VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

BASIC COURSE INFORMATION WITHIN THE STUDY PROGRAMME

PROFESSIONAL UNDERGRADUATE STUDY PROGRAMME

AIRCRAFT MAINTENANCE

Course title: Structural Strength of Constructions

Course Code:
OZR201

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
0	2 + 2 + 0	60	4

Course Objective:
To teach students to analyze aircraft structures and system elements using methods for calculating strength, stiffness, and stability of engineering structures.

Course Content:
Introduction to structural strength: tasks and methods. Classification of loads. Mohr's circle of stress, longitudinal, angular, and volumetric deformation. Hooke's law, elasticity constants, actual and allowable stress, safety factor. General case of rod loading. Components of internal forces in an arbitrarily loaded rod. General approach to stress and deformation analysis. Axial rod load, elongation, and stress. Thermal and initial stresses. Statistically indeterminate problems. Stress in a circular ring. Torsion of a round rod. Bending of a straight rod. Stress and deformation in pure bending. Normal and shear stresses under bending forces. Rod deflection in elastic and plastic regions. Euler's critical load, Tetmajer formula. Shear: basic concepts. Approximate calculation of shear-loaded parts. Geometric properties of rod cross-sections. Basic strength theories. Stress concentration. Dynamic load effects. Vibrations of elastic systems.

General and Specific Competencies (Knowledge and Skills):
Analyze problems occurring during the service life of aircraft structures and system elements in the field of structural strength, and propose solutions to reduce errors and increase the safety of aircraft constructions.

Learning Outcomes:
After completing this course, students will be able to:

1. Calculate basic mechanical loads, stresses, and deformations.
2. Evaluate design criteria, allowable stress, and safety factors under static and dynamic loads.
3. Dimension simple structural elements for tension, compression, shear, torsion, bending, stress concentration, and dynamic loading.

Required Literature:

1. Gugić, D.: Structural Strength of Constructions, Workbook, 5th edition (available in the file CK-vjezbenica-05.pdf).

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Digital Electronics

Course Code:
OZR411

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
0	2 + 2 + 0	60	4

Course Objective:
To enable students to connect fundamental knowledge of decimal and binary number systems, principles of encoders and decoders, signal transmission via optical fibers, with display devices (LED, LCD). Students will also be able to categorize system vulnerabilities caused by electrostatic and electromagnetic interference.

Course Content:
Course presentation of "Digital Electronics," methods of knowledge assessment, grading structure, and student obligations. Presentation of electronic instruments ("glass cockpit"). Number systems: decimal and binary. Conversion between decimal and binary numbers. Data buses. Logic circuits. Fundamentals of computer terminology. Microprocessors and microcomputers. Integrated circuits. Basics of optical fiber signal transmission. Electronic displays – principles of operation and types. Electrostatic-sensitive devices – sensitivity and protection. Control via software.

General and Specific Competencies (Knowledge and Skills):
Students will be able to:

- Analyze the proper functioning of aircraft systems: logic circuits, encoders and decoders, electronic displays (LED, LCD), and electrostatic-sensitive devices using knowledge of Boolean algebra, modulated signal transmission, and circuits enabling such transmission.
- Analyze the correctness of signal transmission through wiring and optical fibers.
- Evaluate the influence of electrostatic and electromagnetic effects and protection measures on signal transmission.

Learning Outcomes:
After completing this course, students will be able to:

1. Present the principles of number system formation and arithmetic operations in number systems.
2. Design basic logic circuits and functions using Boolean algebra rules.
3. Combine different types of digital circuits and their functions.
4. Present the structure, working principles, and programming of digital computers.
5. Sketch basic digital systems, explain their operation principles, and perform BITE (Built-In Test Equipment) checks on aircraft.

Required Literature:

1. U. Peruško, V. Glavinić, Digital Systems, Školska knjiga, Zagreb, 2005.
2. Ž. Novinc, Digital Information Transmission, Kigen, Zagreb, 2009.
3. Lj. Milić, Z. Dobrosavljević, J. Čertić, Introduction to Digital Signal Processing, Akademska misao, Belgrade, 2015.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Elements of Mechanical Structures

Course Code:
OZR202

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
0	2 + 2 + 0	60	4

Course Objective:
To enable students to connect fundamental knowledge of decimal and binary number systems, principles of encoders and decoders, signal transmission via optical fibers, with display devices (LED, LCD). Students will also be able to categorize system vulnerabilities caused by electrostatic and electromagnetic interference.

Course Content:
Course presentation of "Digital Electronics," methods of knowledge assessment, grading structure, and student obligations. Presentation of electronic instruments ("glass cockpit"). Number systems: decimal and binary. Conversion between decimal and binary numbers. Data buses. Logic circuits. Fundamentals of computer terminology. Microprocessors and microcomputers. Integrated circuits. Basics of optical fiber signal transmission. Electronic displays – principles of operation and types. Electrostatic-sensitive devices – sensitivity and protection. Control via software.

General and Specific Competencies (Knowledge and Skills):
Students will be able to:

- Analyze the proper functioning of aircraft systems: logic circuits, encoders and decoders, electronic displays (LED, LCD), and electrostatic-sensitive devices using knowledge of Boolean algebra, modulated signal transmission, and circuits enabling such transmission.
- Analyze the correctness of signal transmission through wiring and optical fibers.
- Evaluate the influence of electrostatic and electromagnetic effects and protection measures on signal transmission.

Learning Outcomes:
After completing this course, students will be able to:

1. Present the principles of number system formation and arithmetic operations in number systems.
2. Design basic logic circuits and functions using Boolean algebra rules.
3. Combine different types of digital circuits and their functions.
4. Present the structure, working principles, and programming of digital computers.
5. Sketch basic digital systems, explain their operation principles, and perform BITE (Built-In Test Equipment) checks on aircraft.

Required Literature:

1. U. Peruško, V. Glavinić, Digital Systems, Školska knjiga, Zagreb, 2005.
2. Ž. Novinc, Digital Information Transmission, Kigen, Zagreb, 2009.
3. Lj. Milić, Z. Dobrosavljević, J. Čertić, Introduction to Digital Signal Processing, Akademska misao, Belgrade, 2015.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: English Language I

Course Code:
OZR105

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
1	1 + 1 + 0	30	2

Course Objective:
To enable students to integrate specialized terminology in English related to aircraft maintenance, as well as to conduct business and multicultural team communication in English. Develop language skills in the professional context, including reading, listening, speaking, and writing.

Course Content:
- Presentation of English grammar: basic verb tenses and forms, passive voice, adjective comparison, noun plural forms, word formation.
- Presentation of professional topics: aerodynamic forces, aircraft parts, control surfaces, wings, engines.

General and Specific Competencies (Knowledge and Skills):
After attending the course, students will be able to:
- Integrate English grammatical structures and verb tenses into professional communication.
- Create new words using prefixes, suffixes, and plural forms.
- Connect terminology and expressions from the professional field for work-related communication.
- Write simple texts using newly acquired technical vocabulary.
- Solve practical problems related to the covered grammatical areas.

Learning Outcomes:
After completing this course, students will be able to:
1. Correctly use English grammatical structures and verb tenses.
2. Identify required manuals for aircraft maintenance tasks prescribed by manufacturers in English according to maintenance task requirements.
3. Integrate the requirements, obligations, and responsibilities prescribed in English by the International Civil Aviation Organization (ICAO) into an organization responsible for aircraft airworthiness programs and maintenance work.
4. Integrate the requirements, obligations, and responsibilities prescribed in English by the European Aviation Safety Agency (EASA) into an organization responsible for aircraft airworthiness programs and maintenance work.

Required Literature:
1. Majić, J.: English for Aircraft Maintenance, teaching script, 2024.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: English Language II

Course Code:
OZR113

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
2	1 + 1 + 0	30	2

Course Objective:
To enable students to integrate specialized terminology in English related to aircraft maintenance, as well as to conduct business and multicultural team communication in English. Develop language skills in the professional context, including reading, listening, speaking, and writing.
To synthesize knowledge from technical sciences and aircraft maintenance technology with English language usage as found in manuals and instructions.

Course Content:
- Presentation of English grammar: verb tenses, word order, expressing purpose, numbers and calculations, describing characteristics, dimensions, positions, and processes, conditional sentences.
- Presentation of professional topics: aircraft parts, primary control surfaces, materials and characteristics, tools, fundamentals of maintenance.

General and Specific Competencies (Knowledge and Skills):
After completing the course, students will be able to:
- Write and present the physical characteristics of objects and components in English, including position, shape, and dimensions.
- Express their opinions on topics related to aircraft maintenance in English.

Learning Outcomes:
After completing this course, students will be able to:
1. Recommend work standards in Croatian and English to prevent errors when working in multicultural teams.
2. Select the necessary professional literature in Croatian and English for solving technical problems in aircraft maintenance.
3. Recommend work standards in Croatian and English to prevent errors when working in multicultural teams.
4. Use technical terminology and phrases from the field of aircraft maintenance.

Required Literature:
1. Majić, J.: English for Aircraft Maintenance, teaching script, 2024.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: English Language III

Course Code:
OZR121

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
3	1 + 2 + 0	45	3

Course Objective:
To enable students to integrate specialized terminology in English related to aircraft maintenance, as well as to conduct business and multicultural team communication in English. Develop language skills in the professional context, including reading, listening, speaking, and writing. Create aircraft maintenance manuals and instructions in English and recommend literature and courses in English necessary for aircraft maintenance.

Course Content:
- Presentation of English grammar: verb tenses and forms, modal verbs, and specialized aircraft maintenance terminology.
- Presentation of professional texts and terminology from aircraft systems, main aircraft components, occupational safety, human factors, engineering tasks for maintenance planning, and tasks for inspection and testing of aircraft.

General and Specific Competencies (Knowledge and Skills):
After attending the course, students will be able to:
- Integrate specialized terminology and expressions in English for writing manuals, work procedures, and verbal communication in aircraft maintenance.
- Write basic professional texts and correspondence in the field of aircraft maintenance.
- Create presentations in English and establish oral communication with team members and personnel in direct contact.

Learning Outcomes:
After completing this course, students will be able to:
1. Recommend courses in aircraft maintenance for the lifelong learning of technical staff.
2. Select the necessary professional literature in Croatian and English to solve technical problems in aircraft maintenance.
3. Manage the technical status of aircraft and engines based on maintenance and usage records in Croatian and English.
4. Maintain the aircraft airworthiness documentation system in Croatian and English.
5. Recommend work standards in Croatian and English to prevent errors in a multicultural team environment.

Required Literature:
1. Majić, J.: Aircraft Maintenance, teaching script, 2024.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Physics

Course Code:
ZAJ102

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
1	2 + 1 + 0	45	4

Course Objective:
Acquisition and interpretation of fundamental laws of physics necessary for subsequent courses in the study program and professional practice.

