VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

BASIC COURSE INFORMATION WITHIN THE STUDY PROGRAMME

PROFESSIONAL UNDERGRADUATE STUDY PROGRAMME

MOTOR VEHICLES

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Strength of Structures

Course Code:
MV203

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

Course objectives:
To provide students with knowledge of the fundamentals of the strength of structures and the dimensioning of simple structural elements of motor vehicles.

Course content:
Introduction to strength of structures. Definitions and basic concepts. Classification of loads. Models of structural elements. Stresses, internal forces, and moments. Basic hypotheses, issues, and problems in the strength of structures. Normal stress, deformation of a bar, Hooke's law. Statistically indeterminate loading cases of bars, initial and thermal stresses. Stresses in a circular ring. Energy of elastic deformation of a bar. Shear, deformations, and stresses, problem-solving. Strength of beams, internal forces and bending moments. Construction of N, Q, and M diagrams. Stresses in the beam cross-section. Axial moments of area. Deflection of bent beams. Statistically indeterminate beams. Dimensioning of beams. Shaft strength, deformations, and stresses. Polar moments of area. Torsion and bending. Solving strength problems of shafts. Buckling of bars. Criteria for dimensioning structural elements. Basic theories of strength. Safety factors and allowable stress. Stress concentration. Analysis of various dimensioning criteria.

General and specific competencies (knowledge and skills):
Independent solving of professional problems related to the strength of structural elements.

Learning outcomes:
Upon successful completion of this course, the student will be able to:

1. Formulate the problem and method of dimensioning structural parts
2. Calculate the cross-sectional dimensions of a bar under normal and shear stress
3. Compute principal stresses in biaxial stress conditions
4. Construct diagrams of internal forces and bending moments
5. Dimension statically determinate beams according to allowable stress and allowable deflection
6. Dimension simple statically indeterminate beams
7. Calculate the minimum shaft diameter according to allowable stress and allowable torsion angle
8. Dimension a compression-loaded bar to prevent buckling
9. Calculate stresses for simple cases of stress concentration

Required literature:

1. Gugić, D.: Strength of Structures – Summary Notes (Podsjetnik.pdf)
2. Gugić, D.: Strength of Structures – Workbook, 5th edition

Course title: Electrical and Electronic Equipment

Course Code:
MV301

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
3	2 + 1 + 0	45	5

Course objectives:
To provide students with fundamental knowledge in the field of electrical and electronic systems in motor vehicles.

Course content:
Electrical system of motor vehicles and its subsystems. Basic laws of electrical engineering and their application in the design and dimensioning of electrical systems. Fundamental characteristics of passive electronic components integrated into vehicle electrical systems (resistors, capacitors, coils, diodes, transistors, thyristors). Power sources in motor vehicles: generators, batteries, and electric starters. Electrical wiring diagrams. Fundamentals of electrical measurements and testing of individual components and assemblies in vehicle electrical systems, as well as fault detection. Component requirements depending on driving conditions (electrical load). Ignition subsystem: battery ignition with breaker points, electronic ignition systems. Other subsystems: ABS, TCS, ESP, air conditioning, airbag systems, lighting systems, windshield wiper and washer systems, engine immobilizers, central locking, and other electrical accessories in modern vehicles. Radio and telecommunication devices in vehicles. CAN systems. Vehicle diagnostic systems.

General and specific competencies (knowledge and skills):
Ability to identify electrical systems in motor vehicles, their main components, and their functions in ensuring proper system operation. Capability to read electrical schematics, diagnose faults, and test the functionality of individual components and entire systems.

Learning outcomes:
Upon successful completion of this course, the student will be able to:

1. Differentiate between electrical and electronic equipment in vehicles
2. Identify operating processes in complex vehicle systems
3. Use modern methods and devices for determining the technical condition of electrical and electronic systems
4. Apply appropriate organizational and technological procedures for the maintenance of electrical and electronic systems

Required literature:

1. Čerlek, S.: Electrical and Electronic Equipment in Vehicles, VVG, 2011, ISBN 987-953-7716-14-1
2. Čerlek, S.: Electrical Equipment and Electronics, VVG, 2006, Lecture Notes

Course title: Electric and Hybrid Vehicles

Course Code:
MV401

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

Course objectives:
To provide students with fundamental knowledge of the design, operation, and maintenance of electric and hybrid electric vehicles.

