness of typical machine elements. Unification and standardization in design works. Application of computer facilities in design works.

**MRA320 Methods and Technology of Process Control**  
3.00 CP (4.5 ECTS)  

**MTM341 Numerical Analysis in Engineering Mechanics**  
2.00 CP (3.0 ECTS)  

**MMP219 Resistance of Materials (for mechanical engineering) Part 1**  
5.00 CP (7.5 ECTS)  
MSE304 Technical Thermodynamics and Heat Exchange
3.00 CP (4.5 ECTS)

MTM201 Theoretical Mechanics (for mechanical engineers) Part 1 and Part 2
5.00 CP (7.5 ECTS)

TAA212 Electrical Power Supply Systems of Aircraft
2.00 CP (3.0 ECTS)
Goals and classification of aircraft electrical power supply systems. Principles of operation of aircraft electrical power supply system accessories. Aircraft electrical power supply system structure schemes and it’s characteristics.

TAA501 Aircraft Radio Location Systems
3.00 CP (4.5 ECTS)
The course "Aircraft radiolocation systems" is based on the theoretical fundamentals of radiolocation and aircraft radiolocation equipment. The subject covers such issues as radiolocation devices and systems, mission, structure and functional circuitry, operating principle, design, technical specification and control methods.

TAE315 Human Factor
2.00 CP (3.0 ECTS)

TDT205 Fundamentals of Transport Systems Functioning
2.00 CP (3.0 ECTS)

TAA260 The Technical Maintenance of the Aircraft Electrical Devices (Study Project)
2.00 CP (3.0 ECTS)

TAE518 Ergonomics and Work Safety in Air Transport
2.00 CP (3.0 ECTS)
The subject "Ergonomics and work safety of air transport" is based on theoretical background study of the maintenance of aircraft equipment. Study subject concerns such issues as ergonomic system devices purpose, structure and operational framework, design, technical specification and control methods of production safety in the workplace.
of harmful and dangerous factors. ICAO, JAR, and Latvian CAA Normative documents on ergonomics requirements to aircraft.

**TAK402 Aircraft Strength**  
2.00 CP (3.0 ECTS)  

**TAK433 Aircraft and Engine Structure and Strength (Study Project)**  
2.00 CP (3.0 ECTS)  

**TAS212 Mechanics of Airframes**  
2.00 CP (3.0 ECTS)  

**TAA231 Aircraft Automatic Control Systems**  
3.00 CP (4.5 ECTS)  
Aircraft's automatic control system’s organization charts. Aircraft automatic control system’s modes of operation. Helicopter’s automatic control system’s operating principles.

**TAA311 Microprocessor Aviation Technologies**  
2.00 CP (3.0 ECTS)  
The subject “Microprocessor Aviation Technologies” - the content and structure of the corresponding document PART 66 (maintenance of aircraft, Category B2) fifth module requirements. The item is intended for studying typical aircraft digital electronic systems - the system task, the composition, the operation principle, and the procedures for using the test with a built-in test system.

**TAA408 Aviation Communication Systems and Nets**  
2.00 CP (3.0 ECTS)  
"Aviation communication systems and networks" based on studying aircraft communications equipment and systems. The study covering such issues as communication devices and systems, mission, structure and functional circuitry, operating principle, design, technical specification and control methods. The subject is dealt with aircraft data bus that supports data exchange between the avionic equipment and systems (ARINC) and between the aircraft and ground services (ACARS).

**TAA414 Aircraft Radio Navigation Systems**  
3.00 CP (4.5 ECTS)  
"Aircraft radio navigation systems" based on a theoretical basis of studying aircraft radio navigation equipment. The studying covering issues such as navigational coordinate systems, navigation elements, navigational accuracy, radio navigation equipment and systems, the task, their structure and functional circuitry, the operating principle design, technical specifications and parameter control methods.
TAK502 Civil Aviation Aircraft
3.00 CP (4.5 ECTS)

TAK305 Aircraft Airframe and Systems
2.00 CP (3.0 ECTS)

TAE314 Safety of Aircraft Flights
2.00 CP (3.0 ECTS)
ICAO, JAR and RL CAA flight regulations. Requirements for the flight safety system. Aviation incidents and special situations. Aviation as a sensitive transport. Air safety - the most important feature of the aviation transport system. Safety indicators and benchmarks. Aircraft technical condition analysis. Human factor. Technical condition of aircraft and crew working on board, means of objective control.

TAA531 Global Satellite Navigation Systems
2.00 CP (3.0 ECTS)
"Global navigational satellites system" based on the global navigation satellite system (GNSS) structure, operation principle and their application to studying. The studying covering such issues as cosmic, terrestrial and consumer segments of the navigation signals and their processing algorithms, the coordinate systems used for satellite navigation, the satellite system parameters and accuracy characteristics used in aviation.

TAE304 Aviation Legislation
2.00 CP (3.0 ECTS)

MASTER COURSES

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

MSE432 Thermodynamics and Gas Dynamics (graduate)
3.00 CP (4.5 ECTS)
The subject covers different thermodynamic systems and their characteristics. Energy transition types. Simple and complicated thermodynamic systems.
MTM409 Technical System Vibration and Stability (graduate)
4.00 CP (6.0 ECTS)

MTH504 Numerical Analysis for Research of Dynamics of Machines (for Master Students)
4.00 CP (6.0 ECTS)
This is the basic course on the use of numerical methods for the analysis and optimization of machine and mechanism dynamics. In the present field the researchers have to deal with complex problems of numerical mathematics, which demand the proficiency level above the average and is not limited to knowledge of the basic math course.
The main topics of the study subject are:

MTH502 Dynamics and Control of Machines (for Master Degree students) (graduate)
4.00 CP (6.0 ECTS)

MTM408 Optimization Methods (graduate)
4.00 CP (6.0 ECTS)
Extremes of analytic function. Extreme types. Minimum and maximum conditions of analytical function. General optimization problem formulation. Criteria and constraint types. Linear and nonlinear programming, the numerical methods. Gradient method. Local and global optimum. Universal and specialized optimization software. Functionals, the classical methods of functional minimization. Optimal control task standard form. Introduction to optimal control - Pontryagin maximum principle and dynamic programming. Introduction to multiobjective and robust optimization. In this course, students are not creating own optimization software codes, but will use specialized commercial software. Theoretical training target is to create the ability to formulate different optimization problems and use of commercial computer software for problem solution.

MTM516 Analysis and Optimization of Machines, Structures and Technological Processes (graduate)
3.00 CP (4.5 ECTS)
MRA253 Basics of Technical Design *(graduate)*
*2.00 CP (3.0 ECTS)*

MTH503 Computer-Aided Analysis of Mechanical Systems of Machines *(graduate)*
*4.00 CP (6.0 ECTS)*

MTH505 Rotary Machines
*3.00 CP (4.5 ECTS)*
Rotating parts of structures, shafts of energy and transportation machinery parts. A key initiative of the dynamic load factor, rotor disbalance. The dynamic calculation methods are analysed. The rotor balancing methods are considered. Within the framework of the present study subject the students should perform independent work on the following themes: 1st Supercritical speed calculation; 2nd Differential equations of rotor oscillation with two degrees of freedom; 3rd Dynamic load for the rotor supports.

MSE535 Non-Standard Sources of Energy *(graduate)*
*3.00 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.