Course Content:
- Historical introduction. SI system of units, scientific notation.
- Kinematics and dynamics of translational and rotational motion; Newton's laws.
- Work, power, conservation of mechanical energy.
- Periodic motion: oscillation, forced oscillation, and resonance.
- Waves: reflection and refraction, superposition, standing waves. Sound waves.
- Electromagnetic spectrum. Visible light, colors, interference, refraction at optical boundaries, total internal reflection, waveguides.
- Ionizing radiation. Density of matter, pressure. Statics and dynamics of fluids.
- Gas laws and thermodynamic processes; heat transfer.
- Electrical and thermal properties of materials, Joule heating.
- Structure of matter, quantum foundations of micro- and nanophysics, new technologies.

General and Specific Competencies (Knowledge and Skills):
- Ability to organize and connect different physical concepts to interpret real-life and professional problems.
- Logical and mathematically reasoned problem analysis and qualitative discussion of solutions.

Learning Outcomes:
After completing this course, students will be able to:
1. Predict the motion of bodies under external forces; calculate corresponding dynamic quantities and relate them to energy exchange with the environment.
2. Compare natural oscillations and resonant properties of systems with one or multiple degrees of freedom, and understand types and characteristics of mechanical and electromagnetic wave propagation.
3. Analyze pressure and forces acting on bodies immersed in fluids and basic characteristics of fluid dynamics.
4. Interpret electrical and thermal properties of materials at macroscopic and microscopic levels and conceptually link them with the principle of energy conservation.
5. Distinguish relevant from irrelevant data in problem-solving tasks, model, and solve simplified physical problems using mathematical and computational tools.
6. Critically evaluate the impact of simplifications and mathematical approximations on the results of simplified models and qualitatively generalize them to real-life problem situations in everyday life and professional practice.

Required Literature:

1. Jelčić Dubček, D. Physics – Collection of Problems (e-edition). Veleučilište Velika Gorica, 2019.
2. Paić, M. Motion, Forces, Waves. Školska knjiga, Zagreb, 1997.
3. Paić, M. Heat and Thermodynamics. Školska knjiga, Zagreb, 1994.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Helicopters

Course Code:
OZR128

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
6	2 + 1 + 0	45	3

Course Objective:
To enable students to connect the principles of aerodynamics, helicopter performance, and physical laws of motion with helicopter construction. Students will relate system requirements to technical maintenance, purpose, and structure of helicopters.

Course Content:
- Introduction.
- Fundamentals of helicopter aerodynamics.
- Basic helicopter performance.
- Types of rotor blade connections (hinged, semi-rigid, rigid rotors).
- Helicopter control (cyclic pitch, collective pitch, directional control).
- Fundamentals of static and dynamic stability.
- Stabilizers.
- Main rotor and hub: construction and power characteristics.
- Tail rotor and hub: construction and power characteristics.
- Rotor arms: construction, load capacity, and power characteristics.
- Helicopter fuselage: construction and components.
- Helicopter propulsion and power transmission: engine types and drive types, gearboxes.
- Basics of vibration analysis.
- Coning of main and tail rotor blades.
- Static and dynamic balancing of aerodynamic lifting surfaces.
- Materials for helicopter components and assemblies.
- Effects and significance of icing.

Note: Course content corresponds to Module 12 of the EASA PART-66 document.

General and Specific Competencies (Knowledge and Skills):
After attending the course, students will be able to:
- Categorize the significance and role of individual helicopter parts in relation to flight safety.
- Categorize the types of loads on helicopter structural components with respect to flight safety.
- Assess the significance of potential structural damage on helicopter airworthiness.
- Propose repair technologies for structural components.

Learning Outcomes:
After completing the course, students will be able to:
1. Classify and present the characteristics of the fuselage of heavier-than-air aircraft that are maintained in flight primarily by the reaction of air on one or more powered rotors on approximately vertical axes.
2. Present the controllability of heavier-than-air rotorcraft maintained in flight primarily by the reaction of air on one or more powered rotors on approximately vertical axes.
3. Integrate systems for correcting gyroscopic moments occurring in rotor-powered aircraft on approximately vertical axes.

4. Evaluate the operation of the power unit, power transmission, and vertical and horizontal rotor drive systems.
5. Present systems used on rotor-powered aircraft maintained in flight primarily by the reaction of air on one or more powered rotors on approximately vertical axes.

Mandatory Literature:

1. European Union Aviation Safety Agency, Certification Specifications, and Acceptable Means of Compliance for Large Rotorcraft CS-29.
2. Helicopter Maintenance Manuals (AM Manual) for Mi-8 MTV1 and Bell 206 BIII.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Hydraulics and Pneumatics

Course Code:
ZAJ122

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
4	2 + 2 + 0	60	5

Course Objective:
Introduce students to the fundamentals of hydraulics and pneumatics and connect the principles of operation of basic hydraulic components with the design and operation of hydraulic systems used in aviation.

Course Content:
- Hydraulic and pneumatic systems.
- Hydraulic pumps: types, classifications, and regulation.
- Hydraulic motors and cylinders.
- Hydraulic control components, damping elements, hydraulic distributors, pressure and flow control valves, proportional valves and distributors, hydraulic servosystems.
- Basic hydraulic drives: open and closed circuits, methods of control.
- Energy calculations of hydraulic systems.
- Physical and chemical properties of hydraulic fluids, maintaining fluid cleanliness.
- Sealing of moving and stationary elements.
- Hydraulic accumulators.
- Hydraulic installation components on aircraft.
- Pneumatic devices for braking and landing gear.
- Pneumatic devices for energy management: distributors, pressure valves, flow valves.
- Pneumatic control, characteristics and methods of operation.
- Designing pneumatic control systems – drawing pneumatic schematics.
- Maintenance of hydraulic and pneumatic systems, main risk and failure factors, principles of fault detection and correction.

General and Specific Competencies (Knowledge and Skills):
Students will gain fundamental knowledge of hydraulics and pneumatics. Practical exercises will provide the ability to perform energy calculations and read and interpret hydraulic schematics. Students will develop skills to analyze, detect faults, and correct issues in hydraulic and pneumatic components, and plan and organize maintenance systems for these devices on aircraft.

Learning Outcomes:
After completing the course, students will be able to:
1. Present hydraulic and pneumatic schematics while recognizing control and regulation functions.
2. Classify parameters of hydraulic and pneumatic system components.
3. Recommend the required power of drive units and hydraulic installation components based on hydraulic parameters – pressure, flow, forces, and torques of actuators.
4. Select preventive and corrective maintenance measures for typical faults in aircraft hydraulic and pneumatic systems.

Mandatory Literature:
1. Koroman V., Mirković R., Hidraulika i pneumatika, Školska knjiga, Zagreb, 1991.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Informatics I

Course Code:
ZAJ106

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
1	2 + 2 + 0	60	4

Course Objective:
Enable students to use basic computer functions and applications in everyday work. Introduce the possibilities of information and communication technology (ICT) in building information systems for business and other purposes.

Course Content:
- Basic concepts and structure of information technology, their origin, significance, and applications.
- Windows operating system: purpose, basic user functions, and applications.
- Word processing software: basic and advanced document formatting functions.
- Multimedia presentation software: basic and advanced features.
- Spreadsheet software: concepts and basic business applications.
- Database software: basic functions and applications.
- Basic concepts of computer networks, and technical and organizational measures for information system and data security on computers.

General and Specific Competencies (Knowledge and Skills):
- Create documents at the level of a seminar paper using advanced software features.
- Independently create multimedia presentations according to specified requirements.
- Apply spreadsheet software to develop simple business applications.
- Understand the complexity and acquire knowledge needed for information system development.

Learning Outcomes:
After completing the course, students will be able to:
1. Identify the main concepts and components of information technology.
2. Use key user functions of the Windows operating system and standard Microsoft Office programs, including Internet use.
3. Present professional content using appropriate software technologies.
4. Select essential technical and organizational measures to ensure the protection and security of information systems and data on computers.

Mandatory Literature:

1. Preppernau, J.; Lambert, J.; Frye, C.: Microsoft Office 2010 – Step by Step, Algoritam, 2010, ISBN: 978-953-7398-29-3
2. Lambert, J.; Lambert, S.: Microsoft Windows 10 – Step by Step

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Engineering Measurements

Course Code:
ZAJ136

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
2	2 + 1 + 0	45	3

Course Objective:
Teach students the procedures for measuring basic mechanical and electrical quantities in aircraft maintenance tasks using theoretical knowledge and practical skills from exercises. Enable students to analyze measured values.

Course Content:
- Basic concepts of measurement and metrology.
- Measurement units and systems of units.
- Measurement instruments for physical quantities.
- Standards and calibration.
- Measurement errors: inaccuracy, accuracy, and precision.
- Measurement methods and metrological organizations.
- Measurement of length, shape, and surface arrangement.
- Measurement of angles and cones.
- Surface roughness measurement.
- Strain gauge (tensometry).
- Measurement of force and mass.
- Measurement of pressure, temperature, sound, and noise.
- Measurement of electrical quantities.

General and Specific Competencies (Knowledge and Skills):
- Classify measurement unit systems and propose appropriate methods and equipment for engineering measurements.
- Independently analyze measurement results and conduct measurements or lead a team measuring physical quantities.

Learning Outcomes:
After completing this course, students will be able to:
1. Analyze and compare SI system elements with non-SI measurement systems.
2. Present instruments and devices for measuring mechanical and electrical quantities on aircraft components and systems.
3. Demonstrate procedures for measuring non-electrical physical quantities using electrical methods.
4. Critically analyze measurement procedures for mechanical and electrical physical quantities.
5. Plan and perform measurements of basic mechanical and electrical quantities on aircraft components and systems.
6. Evaluate accuracy, precision, and errors in measurements to improve measurement quality.

Mandatory Literature:
1. Šilić, Đ.: Mjerenja, VVG, Velika Gorica, 2016. ISBN 978-953-7716-70-7

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Chemistry

Course Code:
ZAJ103

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
1	2 + 1 + 0	45	4

Course Objective:
Teach students to connect the fundamentals of chemical laws, organic chemistry, and chemical substances used in the aviation industry. Relate the chemical properties of substances to the types of materials used in aircraft manufacturing and maintenance.

Course Content:
- Introduction to the course. Matter and energy. Measurement and SI units.
- Types of substances and methods of separating mixtures.
- Chemical bonds, chemical laws, and structure and properties of substances.
- Periodic table of elements. Avogadro's law. Atomic mass. Relative atomic and molecular mass. Mole concept.
- Electrochemical reactions and their role in technology.
- Types of chemical bonds: ionic, covalent, metallic. Complex compounds. Intermolecular interactions and solubility.
- Indicator reactions.
- Basics of organic chemistry: acyclic and cyclic hydrocarbons. Organic solvents. Fuels and lubricants in aviation.
- Types of polymerization and applications in aviation.
- Use of metals and composites in aviation.