Course content:
Fundamental characteristics of electric vehicles. Concept of the drive system and transmission. Battery systems – capacity, power, driving range, and efficiency. Permanent magnet electric motors. Frequency converters. Control of electric systems. Torque vectoring systems. Cooling of high-voltage components. Braking and regenerative braking. Heating and air conditioning systems. Concept of hybrid electric vehicles. Control of hybrid systems. Testing and maintenance of electric and hybrid vehicles. Safety measures when working with electric and hybrid vehicles.
General and specific competencies (knowledge and skills):
General: Ability to identify and understand the operating principles of electric and hybrid systems in road vehicles.
Specific: Diagnosis of malfunctions in individual components and systems.

Learning outcomes:
Upon successful completion of this course, the student will be able to:

1. Differentiate between electrical and electronic systems in a vehicle
2. Identify operating processes in complex vehicle systems
3. Use modern methods and equipment to assess the technical condition of electrical and electronic systems
4. Apply appropriate organizational and technological procedures for maintaining electrical and electronic systems

Required reading:

1. Čerlek, S.: Electrical and Electronic Equipment in Vehicles, VVG, 2011.
2. Čerlek, S.: Electrical Equipment and Electronics, VVG, 2016, Lecture Notes.
3. Mikulić, D.: Motor Vehicles – Theory of Motion and Design, 2nd Edition, VVG, 2016.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Electrical Engineering I

Course Code:
ZAJ1046

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

Course objectives:
To provide students with fundamental knowledge of electrostatics, direct current (DC) and alternating current (AC) circuits, and electromagnetism.

Course content:
Electrical properties of materials. Electrostatics. Electric field of a point charge. Coulomb's law. Work in an electric field, electric potential, and voltage. Electric capacitance and capacitors. Parallel-plate capacitor. DC voltage sources. Electromotive force. Electric circuit. Electric current intensity. Ohm's law. Electrical resistance. Electric work and power. Joule's law. Capacitor connections. Resistor connections. Mixed DC circuit connections. Source connections. DC networks. Magnetism and electromagnetism. Electromagnetic induction and magnetic field intensity. Faraday's law of electromagnetic induction. Self-induction. Lorentz force and Lenz's law. Inductance. Operating principles of DC and AC generators and motors. Alternating voltage and current. RLC connections in AC circuits. Power of sinusoidal alternating current. Transformers. Three-phase systems.

General and specific competencies (knowledge and skills):
Understanding and applying the International System of Units (SI) and decimal prefixes.
Understanding the concept of electric fields, their effects on materials, and their use in electrical engineering.
Comprehending electric current, its applications, and solving mixed resistor circuits.
Understanding the difference between energy, power, and work.
Understanding magnetic fields, their influence on materials, and their use in electrical engineering.
Understanding the generation of DC and AC current and the operating principles of DC and AC motors.
Knowledge and use of electrical measuring instruments and the basics of measuring electrical quantities.

Learning outcomes:
Upon successful completion of this course, the student will be able to:

1. Analyze the effects of electric fields and compare the characteristics of homogeneous and non-homogeneous fields
2. Analyze the structure of external and internal electrical circuits and interpret the distribution of voltage and current
3. Calculate and interpret the results of mixed resistor and capacitor connections in DC circuits
4. Distinguish between electrical work and power
5. Calculate electrical work and power
6. Evaluate the application of electromagnetism and electromagnetic induction principles
7. Model alternating voltage and current and explain the principles of their transformation
8. Compare critically the operating principles of DC and AC electrical machines and assess their applications
9. Calculate electrical conductors and recommend protective measures against electric shock

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: Structural Elements

Course Code:
MV204

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

Course objectives:
To introduce students to the fundamental principles of dimensioning and design, as well as the purpose and structural characteristics of machine components and mechanical constructions.

Course content:
Basic concepts of strength of materials: load, stress, strength. Design principles: required safety, allowable stress, actual safety. Dimensional, shape, and positional tolerances. Surface roughness. Permanent joints: riveted, welded, soldered, glued, and press-fit joints. Detachable joints: bolts, pins, springs. Shafts and axles. Friction and lubrication. Sliding bearings. Rolling bearings. Power and motion transmission elements: belts and pulleys, chains and sprockets, gears. Power transmissions: types of transmissions and changes in transmission parameters across stages. Pipeline elements – pipes, fittings, and valves. Seals and sealing methods.