General and Specific Competencies (Knowledge and Skills):
- Integrate fundamental knowledge of applied chemistry, emphasizing substance types, chemical laws, basic chemical calculations, and properties of chemical bonds with technological procedures in aircraft maintenance.

Learning Outcomes:
After completing this course, students will be able to:
1. Explain the importance of chemistry and material technology.
2. Present the chemical laws governing basic chemical reactions.
3. Identify types of chemical bonds, structure of substances, and their properties.
4. Evaluate electrochemical reactions and their applications.
5. Present basic chemical characteristics of fuels and oils.
6. Demonstrate the use of adhesives and polymerization in aircraft and vehicle maintenance.

Mandatory Literature:

1. Kalambura, S., Kemija, Veleučilište Velika Gorica, 2012.
2. Kalambura, S., Recenzirana predavanja iz kemije, Veleučilište Velika Gorica, 2011.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Aircraft Structure

Course Code:
OZR122

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
4	3 + 2 + 0	75	6

Course Objective:
Enable students to connect the principles of fuselage, wing, and tail construction and their components with aircraft purpose, flight speed, and load in flight and on the ground. Train students to evaluate aircraft airworthiness based on the construction of fuselage, wing, and tail elements in case of damage or degradation.
The course content covers parts of the EASA PART-66 modules 11A, 11C, and 12, particularly regarding aircraft structural knowledge.

Course Content:
- Introduction to the course. Forces and moments acting on an aircraft in horizontal flight.
- Geometric characteristics of aircraft wings. Surfaces for lift enhancement and control.
- Aircraft control surfaces along all axes. Landing gear (main gear) construction.
- Fuselage construction according to purpose: aircraft load in flight with changing positions.
- Construction of individual fuselage components. Load on wings during flight and fuselage-wing joint construction.
- Airworthiness requirements for structural strength. Wing structure and skin dimensioning.
- Types of fuselage structures according to load. Fuselage structural calculation with respect to safety and service life.
- Composite materials.

General and Specific Competencies (Knowledge and Skills):
- Classify aircraft fuselages, components, and system parts according to purpose and usage.
- Interpret the nature and type of loads on individual aircraft structure components.
- Dimension aircraft structural elements and assess the impact of potential structural damage on airworthiness.
- Recommend structural repair technologies.

Learning Outcomes:
After completing this course, students will be able to:
1. Relate design and construction requirements of fuselage, wings, and control surfaces to flight speed.
2. Connect maximum takeoff weights and aircraft purpose with landing gear and ground handling requirements.
3. Associate aircraft structural types with maximum allowable flight loads.
4. Classify aircraft structural components by load-bearing role: primary, secondary, tertiary.
5. Differentiate aircraft constructions according to damage-resistance concepts (fail safe, safe life, damage tolerance).
6. Categorize composite aircraft parts by the type of composite material used.

Mandatory Literature:

1. Vidović, A., Elementi stabilnosti i upravljanja zrakoplovom, Fakultet prometnih znanosti, 2010
2. Federal Aviation Administration, Aviation Maintenance Technician Handbook – General, US, 2018
3. European Union Aviation Safety Agency (EASA), CS-25

Course title: Logistics Engineering

Course Code:
ZAJ143

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
6	2 + 1 + 0	45	3

Course Objective:
Teach students to apply basic parameters of technical system effectiveness and integrated logistics support in analyzing the efficiency and reliability of technical systems.

Course Content:
- Fundamental concepts.
- Integrated logistics support.
- Effectiveness of complex technical systems.
- Life cycle costs.
- Reliability and failure models.
- Reliability configurations.
- Repairable system reliability.
- Availability (readiness).
- Maintainability.
- Maintenance theory.

General and Specific Competencies (Knowledge and Skills):
- Independently apply theoretical knowledge of technical system effectiveness in reliability and logistics support of complex systems, with emphasis on maintenance processes.

Learning Outcomes:
After completing this course, students will be able to:
1. Calculate reliability indicators and maintainability of technical equipment.
2. Compare different technical systems from the perspective of users and maintenance personnel.
3. Categorize historical operational data to create a database of technical system usage.
4. Manage operational costs throughout the life cycle of technical equipment.
5. Standardize requirements and maintainability of technical equipment.

Mandatory Literature:
1. Matijaščić, Z., Logističko inženjerstvo, Veleučilište Velika Gorica, Velika Gorica, 2012

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Mathematics I

Course Code:
ZAJ101

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
1	2 + 2 + 0	60	5

Course Objective:
Develop mathematical thinking, connect results from calculations to graphically represented functions, and distinguish basic concepts of statistics and computational methods.

Course Content:
- Mathematical Language: Arithmetic and algebraic expressions, equations, qualitative, analytical, and numerical equation solving, applications to geometry and physics.
- Functions: Concept of function, function rule, graph, domain, range, continuity, sign, increasing/decreasing behavior, extrema, inflection points, limits.
- Elementary Functions: Linear, quadratic, polynomial, rational, roots, powers, exponential, logarithmic, trigonometric, inverse trigonometric functions, applications to geometry and physics.
- Basic Concepts of Statistics: Population, random sample, random event.
- Probability Models: Random events, probability.
- Variables: Concept and classification, discrete variables, binomial and Poisson, continuous variables, normal and exponential distributions.
- Relationship Between Variables: Linear model, correlation, regression.
- Random Sample: Point estimates, plug-in model.
- Inferential Statistics: Interval estimates, hypothesis testing.

General and Specific Competencies (Knowledge and Skills):
- Understanding and using mathematical language and software.
- Understanding and applying the concept of function.
- Knowledge of elementary functions and application of their properties.
- Application to the analysis of geometric figures and physical phenomena.
- Ability to use statistical concepts and methods.

Learning Outcomes:
After completing this course, students will be able to:
1. Select and critically evaluate systems of equations in mathematical problem modeling.
2. Select and critically evaluate functions in mathematical problem modeling.
3. Select and critically evaluate derivatives or integrals in mathematical problem modeling.
4. Select and critically evaluate vector expressions in mathematical problem modeling.
5. Select and critically evaluate matrix expressions in mathematical problem modeling.

Mandatory Literature:
1. B. Čulina, Š. Zlopaša, Matematika za tehničke visoke škole, Part I, II, III, Veleučilište Velika Gorica, Velika Gorica, 2010.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Mathematics II

Course Code:
ZAJ108

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
2	2 + 2 + 0	60	4

Course Objective:
Apply the fundamentals of differential and integral calculus to calculations in geometry and physics. Apply vector and matrix calculus in geometry, physics, and solving systems of equations. Relate first-order differential equations to physics applications and second-order linear differential equations to linear systems. Apply differential and integral calculus of scalar functions of multiple variables and vector functions of one or more variables to geometry and physics.

Course Content:
- Derivatives: Concept, partial derivatives, derivative computation, mechanical applications, optimization problems.
- Integrals: Indefinite integrals, basic computation rules, substitution and integration by parts, mechanical applications; definite integrals and applications to area calculations.
- Differential Equations: Basic concepts, separation of variables, second-order linear differential equations with constant coefficients and simple forcing terms.
- Vectors: Concept, operations, geometric meaning, calculations.
- Matrices: Linear systems, matrix algebra, geometric interpretations.
- Vector Functions of One Variable: Differentiation and integration, applications to motion and curves.
- Scalar Functions of Multiple Variables: Partial derivatives, tangent planes, differentials, directional derivatives, gradient, optimization problems, double and triple integrals, applications to area and volume, physics applications.
- Integration over Curves and Surfaces: Scalar and vector fields, conservative fields, applications in geometry and physics.
- Software Application: Use of SageMath for solving calculus and linear algebra problems.

General and Specific Competencies (Knowledge and Skills):
- Understand and apply differential and integral calculus to analyze non-uniform processes.
- Understand and apply differential equations in modeling continuous deterministic processes.
- Apply vectors and matrices in geometry, physics, and solving linear systems.
- Apply multivariable and vector calculus in geometry and physics, including optimization and volume/area calculations.
- Use software tools like SageMath for computational support.

Learning Outcomes:
After completing this course, students will be able to:
1. Select and critically evaluate limits or derivatives in mathematical modeling.
2. Select and critically evaluate indefinite and definite integrals or differential equations in mathematical modeling.
3. Apply multivariable differential calculus to determine tangent planes and analyze motion of a point along a spatial curve.
4. Solve integrals of scalar and vector fields along a given curve or surface, independently or with computational tools.

Mandatory Literature:

1. B. Čulina, Š. Zlopaša: Matematika za tehničke visoke škole, Part III, Veleučilište Velika Gorica, 2010.
2. B. Čulina, I. Golubić: Matematika za tehničke visoke škole, Part IV, Veleučilište Velika Gorica, 2015.
3. B. Čulina, Š. Zlopaša: Matematika za tehničke visoke škole, Part V, Veleučilište Velika Gorica, 2015.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Materials and Heat Treatment

Course Code:
ZAJ111

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
2	2 + 1 + 0	45	4

Course Objective:
Enable students to select materials and plan heat treatment processes within the maintenance system of aircraft components.

Course Content:
- Introduction to materials science.
- Technical materials: description and basic classification.
- Structure and microstructure of materials; crystallography.
- Metals and metal alloys; iron-carbon alloys; phase diagrams; Fe-C diagram.
- Steel: classification, properties, applications.
- Iron-based castings: systematization and properties.
- Light metals and alloys: classification, properties, applications.
- Polymer materials: properties and applications.
- Composite materials: properties and applications.
- Basic properties of technical materials; methods for testing mechanical properties.
- Fundamentals of heat treatment: annealing, quenching, tempering.
- Thermo-chemical treatments: carburizing, nitriding, boriding.
- Purpose and application of heat treatment in aircraft industry.

General and Specific Competencies (Knowledge and Skills):
- Understanding the structure and properties of technical materials.
- Selecting optimal materials for specific applications.
- Knowledge of basic heat treatment and thermo-chemical treatment procedures and their purposes.

Learning Outcomes:
After completing this course, students will be able to:
1. Differentiate between various technical materials based on structure and microstructure.
2. Propose methods for testing basic mechanical properties of materials.
3. Analyze requirements for selecting technical materials for specific applications.
4. Distinguish between heat treatment and thermo-chemical treatment procedures.
5. Integrate knowledge of technical materials with application requirements in aircraft maintenance.

Mandatory Literature:
- Course materials published on the Gaudeamus system.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Mechanical Processing

Course Code:
OZR410

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
0	2 + 2 + 0	60	4

Course Objective:
Enable students to select and plan mechanical processing procedures for materials in the production and repair of parts needed for aircraft and engine maintenance.

Course Content:
- Forming processes (deformation-based shaping).
- Material removal processes.
- Technological equipment for specific material processing methods.
- Production and processing of polymers and composites.
- Basic technological parameters of individual mechanical processing methods.
- Examples of technological procedures for repairing and manufacturing engine and aircraft parts.

General and Specific Competencies (Knowledge and Skills):
- Combining material processing methods with and without material removal.
- Planning technological equipment for specific processing procedures.
- Defining technological processes for repairing or manufacturing spare parts.

Learning Outcomes:
After completing this course, students will be able to:
1. Analyze and evaluate casting processes in terms of functional requirements, quality, and production context.
2. Select and compare suitable welding, soldering, and adhesive bonding processes relative to design and material limitations.
3. Evaluate and apply forming processes.
4. Analyze and justify the selection of material removal processes.
5. Compare and assess the suitability of polymer processing and composite material fabrication methods.
6. Plan, coordinate, and integrate multiple technological processes and associated equipment into a complete production and repair workflow for mechanical parts.

Mandatory Literature:
1. Šavar, Š.: Obrada metala odvajanjem čestica, Volumes 1 & 2, Školska knjiga, Zagreb, 1990.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Mechanics

Course Code:
ZAJ112

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
2	2 + 2 + 0	60	5

Course Objective:
Enable students to solve engineering tasks in aircraft maintenance by applying fundamental laws and methods of technical mechanics, statics, kinematics, and dynamics.

Course Content:
Statics:
- Introduction to statics, fundamental concepts, and axioms.
- Force, moment of force, force systems.
- Force reduction, isolation of bodies, constraints and equilibrium conditions.
- Friction: coefficient, inclined planes, axial and radial bearings, ropes.
- Beams, internal forces, centroid of lines, areas, and solids.
- Static moment of cross-sections.

Dynamics:
- Kinematics of particles: position, displacement, velocity, acceleration.
- Rectilinear and curvilinear motion, natural components.
- Relative motion, rigid body motion, planar motion, rotation about a fixed axis.
- Kinematics of simple mechanisms.
- Equations of motion of particles and rigid bodies.
- D'Alembert principle, mechanical work and power, kinetic and potential energy.
- Conservation of mechanical energy, momentum, and angular momentum.
- Dynamics of particle systems and rigid bodies, reaction forces in supports.

General and Specific Competencies (Knowledge and Skills):
- Analyze problems and propose improvements in aircraft and equipment maintenance using fundamental laws of statics, dynamics, and mechanics.

Learning Outcomes:
After completing this course, students will be able to:
1. Calculate reaction forces and internal forces in beams and rigid body systems using analytical and graphical methods.
2. Determine coordinates of centroids.
3. Solve problems in kinematics of particles and rigid bodies.
4. Solve dynamics problems for particles and rigid bodies using Newton's laws, D'Alembert principle, energy conservation, kinetic energy law, momentum, and angular momentum laws.
5. Analyze simple mechanisms and calculate basic kinematic quantities.

Mandatory Literature:
1. Teaching materials published on the Gaudeamus system.

Course title: Non-Destructive Testing in Aviation

Course Code:
OZR129

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
3	2 + 1 + 0	45	3

Course Objectives:
To categorize the basic types of material testing methods, both destructive and non-destructive. To present the types of non-destructive testing (NDT) methods, the fundamental characteristics of each technological process, and the application of each NDT method. To connect the types of non-destructive testing methods with aircraft maintenance tasks during routine and non-routine maintenance operations.

Course Content:
Introduction to the course. Testing methods, basic division into: destructive testing methods and non-destructive testing methods. Quality control. Non-destructive testing methods: Surface methods, Volume methods, and specially highlighted methods. Scope of application, working conditions, applicability, and test results for non-destructive material testing methods: Visual Testing (VT), Penetrant Testing (PT), Radiographic Testing (RT), Magnetic Particle Testing (MT), Ultrasonic Testing (UT), Thermography (IR), Eddy Current Testing (EC). Other NDT methods: Tap Test (TT), Shearography Testing (ST), and Holography Testing (HT).

General and Specific Competencies (Knowledge and Skills):
- To recommend types of non-destructive testing methods based on the material being inspected and the requirement for detecting defects or material damage in aircraft.
- To determine the degree of material damage or irregularities based on results obtained from non-destructive testing methods.

Learning Outcomes:
Upon completion of this course, the student will be able to:
1. Recommend non-destructive testing methods for detecting surface irregularities in materials.
2. Recommend procedures for detecting material irregularities in aircraft structures and components using ultrasonic non-destructive testing methods.
3. Recommend procedures for detecting material irregularities in aircraft structures and components using radiographic non-destructive testing methods.
4. Recommend procedures for detecting material irregularities in aircraft structures and components using eddy current non-destructive testing methods.
5. Recommend procedures for detecting material irregularities in aircraft structures and components using thermography non-destructive testing methods.

Required Literature:
1. Špehar S., Non-Destructive Testing in Aviation, Lectures, Velika Gorica Polytechnic, 2020

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Aircraft Maintenance I

Course Code:
OZR125

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
5	3 + 2 + 0	75	6

Course Objectives:
To acquire knowledge on maintenance planning, documentation management in maintenance, and the implementation of specific maintenance procedures.

Course Content:
Introduction. Aircraft maintenance tasks. Classification of aircraft maintenance, maintenance of aircraft systems, airframe maintenance, workshop maintenance. Occupational safety measures. Maintenance resources. Internal organization of airlines and maintenance organizations. Quality system, technical documentation, facilities and workspace, tools and equipment, maintenance personnel. Maintenance technology. Aircraft maintenance program. Routine maintenance process. Non-routine maintenance process. Aircraft component maintenance process. Aircraft engine maintenance. Propeller and associated systems maintenance. Storage and preservation of engines and propellers. Aircraft modifications. Airframe repairs. Work planning and preparation, execution of maintenance work on aircraft, certification of maintenance work on aircraft.

General and Specific Competencies (Knowledge and Skills):
- Understanding basic concepts in aircraft maintenance.
- Knowledge and application of occupational safety measures.
- Knowledge and use of aircraft technical documentation.
- Development of maintenance programs.
- Planning maintenance work.
- Understanding processes and procedures in aircraft maintenance.

Learning Outcomes:
Upon completion of this course, the student will be able to:
1. Organize and implement occupational safety measures.
2. Prepare work documentation – work orders for maintenance tasks.
3. Develop a maintenance plan for aircraft work.
4. Distinguish legal responsibilities related to aircraft maintenance.
5. Recognize critical situations in aircraft maintenance from the perspective of human factors.

Required Literature:
1. Certification Specification for Large Aeroplanes CS-25, EASA
2. MSG-3 Document, ATA 100 Standard (available on the Polytechnic server)

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Aircraft Maintenance II

Course Code:
OZR127

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
6	3 + 2 + 0	75	6

Course Objectives:
To enable students to evaluate designed reliability in relation to operational reliability of aircraft based on monitoring parameters within a reliability program. To determine the necessary human and material resources for aircraft maintenance. To assess maintenance costs and optimize procurement and spare parts/material reserves for aircraft maintenance.

Course Content:
Fundamentals of reliability. Monitoring reliability in fleet operations: Reliability Program. Engine maintenance based on monitoring operational trends and engine failures. Planning and costing of aircraft maintenance and planning maintenance reserves. Estimating the required quantity of parts, equipment, and materials based on failure trends and prescribed aircraft maintenance systems. Classification of parts and materials according to storage conditions and consumption rates for a given aircraft fleet. Maintenance planning during aircraft or engine downtime.

General and Specific Competencies (Knowledge and Skills):
- Analyze reliability trends of aircraft operation based on monitoring operational failures and trends in system and engine performance parameters.
- Evaluate the cost-effectiveness of flight operations and lifecycle costs of aircraft relative to designed values.
- Plan material stock levels and storage conditions.

Learning Outcomes:
Upon completion of this course, the student will be able to:
1. Manage aircraft airworthiness systems.
2. Develop aircraft maintenance programs according to safety and economic principles.
3. Structure and plan aircraft maintenance costs.
4. Classify system failures using probability laws and statistical methods.

Required Literature:
1. Delp, F., Bent, R.D., McKinley, J.L.: Aircraft Maintenance and Repair, Fifth Edition, New York

Course title: Human Resource Management in Aircraft Maintenance

Course Code:
OZR610

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
0	2 + 1 + 0	45	3

Course Objectives:
The aim of the course is to categorize the main factors contributing to unintentional human errors in aircraft maintenance and to explore ways to prevent them. To analyze the causes of unintentional human errors in accordance with civil aviation regulatory requirements and recommend preventive measures within maintenance organizations to mitigate human errors.

Course Content:
General overview of causes of unintentional human errors; SHELL Model; Organization of technological processes in line with human capabilities and limitations; Teamwork organization in multicultural teams; Categorization of communication types within teams: records and information transfer; Physical environment under specific working conditions; Aircraft maintenance tasks according to their impact on flight safety.

General and Specific Competencies (Knowledge and Skills):
- Evaluate the potential for unintentional human errors in aircraft maintenance processes and propose workflow modifications to prevent them.
- Lead maintenance teams in both simple and complex intercultural environments in aircraft maintenance operations.

Learning Outcomes:
Upon completion of this course, students will be able to:
1. Present the conditions for unintentional human errors according to the SHELL model prescribed by the International Civil Aviation Organization (ICAO).
2. Analyze human capabilities and limitations for performing technical maintenance tasks.
3. Connect individual personality traits with organizational efficiency and teamwork performance.
4. Identify societal influences on individuals as stress factors affecting work effectiveness.
5. Categorize human errors by the type of communication involved in the work process.
6. Identify types of stressors arising from group demands in task execution.
7. Relate key aspects of work psychology to human performance within the work process.
8. Evaluate factors directly influencing error occurrence during task execution.

Required Literature:
1. International Civil Aviation Organization (ICAO), Human Factors Guidelines for Safety Audits Manual, DOC-9806, ICAO, 2002

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Organization of Aircraft Maintenance Processes

Course Code:
OZR301

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
0	2 + 1 + 0	45	3

Course Objectives:
To enable students to evaluate an individual's relationship to the work environment, hierarchical management structures, task complexity in aircraft maintenance, and available work resources. Based on the analysis of maintenance task requirements and existing constraints (human and material), to categorize potential hazards for human errors, analyze errors that have occurred, and propose preventive measures to avoid future errors.

Course Content:
Definition of unintentional human error in the workplace. Influence of maintenance organization characteristics on the occurrence of unintentional errors. Organization of the work process according to the complexity of maintenance tasks. Organizational (corporate) culture and "no-blame" statements regarding unintentional errors. Task analysis in relation to existing working conditions. Human resources required to perform tasks: medical certifications for work at heights or in confined spaces. Legal obligations of individuals to report inability to perform aircraft maintenance tasks. Task standardization based on complexity. Planning task execution according to activity sequences and individual steps. Preventive, proactive approach to analyzing unintentional human errors. Investigation of error causes through staff interviews following EASA Human Factors "no-blame" requirements. Event analysis using Ishikawa diagrams. Organizational aspects of work: teamwork, performing tasks in multicultural environments. Use of documentation and manuals. Identification of multidisciplinary tasks. Mandatory lifelong training for personnel holding aviation maintenance licenses.

General and Specific Competencies (Knowledge and Skills):
- Identify the impact of the work environment and individual characteristics on productivity, work quality, and the occurrence of unintentional errors.
- Analyze errors in maintenance work and propose measures and standards to prevent human errors in task planning and execution, whether by individuals or multicultural teams.
- Recommend courses and training programs in accordance with technological maintenance procedure developments.

Learning Outcomes:
Upon completion of this course, students will be able to:
1. Categorize factors influencing errors due to human factors (The Dirty Dozen).
2. Comment on the impact of work environment and individual personality on error occurrence.
3. Analyze the effect of resource limitations on unintentional human errors in maintenance work.
4. Identify the influence of task standardization by complexity and execution time on error occurrence.
5. Analyze organizational factors contributing to human errors in maintenance using the Human Factor MEDA method (Maintenance Error Decision Aid).
6. Recommend work standards in Croatian and English to prevent errors in multicultural teams.
7. Propose lifelong learning courses for technical personnel in aircraft maintenance.

Required Literature:

1. International Civil Aviation Organization (ICAO), Human Factors Guidelines for Safety Audits Manual, DOC-9806
2. Sikavica, P.; Bahtijarević-Šiber, F.; Vokić, N.P., Foundations of Management, Školska Knjiga, Zagreb, Croatia, 2008
3. Kroemer, K.H.E.; Grandjean, E., Fitting the Task to the Human: An Ergonomics Handbook, Naklada Slap, Jastrebarsko, 1999

Course title: Quality Assurance and Quality Control

Course Code:
OZR302

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
0	2 + 0 + 0	30	3

Course Objectives:
To enable students to relate the key features of quality planning systems, quality assurance, quality control, and improvement methods to the requirements of quality standards and the organizational structure of maintenance. To connect quality management systems with risk management systems within aircraft maintenance organizations.

Course Content:
Introduction to quality; fundamental principles of quality management; tools for managing quality systems; regulations defining standards and norms for quality; integrated regulatory systems within organizational work for quality management; structure and implementation of quality management systems; integration of quality systems with aviation safety management systems; types of systems enabling organizational structure for efficient work processes and management in accordance with quality requirements; technological standards; risk management; MSG and SMS in aircraft maintenance organizations.
Legal factors for quality assurance (metrology, accreditation, technical legislation); quality and business in the European Union; education in quality assurance and control; management and planning in production processes to eliminate existing non-conformities, risk assessment, and prevention of new non-conformities.

General and Specific Competencies (Knowledge and Skills):
- Relate types of quality standards to quality systems used in aircraft maintenance organizations.
- Propose principles and methods for establishing quality in maintenance organizations.
- Identify institutions and principles for implementing quality systems internationally, within the European Union, and in Croatia.
- Integrate civil aviation regulatory requirements with quality systems, incorporating aviation safety, business efficiency, and quality standards.

Learning Outcomes:
Upon successful completion of this course, students will be able to:
1. Select a quality system and quality management principles for an aircraft maintenance organization.
2. Determine which type of quality standard is applicable within an aircraft maintenance organization.
3. Analyze causes of non-conformities and errors in maintenance organizations to eliminate their root causes.
4. Categorize work errors in terms of aircraft safety and business efficiency.
5. Assess the compliance of implemented quality systems with actual conditions in the maintenance organization.

Required Literature:
1. Kacian Ivetić, I., Quality Assurance and Quality Control, Iproz d.o.o., Zagreb, 2018

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Fundamentals of Aerodynamics and Flight Mechanics

Course Code:
OZR115

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
3	3 + 2 + 0	75	6

Course Objectives:
To teach and enable students to connect the physical principles and causes of aerodynamic forces resulting from the relative motion of a body through air. To present the geometric and aerodynamic characteristics of propeller airfoils and aircraft structural elements, calculate aerodynamic forces, flight speeds, moments, and aircraft performance in all phases of flight (takeoff, climb, cruise, descent, and landing), and to determine aircraft weight and center of gravity using both mathematical methods and direct weighing.

Course Content:
Fundamental principles of aerodynamics: state equations, conservation of mass and momentum, first law of thermodynamics, isentropic flow equation, energy equation, speed of sound, isentropic and supersonic flow, nozzles. Friction drag: laminar, turbulent, and mixed boundary layers. Thin airfoils at small angles of attack: geometry, aerodynamic coefficients, incompressible flow, asymmetrical airfoils, airfoil database, compressibility effects, superposition principle, critical Mach number, supercritical airfoils. Supersonic flow: Mach cone, aerodynamic coefficients of plates. Finite wing: geometry, tip effects, lift, induced drag, flaps and slats, control surfaces. Fuselage. Static stability: aircraft lift, pitching moment, equilibrium flight, static stability, neutral point, center of gravity limits, hinge moments, effect of free horizontal stabilizer on neutral point, stick forces. Horizontal flight: flight regimes, required power, available power, envelopes, range (propeller and jet propulsion), flight endurance. Climb: BRC and BAC, time and fuel consumption. Descent: range and angle. Horizontal turn: radius, angular velocity, load factor. Vertical turn: radius, angular velocity, load factor. Takeoff and landing: takeoff technique, ground roll, takeoff distance, landing description, descent, braking. Total energy: energy height, specific power, aircraft operational envelope. Aircraft testing: measurement accuracy, preparation and reporting, ground measurements (theodolite and radar), in-flight measurements (speed, angles, temperatures). Experimental determination of polar curves, BRC, stall. Takeoff and landing testing.

General and Specific Competencies (Knowledge and Skills):
- Solve problems related to aircraft performance independently and compare aircraft types based on flight performance, fuel consumption, and flight conditions.
- Prepare aircraft center of gravity diagrams based on measurements or calculations.
- Lead multicultural teams in solving problems related to aircraft performance according to principles of ethical and social responsibility.

Learning Outcomes:
Upon completion of this course, students will be able to:
1. Present aerodynamic parameters of the boundary layer around an airfoil relative to airflow speed in standard atmospheric conditions.
2. Categorize airfoil shapes and their control surfaces according to airflow relative to aircraft speed and Mach number.

3. Relate airfoil shapes to optimal lift distribution on the wing and tail for given flight speeds and aircraft design performance.
4. Relate propeller aerodynamic characteristics to propeller efficiency coefficients.
5. Calculate theoretical aircraft performance in all flight phases, from takeoff to landing.
6. Determine the aircraft center of gravity mathematically by calculating mass shifts and by direct weight measurement.

Required Literature:

1. Janković, Slobodan, Fundamentals of Aerodynamics and Flight Mechanics, Velika Gorica Polytechnic, Velika Gorica, 2011

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Fundamentals of Automatic Control

Course Code:
MV403

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
4	2 + 1 + 0	45	5

Course Objectives:
To enable students to analyze automatic control systems and propose appropriate technologies in the technical maintenance of motor vehicles by applying theoretical knowledge of automatic control.

Course Content:
Automation, control, and regulation; application of control in mechatronic systems. Mathematical description of dynamic systems. Analysis of fundamental characteristics of control loops. Description of automatic control systems, control of technical processes in motor vehicles or aircraft, description of system elements – dynamic components (microcontrollers and PLCs, sensors, actuators, interfaces, etc.), analysis and synthesis of control processes, regulator analysis and tuning.

General and Specific Competencies (Knowledge and Skills):
- Critically evaluate the operation of automatic control systems and dynamic system components.
- Analyze the characteristics of automatic control systems using examples from motor vehicles.
- Determine system parameters for maintenance purposes.

Learning Outcomes:
Upon completion of this course, students will be able to:
1. Critically analyze the structure and types of automatic control systems.
2. Design linear models and control systems using differential equations and transfer functions in the Laplace domain.
3. Calculate time responses and frequency characteristics of linear systems.
4. Analyze the stability of automatic control systems using analytical and graph-analytical methods.
5. Create block diagrams for examples of automatic control systems in motor vehicles.
6. Identify systems and problems related to motor vehicles.
7. Present the physical parameters of automatic control in motor vehicles.
8. Present the operating principles of automatic control components and devices in motor vehicles.

Required Literature:
1. Kuljača, Lj.; Vukić, Z., Automatic Control – Analysis of Linear Systems, Zagreb, Kingen, d.o.o., 2004

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Fundamentals of Ecology

Course Code:
ZAJ135

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
0	2 + 1 + 0	45	3

Course Objectives:
To enable students to connect fundamental concepts of ecology, sustainable development, and human environmental impact. To identify types of ecological threats caused by humans and recommend measures to reduce pollution.

Course Content:
Introductory lecture. Basic definitions and classifications of ecology as a science; the concept of populations and their influencing factors. Ecologically protected areas, habitats, and protected plant and animal species in Croatia. Types of environmental pollution and the impact of air transport on the environment: noise, vibrations, exhaust emissions; aircraft and water pollution; air transport and soil pollution; waste generated during aircraft maintenance. Application of sustainable development principles in aircraft maintenance; green economy and green technologies in aviation; use of biofuels and renewable energy in air transport; environmental risks in aircraft production and maintenance.

General and Specific Competencies (Knowledge and Skills):
- Identify basic areas of ecology and types of ecological pollution, as well as the impact of industry on humans, the environment, and climate.
- Recognize key ecological concepts, ecological laws, and anthropogenic impacts on ecosystems.
- Classify types of ecological threats in aviation and measures used to mitigate environmental impact.

Learning Outcomes:
Upon completion of this course, students will be able to:
1. Define basic ecological concepts, classifications, and principles.
2. Distinguish types of protected areas and species, and apply environmental laws and regulations.
3. Relate pollution sources and consequences, differentiating types of environmental pollution according to regulations issued by the International Civil Aviation Organization (ICAO).
4. Explain the impact of transport and emissions on the environment.
5. Recommend procedures for disposal of aircraft parts and materials, and classify waste generated in maintenance workshops according to sustainable development goals.
6. Categorize environmental pollution risks by likelihood and potential impact on the environment.

Required Literature:
1. Kalambura, S.; Jovičić, N., Ecology, Velika Gorica, 2018

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Fundamentals of Ecology

Course Code:
ZAJ135

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
0	2 + 1 + 0	45	3

Course Objectives:
To enable students to connect fundamental concepts of ecology, sustainable development, and human environmental impact. To identify types of ecological threats caused by humans and recommend measures to reduce pollution.

Course Content:
Introductory lecture. Basic definitions and classifications of ecology as a science; the concept of populations and their influencing factors. Ecologically protected areas, habitats, and protected plant and animal species in Croatia. Types of environmental pollution and the impact of air transport on the environment: noise, vibrations, exhaust emissions; aircraft and water pollution; air transport and soil pollution; waste generated during aircraft maintenance. Application of sustainable development principles in aircraft maintenance; green economy and green technologies in aviation; use of biofuels and renewable energy in air transport; environmental risks in aircraft production and maintenance.

General and Specific Competencies (Knowledge and Skills):
- Identify basic areas of ecology and types of ecological pollution, as well as the impact of industry on humans, the environment, and climate.
- Recognize key ecological concepts, ecological laws, and anthropogenic impacts on ecosystems.
- Classify types of ecological threats in aviation and measures used to mitigate environmental impact.

Learning Outcomes:
Upon completion of this course, students will be able to:
1. Define basic ecological concepts, classifications, and principles.
2. Distinguish types of protected areas and species, and apply environmental laws and regulations.
3. Relate pollution sources and consequences, differentiating types of environmental pollution according to regulations issued by the International Civil Aviation Organization (ICAO).
4. Explain the impact of transport and emissions on the environment.
5. Recommend procedures for disposal of aircraft parts and materials, and classify waste generated in maintenance workshops according to sustainable development goals.
6. Categorize environmental pollution risks by likelihood and potential impact on the environment.

Required Literature:
1. Kalambura, S.; Jovičić, N., Ecology, Velika Gorica, 2018

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Fundamentals of Electronics

Course Code:
OZR310

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
0	2 + 1 + 0	45	3

Course Objectives:
To enable students to connect knowledge of semiconductor conductivity and P-N junctions with the operation of semiconductor elements such as diodes, transistors, thyristors, and integrated circuits. To relate the characteristics of semiconductor elements to the operation of complex circuits including oscillators, power amplifiers, multivibrators, voltage regulators, multiplexers/demultiplexers, and analog-to-digital and digital-to-analog converters.

Course Content:
Introduction to semiconductor properties and characteristics, semiconductor materials, diode characteristics, P-type and N-type materials, majority and minority charge carriers, P-N junction, forward and reverse bias, diode parameters. Rectifier diodes, light-emitting diodes, photodiodes, varicap diodes, Zener diodes, Schottky diodes. Half-wave and full-wave rectifiers, voltage doublers. Transistors: symbols, characteristics, PNP and NPN types, base-emitter-collector configurations, basic transistor amplifier circuits (CE, CB, CC), amplifier classes (A, B, C), multistage amplifiers, feedback. Operational amplifiers (voltage follower, comparator, differentiator, integrator), voltage regulators, oscillators. Thyristors, multivibrators (bistable, astable, monostable), multiplexers and demultiplexers, integrated circuits, printed circuit boards, servomechanisms, open and closed-loop systems, feedback, analog converters, resolvers, differentiators, torque control, inductive and capacitive transmitters, synchro reversal, digital control, A/D and D/A signal conversion.

General and Specific Competencies (Knowledge and Skills):
- Analyze the operation of rectifier circuits, amplifiers, operational amplifiers, voltage regulators, oscillators, thyristors, multivibrators, multiplexers/demultiplexers, printed circuit boards, servomechanisms, transmitters, and A/D and D/A signal conversion.
- Assess signal transmission integrity via electromagnetic transmission, wiring, or optical cables.

Learning Outcomes:
Upon completion of this course, students will be able to:
1. Explain the operating principles of semiconductor elements.
2. Compare basic electronic circuits and describe their operation.
3. Classify types of electromagnetic signals according to modulation type and signal frequency.
4. Integrate the fundamental architectures of radio communication and navigation devices.

Required Literature:

1. Biljanović, P., Electronic Circuits, Školska knjiga, Zagreb, 2005
2. Brodić, T., Electronic Components and Basic Circuits, Školska knjiga, Zagreb, 1995
3. Butković, Ž.; Divković-Pukšec, J.; Barić, A., Electronics II, FER, Zagreb, 2010

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Fundamentals of Electrical Engineering

Course Code:
OZR101

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
0	2 + 2 + 0	60	4

Course Objectives:
To teach students to connect fundamental knowledge of electrostatics, direct current (DC) and alternating current (AC) circuits, and electromagnetism with the operation of aircraft systems and components. To enable students to independently calculate electrical parameters in complex electrical networks and apply acquired electrical engineering knowledge to troubleshoot and solve problems in aircraft systems.

Course Content:
Introduction. Electrical properties of materials. Electrostatics. Electric field of a point charge. Coulomb's law. Work in an electric field, electric potential, and voltage. Capacitance and capacitors; plate capacitor. DC voltage sources. Electromotive force. Electric circuits. Electric current intensity. Ohm's law. Electrical resistance. Electric work and power. Joule's law. Capacitor and resistor connections. Mixed circuits in DC networks. Source connections. DC networks. Magnetism and electromagnetism. Electromagnetic induction and magnetic field strength. Faraday's law of electromagnetic induction. Self-induction. Lorentz force and Lenz's law. Inductance. Principles of DC and AC generators and motors. AC voltage and current. RLC circuits in AC networks. AC sinusoidal power. Transformers. Three-phase systems.

General and Specific Competencies (Knowledge and Skills):
- Classify units for measuring electrical quantities according to the International System of Units (SI).
- Interpret the concept of electric and electromagnetic fields, their effects on matter, and their applications in electrical engineering.
- Calculate electrical parameters in networks consisting of mixed connections of electrical elements.
- Analyze the operation of generators, motors, electrical elements, and conductors in DC and AC circuits and determine their parameters based on analysis.
- Measure electrical and electromagnetic parameters of circuits using measurement instruments.

Learning Outcomes:
Upon completion of this course, students will be able to:
1. Calculate parameters in electrostatic fields (electric charge, potential, voltage, forces on charges, and work) and electromagnetic fields (magnetic flux, magnetic induction, magnetic field strength, forces on moving charges).
2. Explain the operating principles of passive elements (capacitors, resistors, coils) in DC and AC circuits.
3. Explain the laws of electromagnetic induction (Faraday's law and Lenz's rule), inductance, self-induction, and mutual induction.
4. Explain the operating principles of DC generators and motors.
5. Explain the operating principles of AC generators and motors.

6. Evaluate the operation of aircraft systems that use DC power for operation, control, and management by solving circuit parameters.
7. Classify the operation of aircraft systems using AC power for operation, control, and management by solving circuit parameters.
8. Distinguish between primary and secondary chemical energy sources (batteries and accumulators) as devices for electrical energy storage according to their intended use.

Required Literature:

1. Kozlina, Ž., Fundamentals of Electrical Engineering, VVG, Velika Gorica, 2013
2. Pinter, V., Fundamentals of Electrical Engineering, Part I, Tehnička knjiga, Zagreb, 1994
3. Šehović, E.; Tkalić, M.; Felja, I., Fundamentals of Electrical Engineering – Collection of Examples (Part I), Školska knjiga, Zagreb, 1984

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Aircraft Propulsion I

Course Code:
OZR101

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
4	3 + 1 + 0	60	4

Course Objectives:
To teach students to present the operational processes and performance of aircraft piston-propeller propulsion systems, and, based on knowledge of construction and operational loads, assess the condition and select appropriate maintenance procedures.

Course Content:
Fundamentals of aircraft piston engines. Working cycles, compression ratio. Engine types and ignition sequence. Engine performance. Factors affecting engine power. Fuel mixture, pre-ignition. Engine construction: engine casing, crankshaft, camshaft, pistons, cylinders, connecting rods, intake and exhaust, valve system. Propeller reduction gear. Fuel system, carburetors, direct fuel injection. Ignition system. Exhaust and cooling systems. Lubricants and fuels. Lubrication system. Engine parameter monitoring and ground operation. Engine and component inspection according to manufacturer criteria. Fundamentals of propeller theory. Propeller construction. Propeller systems (synchronization and synchrophasing, anti-icing and de-icing systems, etc.).

General and Specific Competencies (Knowledge and Skills):
- Present principles of aircraft piston engine operation.
- Calculate thermodynamic parameters and engine performance.
- Analyze the technical condition of major engine components and systems.
- Apply acquired knowledge to the maintenance of turbine engines.

Learning Outcomes:
Upon completion of this course, students will be able to:
1. Analyze ideal and real processes and performance of aircraft Otto and Diesel engines.
2. Present operational loads and construction solutions of major components and systems of piston engines.
3. Present aerodynamic characteristics of the propeller and its operating systems.
4. Assess the technical condition of the engine based on measured parameters.
5. Select maintenance procedures based on the technical condition of the engine.

Required Literature:
1. Bazijanac, Ernest, Aircraft Piston Engines, University of Zagreb, Faculty of Transport and Traffic Sciences, Zagreb, 2005

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Aircraft Propulsion II

Course Code:
OZR101

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
0	3 + 2 + 0	75	6

Course Objectives:
To teach students to present operational processes and performance of jet engines, and, based on knowledge of construction and operational loads, enable students to assess technical condition and select appropriate maintenance technologies.

Course Content:
Fundamentals of aircraft jet engines. Design principles and operation of turbojet, turbofan, turboshaft, and propeller-jet engines. Engine characteristics and efficiency. Main components: inlet, compressor, combustion chamber, turbine section, turbine blades, exhaust, and noise reduction systems. Air systems. Electronic engine control and fuel-air mixing systems. Engine starting and ignition systems. Power augmentation systems. Lubricants and fuels: properties, specifications, and fuel additives. Lubrication systems. Propeller-jet engines. Turbine engines for helicopter propulsion. Auxiliary power unit (APU). Engine parameter monitoring and ground operation.

General and Specific Competencies (Knowledge and Skills):
- Present principles of jet engine operation.
- Calculate thermodynamic parameters and engine performance.
- Analyze technical condition of major engine components and systems.
- Apply acquired knowledge to jet engine maintenance technologies.

Learning Outcomes:
Upon completion of this course, students will be able to:
1. Analyze ideal and real processes and performance (thrust/power, TSFC) of turbojet, turbofan, propeller-jet, and turboshaft engines.
2. Present operational loads and construction of major jet engine components: inlets for subsonic and supersonic speeds, axial and radial compressors, combustion and afterburner chambers, nozzles and thrust vectoring devices, compressor and turbine shafts, bearings, and seals.
3. Present construction and operational regimes of jet engine systems: fuel system, FADEC, lubrication system, ignition and starting systems, air system, APU, propeller systems for propeller-jet engines, fire protection system, and engine parameter monitoring systems.
4. Explain the operation of aircraft propulsion systems using electrical and alternative fuel-based systems.
5. Select preventive maintenance procedures for gearboxes and engines based on technical condition.

Required Literature:
1. Bazijanac, E., Aircraft Jet Engines, Authorized Lecture Notes, VVG, 2022

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Air Navigation Regulations

Course Code:
OZR101

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
3	3 + 0 + 0	45	3

Course Objectives:
To enable students to evaluate regulatory requirements for aircraft in accordance with the hierarchical structure of the issuing authority. To assess compliance of maintenance organization structures, licenses, and authorizations of personnel with legal requirements and operational standards.

Course Content:
- Role of ICAO and ICAO Annexes.
- Role of EASA and EASA member states.
- Regulations Part-145, Part-66, Part-147, Part-CAMO and their interrelations.
- Coordination with civil authorities in non-EASA member states.
- ICAO Annex 19 – Safety Management System (SMS).
- PART-66 – Licensed personnel in aircraft maintenance.
- PART-145 – Approved aircraft maintenance organization.
- EU-OPS – Commercial air operations.
- Air Operators Certificates (AOC), operator responsibilities, aircraft documentation.
- Aircraft certification: CS 23/25/27/29, type certification, supplemental type certification.
- Part-21 – Approved design/manufacturing organization for aircraft and components.
- Airworthiness certificate, aircraft registration, noise certificate, weighing, radio station license.
- Part-CAMO – Continuing airworthiness management.
- Maintenance programs, inspections, MMEL, AD, SB, manufacturer service information, modifications and repairs.
- Maintenance documentation: Maintenance Manuals (MM), Structural Repair Manuals (SRM), Illustrated Parts Catalogs (IPC).
- Continuing airworthiness, test flights, ETOPS, AWO, CAT II/III operations.

General and Specific Competencies (Knowledge and Skills):
- Evaluate issuance of certificates, airworthiness requirements, flight safety obligations, and organizational structures for aircraft maintenance in compliance with regulations.

Learning Outcomes:
Upon completion of this course, students will be able to:
1. Integrate ICAO requirements, obligations, and responsibilities into organizations responsible for airworthiness programs and aircraft maintenance activities.
2. Integrate EASA requirements, obligations, and responsibilities into organizations responsible for airworthiness programs and aircraft maintenance activities.
3. Integrate national requirements of the country of aircraft registration into organizations responsible for airworthiness programs and maintenance.
4. Distinguish responsibilities of individual authorizations held by organizations and positions within aircraft maintenance organizations.
5. Integrate airworthiness and maintenance regulations with national occupational safety, environmental protection, and general labor laws.

6. Manage airworthiness documentation in Croatian and English.
7. Evaluate aircraft airworthiness based on issued certificates and approved flight manuals.

Required Literature:

1. EASA, Easy Access Rules for Airworthiness and Environmental Certification (Regulation (EU) No 748/2012)

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Psychology of Stress

Course Code:
ZAJ132

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
1	2 + 1 + 0	45	3

Course Objectives:
To introduce students to the circumstances and mechanisms of stress, its effects on perception, behavior, and health, and to present methods for prevention, mitigation, and management of stress.

Course Content:
- Introduction and historical overview of stress.
- Basic concepts: stressor, stress, stress response.
- Types and forms of stressors, stress, and stress reactions.
- Biological basis of stress: nervous and endocrine system regulation.
- Stress and immune function; relationship between stress and disease; somatic illnesses associated with stress.
- Theoretical approaches to stress: psychodynamic theory, fight-or-flight theory, general adaptation syndrome, life-change model, transactional model, diathesis-stress model.
- Mediators and moderators of stress: situational characteristics (intensity, frequency, controllability, developmental aspects), individual characteristics (demographics, personality traits).
- Coping with stress: adaptive and maladaptive strategies.
- Specific sources of stress: workplace stress, burnout, mobbing, traumatic stress, post-traumatic stress disorder.
- Communication as a stress source and prevention through effective communication.
- Techno-stress: negative impacts of technology use.
- Stress management and prevention: organizational climate, treatment options, lifestyle factors, physical activity, nutrition, leisure activities.

General and Specific Competencies (Knowledge and Skills):
Knowledge:
- Understanding basic stress concepts and classification.
- Comprehension of stress effects on psychophysiological state.
- Familiarity with theoretical approaches to stress.
- Knowledge of coping strategies and stress prevention in the workplace.

Skills:
- Explain core concepts related to stress.
- Connect causes of stress with its consequences.
- Critically evaluate stress models and approaches.
- Analyze and distinguish types of coping strategies.
- Design concrete interventions to prevent and manage stress in organizational settings.

Learning Outcomes:
Upon completion of this course, students will be able to:
1. Explain core concepts of stress, including stressors, stress, stress responses, and their classification.
2. Explain how different stressors affect health, perception, and behavior.

3. Evaluate various theoretical approaches to stress, including psychophysiological, social, cognitive, and integrative models.
4. Analyze coping strategies, distinguishing adaptive from maladaptive responses.
5. Propose activities to reduce or prevent stress, with emphasis on organizational and workplace interventions relevant to engineering professions.

Required Literature:

1. Havelka Meštrović, A., & Havelka, M. (2020). Zdravstvena psihologija: psihosocijalne osnove zdravlja. Jastrebarsko: Naklada Slap – chapters on stress.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Professional Practice

Course Code:
SP-OZR

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
5	0 + 15 + 0	225	18

Course Objectives:
To connect theoretical knowledge with practical tasks in aircraft maintenance programs, resource planning, and workshop organization. Students will apply theoretical requirements in practical management, organization of work, and control of material and human resources.

Course Content:
- Observation and participation in planning, organizing, and executing aircraft maintenance in commercial, police, and military maintenance facilities.
- Application of occupational safety measures.
- Application of quality management systems.
- Familiarization with technical documentation, facilities, workspaces, tools, and equipment.
- Understanding the structure of maintenance personnel.
- Learning technology and programs for aircraft maintenance.
- Participation in routine and non-routine maintenance of aircraft and aircraft components.
- Familiarization with aircraft engine maintenance, modifications, and structural repairs.

General and Specific Competencies (Knowledge and Skills):
- Recommend procedures for planning human and material resources, organizing work, and implementing maintenance technologies.
- Knowledge and application of occupational safety measures.
- Competent use of aircraft technical documentation.

Learning Outcomes:
Upon completion of this course, students will be able to:
1. Test the operational condition of equipment for transporting cargo, passengers, and equipment in emergency situations.
2. Verify aircraft systems through practical inspection according to maintenance manuals.
3. Test engine and propeller operation through practical procedures in maintenance manuals.
4. Examine aircraft structural condition using non-destructive testing methods.
5. Demonstrate practical execution of line maintenance tasks.
6. Organize ground tasks for aircraft preparation (Ground Handling).
7. Assess aircraft airworthiness in compliance with approved maintenance programs.
8. Verify adherence to safety instructions and use of protective equipment in maintenance tasks.
9. Check airworthiness of materials and spare parts in storage through practical inspection.
10. Examine electrical wiring on the aircraft through detailed inspection and electrical measurements.
11. Verify repairs of aircraft electrical wiring according to the Electrical Standard Practice Manual (ESPM).

Required Literature:
1. Workshop documentation for aircraft maintenance.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Aircraft Systems and Equipment I

Course Code:
OZR116

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
3	3 + 2 + 0	75	6

Course Objectives:
To enable students to classify electrical, mechanical, electronic, and digital displays in aircraft according to their fundamental operating principles. Students will learn to prioritize information displays based on flight safety risks, including visual, auditory, and written alerts. The course content fully covers EASA PART-66 modules 11a, 11b, 11c, 12, and 13 in the context of aircraft instrument knowledge.

Course Content:
- Human-system-device interaction in the cockpit and safety design principles to minimize human error.
- Classification of alerts: visual, auditory, and physical indications.
- Impact of pilot number on instrument panel layout and controls.
- Layout and quantity of cockpit indicators and control levers.
- Prioritization of system alerts according to flight phase.
- Passenger cabin systems: alerting for <20 passengers, entertainment systems, cabin crew displays, and emergency notifications.
- Types of warnings: light, voice, written, and mechanical; prioritization based on flight safety.
- Principles of operation of mechanical, electrical, electromagnetic, and hybrid display systems.
- Pitot-static instruments for direct measurement of flight parameters.
- Mechanical gyroscopes, laser gyros, and accelerometers.
- Horizontal Situation Indicator (HSI), magnetic compass, and gyroscopic compass operation.
- Navigation instruments: radar, weather radar, radio altimeter, TCAS, GPWS.
- Flight data monitoring: Flight Data Recorder (FDR), Cockpit Voice Recorder (CVR), FOQA.
- Glass Cockpit displays: Electronic Flight Bag (EFB), Electronic Centralized Aircraft Monitor (ECAM), Electronic Flight Instrument System (EFIS), Engine Indicating and Crew Alerting System (EICAS), Head-Up Display (HUD).

General and Specific Competencies (Knowledge and Skills):
- Classify the operation principles of mechanical, electromechanical, electronic, and digital aircraft display systems.
- Identify errors in instrument displays and alert systems using schematic and functional diagrams.
- Propose improvements to maintenance processes of the covered systems.

Learning Outcomes:
After completing this course, students will be able to:
1. Recommend cockpit device layout according to ergonomic principles.
2. Classify instrument and control panel organization in the cockpit based on importance for flight.
3. Present the organization of passenger alert systems in the cabin.
4. Categorize visual, auditory, and voice alerts according to flight safety significance.
5. Explain operating principles of instruments with direct measurement mechanisms.
6. Connect flight control requirements with navigation systems and instrument displays.
7. Present instruments for monitoring engine and aircraft system performance.
8. Integrate data display principles in integrated electronic and digital systems (Glass Cockpit).

Required Literature:

1. Bucak, T.; Zorić, I.: Zrakoplovni instrumenti i prikaznici, Sveučilišni udžbenik, Fakultet prometnih znanosti, Zagreb, 2002.
2. Ivošević, J.: Zrakoplovni instrumenti - zbirka zadataka i riješenih primjera, Zagreb, 2019.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Aircraft Systems and Equipment II

Course Code:
OZR123

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
4	3 + 2 + 0	75	6

Course Objectives:
To enable students to classify interconnections of aircraft systems according to aircraft architecture and fundamental technical operating principles. Students will learn to verify system functionality, analyze the influence of components on system operation, and understand interdependencies between aircraft systems using schematics and system architecture. The course covers EASA PART-66 modules 11a and 13 regarding aircraft systems knowledge.

Course Content:
- General classification of aircraft and main structural components.
- Classification of aircraft systems.
- Passenger cabin equipment and emergency equipment.
- ATA-31: Crew alerting systems for aircraft systems operation.
- Systems warning of aircraft malfunctions and hazardous flight conditions.
- ATA-24: Electrical system operations, DC and AC system variants, batteries, external power connections, generator protection, schematics.
- ATA-33: Aircraft lighting—external, internal, emergency, and passenger entertainment lights.
- ATA-05: Mandatory markings on aircraft.
- ATA-28: Fuel system components and operation; nitrogen system overview.
- ATA-29: Hydraulic pumps and actuators; dual-engine hydraulic systems; hybrid actuators.
- ATA-32: Landing gear components, electrical and hydraulic extension/retraction, braking systems.
- ATA-36: Pneumatic systems overview.
- ATA-21: Heating, ventilation, and air conditioning (HVAC); aircycling machine; cabin pressurization.
- ATA-35: Oxygen systems for crew and passengers; cabin depressurization alerts.
- ATA-27: Flight control systems, hydraulic actuation, position indicators.
- ATA-31: Ice and rain protection systems.
- ATA-26: Fire detection and suppression systems.
- ATA-72: Engine types, lubrication, air supply, starting systems, FADEC, engine monitoring, and maintenance interface.
- ATA-23: Communication systems, passenger notification, and aircraft monitoring systems.
- ATA-34: Navigation systems, active/passive systems, surveillance, collision avoidance, fly-by-wire, autopilot, flight management guidance, and satellite navigation.

General and Specific Competencies (Knowledge and Skills):
- Analyze aircraft systems, components, and interconnections.
- Verify system functionality and assess the influence of components on system operation using schematics and reliability data.
- Evaluate interdependencies between systems and suggest maintenance improvements to enhance reliability and reduce costs.

Learning Outcomes:

After completing this course, students will be able to:

1. Determine mandatory aircraft equipment based on aircraft usage.
2. Analyze the architecture and operation principles of mechanical aircraft systems.
3. Design the architecture and operation principles of electrical aircraft systems.
4. Integrate architecture and operation principles of communication and navigation systems.
5. Categorize architecture and operation principles of aircraft engine systems.
6. Present architecture and operating principles of automatic flight control systems.
7. Distinguish between manual and computer-assisted (Flight by Wire) control systems.
8. Connect required ground support systems to aircraft category and usage.

Required Literature:

1. Course materials published on the Gaudeamus system.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Technical Drawing and Documentation

Course Code:
OZR102

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
0	2 + 2 + 0	60	4

Course Objectives:
To teach students fundamental knowledge and practical skills in technical drawing and the creation of technical documentation.

Course Content:
- Concept of projection and types of projections.
- Lines, technical lettering, drawing formats, and scales.
- Spatial visualization and sketching in orthogonal projection.
- Orientation of objects in projection according to EN and ANSI standards.
- Dimensioning, quality marks on drawings.
- Tolerances and fits on workshop and assembly drawings.
- Use of computers in technical documentation.
- 2D CAD computer graphics.

General and Specific Competencies (Knowledge and Skills):
- Knowledge of projection types and projection rules.
- Ability to independently create and use engineering documentation.
- Competence in applying computer tools for creating technical documentation.

Learning Outcomes:
After completing this course, students will be able to:
1. Analyze and apply standardized elements and tools of technical drawing according to norms.
2. Critically compare projection types of geometric bodies, including ISO and ANSI standards.
3. Create orthogonal projections and develop spatial visualization of technical components.
4. Select and justify the use of views and sections for clear technical communication.
5. Apply dimensioning rules for parts and assemblies and verify compliance with standards.
6. Evaluate construction and technological markings on drawings according to product functional requirements.
7. Create assembly drawings with associated workshop drawings following technical documentation principles.
8. Integrate CAD tools in creating technical documentation.

Required Literature:

1. Jakopčić, M.: Tehničko crtanje i dokumentacija (lecture materials – electronic version on the college website), VVG, Velika Gorica.
2. Jakopčić, M., Kožar, Zd.: AutoCAD – Podloge za vježbe, electronic version on the college website, VVG, Velika Gorica, 2016.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Thermodynamics

Course Code:
ZAJ109

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
2	2 + 2 + 0	60	4

Course Objectives:
To teach students to independently analyze the operation of aircraft engines and systems by applying knowledge of thermodynamic systems, energy transfers, efficiency, thermodynamic states, state variables, processes, and cycles of ideal gases and mixtures.

Course Content:
- Fundamentals of thermodynamics: heat and work, thermodynamic systems.
- Thermodynamic state: state variables and the ideal gas equation of state.
- Fundamental laws of ideal gases.
- First main law: internal energy, work, p,V diagram, enthalpy. Heat capacities. Mixtures of ideal gases.
- Second main law: reversible and irreversible processes, entropy, T,S diagram.
- Basic thermodynamic processes of ideal gases: isochoric, isobaric, isothermal, adiabatic, polytropic.
- Cyclic processes – cycles of thermal machines.
- Flow without shock. Selected topics in heat engineering.
- Heat transfer: conduction, convection, radiation.
- Moist air: state parameters, Mollier hx diagram, changes in moisture content.
- Combustion: chemistry, kinetics, heat release process, heating value of fuels, combustion losses.

General and Specific Competencies (Knowledge and Skills):
- Ability to independently define, describe, and calculate thermodynamic states and processes of thermal machines.
- Capability to compute thermal states of thermal machines for individual subsystems and the complete system.
- Skills to select fuel, calculate fuel and air quantities at the combustion site, analyze combustion efficiency, and assess ecological impact.
- Competence in solving problems related to heat transfer in cooling processes and insulation design.

Learning Outcomes:
After completing this course, students will be able to:
1. Analyze and calculate thermodynamic state variables and the ideal gas equation.
2. Comment on and analyze the fundamental laws of thermodynamics.
3. Compare basic thermodynamic processes and calculate initial and final states of ideal gases for quasi-static and non-equilibrium processes: isochoric, isobaric, isothermal, adiabatic, and polytropic.
4. Present thermodynamic cycles for thermal machines, calculate state variables at characteristic points, and evaluate efficiency with application to gas turbines and internal combustion engines.
5. Analyze combustion processes and mass balance during combustion.
6. Present one-dimensional heat transfer processes, calculate heat flux, and apply the knowledge to the analysis of heat exchanger operation.

Required Literature:

1. Hnatko, E.: Osnove termodinamike i termotehnike, SF, Slavonski Brod, 2001 (reprint 2011).
2. Halazs, B.; Galović, A.: Zbirka zadataka iz nauke o toplini I. i II., FSB, Zagreb, 2014.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Final Thesis

Course Code:
ZR-OZR

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
6	0 + 5 + 0	75	18

Course Objectives:
To teach students to analyze existing conditions based on assigned theses, critically evaluate facts, analyze results, and select the optimal solution to a problem. The student must present their work in written form, arguing their reasoning and conclusions.

Course Content:
- Based on completed courses and learning outcomes from the undergraduate program in Aircraft Maintenance at Veleučilište Velika Gorica, the student receives a thesis task from the field of aircraft maintenance technology.
- The thesis topic is approved by the Final Thesis Committee according to the Regulations on the Preparation of Final Theses.
- A mentor is assigned to guide the student through the preparation of the thesis.
- After submission of the written thesis and its acceptance by the Committee, the student defends the thesis before the Committee.

General and Specific Competencies (Knowledge and Skills):
- Ability to independently analyze technological problems, evaluate possible trends, and propose solutions.
- Skills in critical thinking, technical writing, and argumentation of proposed solutions.

Learning Outcomes:
After defending the final thesis, the student will be able to:
1. Select appropriate professional literature in Croatian and English to address a technical problem in aircraft maintenance.
2. Choose suitable engineering methods and tools.
3. Propose a technical solution or technological procedure in the field of aircraft maintenance.
4. Defend the proposed technical solution or technological procedure before a professional committee.

Required Literature:
- Determined by the student's thesis topic and mentor recommendations.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Aircraft Technologies

Course Code:
OZR117

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
3	2 + 1 + 0	45	3

Course Objectives:
To enable students to differentiate aircraft structural elements, categorize material types according to their properties and markings, and identify types of corrosion, wear, and damage. Students will learn to determine appropriate disassembly, repair, and joining technologies in accordance with maintenance requirements.

Course Content:
- Influence of aircraft operation on the condition of aircraft systems.
- Materials used in aviation: classification, properties, and labeling.
- Assembly and disassembly techniques.
- Aircraft fasteners, joints, securing elements, and fittings.
- Inspection and maintenance of aircraft electrical and electronic systems.
- Testing, adjustment, and repair of steel cables and control linkages.
- Forming, joining, and inspection of tubes in aircraft structures.
- Repair of metallic aircraft structures.
- Welding, brazing, and adhesive bonding in aviation.
- Corrosion processes in aircraft structures; painting and electrostatic protection.
- Technologies for manufacturing and repairing parts made of ceramic and composite materials.

General and Specific Competencies (Knowledge and Skills):
Students will be able to:
- Classify materials and assembly elements according to type and application in aircraft construction and repair.
- Identify technological procedures required for assembly, disassembly, and repair of aircraft parts and structures.
- Categorize types of corrosion, and apply prevention and protection measures.

Learning Outcomes:
After completing this course, students will be able to:
1. Identify types of metallic materials according to standards for steels, non-ferrous metals, and alloys used in aircraft manufacturing and repair.
2. Relate assembly and disassembly techniques of aircraft structures to the type of connecting elements used.
3. Select bearing types according to shaft vibration characteristics in power transmission systems.
4. Categorize mechanical power transmission systems by element type.
5. Select appropriate repair methods for aircraft parts or structures according to the approved aircraft maintenance program (e.g. welding, brazing, bonding, or composite repair).
6. Recommend maintenance and repair procedures for fluid transmission tubing.
7. Correlate appropriate protection methods for preventing and treating corrosion with the type of corrosion present on the aircraft.
8. Relate coating and paint types used for corrosion protection and aircraft markings to their chemical composition and electrostatic conductivity.
9. Compare types of composite materials and their application in the construction of aircraft structures and components.

Required Literature:

1. Jakopčić, M. Theoretical Characteristics of Maintenance and Condition of Technical Systems – Course materials, electronic version, VVG, Velika Gorica, 2011.
2. Jakopčić, M. Aircraft Fasteners, Joints, and Securing Elements – Course materials, electronic version, VVG, Velika Gorica, 2011.
3. Jakopčić, M. Material Corrosion – Course materials, electronic version, VVG, Velika Gorica, 2011.
4. Jakopčić, M. Welding, Brazing, Bonding – Course materials, electronic version, VVG, Velika Gorica, 2011.
5. Jakopčić, M. Composite Materials – Course materials, electronic version, VVG, Velika Gorica, 2011.