General and specific competencies (knowledge and skills):
Ability to calculate and design simpler parts and assemblies. Analyze and apply technical design documentation. Identify the function and structural characteristics of machine parts and assemblies. Integrate power transmission components into a functional system and calculate the main parameters of power transmission.

Learning outcomes:
Upon successful completion of this course, the student will be able to:

1. Analyze, calculate, and interpret the functional characteristics of mechanical components and assemblies in relation to their application and permissible stress
2. Dimension and evaluate characteristic tolerance, fit, position, and surface quality parameters according to technical requirements and standards
3. Assess structural characteristics and select appropriate permanent and detachable joints according to load conditions and disassembly requirements
4. Evaluate the structural characteristics of shafts, axles, and bearings and apply them in mechanical system design
5. Critically analyze the function and design of power transmission elements and select optimal solutions based on operating conditions
6. Analyze and justify the use of pipeline structural elements considering pressure, working medium, material properties, and connection conditions

Required literature:

1. Decker: Machine Elements, Tehnička knjiga, Zagreb, 2006.
2. Križan, B.: Fundamentals of Calculation and Design of Structural Elements, Školska knjiga, Zagreb, 2008.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: English Language I

Course Code:
MV105

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

Course objectives:
To acquire professional terminology and improve business communication in English by learning relevant vocabulary and grammatical structures. To develop language skills in the professional context — reading, listening, speaking, and writing — with a focus on automotive engineering.

Course content:
Grammar and language: Basic verb tenses, comparison of adjectives.
Professional topics: Types and parts of motor vehicles, systems (components and functions), history of automobile development.

General and specific competencies (knowledge and skills):
Knowledge of specific terminology and its use in written and spoken English. Reading comprehension and communication skills in English related to the field of motor vehicles.

Learning outcomes:
Upon successful completion of this course, the student will be able to:

1. Distinguish and analyze grammatical structures in English and apply them in real-life situations
2. Appropriately use professional terminology and phrases from the field and integrate them into new contexts
3. Apply oral communication skills related to professional topics and support opinions with arguments
4. Independently use professional literature in English
5. Produce written texts in English related to the field of study

Required literature:

1. Rubić, I.: Motor Vehicle Maintenance – course script, published on Gaudeamus.
2. Additional course materials published on the Gaudeamus platform.

Course title: English Language II

Course Code:
MV202

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

Course objectives:
To acquire professional terminology and improve business communication in English by expanding relevant vocabulary and grammatical structures. To further develop language skills in the professional context — reading, listening, speaking, and writing — with a focus on the automotive field.

Course content:
Grammar and language: Verb tenses and forms, passive voice for describing processes, conditional sentences, adjectives for describing physical characteristics, position, shape, and dimensions.
Professional topics: Vehicle maintenance, components of motor vehicles and their systems, tools.

General and specific competencies (knowledge and skills):
Knowledge of specific terminology and its use in written and spoken English. Reading comprehension and communication skills in English related to the field of motor vehicles.

Learning outcomes:
Upon successful completion of this course, the student will be able to:

1. Distinguish and analyze grammatical structures in English and apply them in real-life situations
2. Appropriately use professional terminology and phrases from the field and integrate them into new contexts
3. Apply oral communication skills related to professional topics and support opinions with arguments
4. Independently use professional literature in English
5. Present critical reflections on the relationship between sustainable development and motor vehicles and propose possible solutions for environmentally friendly technologies and related challenges
6. Produce written texts in English related to the field of study

Required literature:

1. Rubić, I.: Motor Vehicle Maintenance – course script, published on Gaudeamus.
2. Additional course materials published on the Gaudeamus platform.

Course title: English Language III

Course Code:
MV302

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
3	1 + 1 + 0	30	2

Course objectives:
To acquire advanced professional terminology and improve communication in English within the automotive engineering context by expanding vocabulary and grammatical structures. To further develop the four key language skills — reading, listening, speaking, and writing — with a focus on technical and professional communication.

Course content:
Grammar and language: Passive voice for describing processes, compound words, word formation with prefixes, conditional sentences, giving instructions.
Professional topics: Professional English for describing malfunctions and suggesting possible solutions, vehicle maintenance, material description, automotive glass.

General and specific competencies (knowledge and skills):
Knowledge of specific terminology and its use in written and spoken English. Reading comprehension and communication skills in English related to the field of motor vehicles.

Learning outcomes:
Upon successful completion of this course, the student will be able to:
1. Distinguish and analyze grammatical structures in English and apply them in real-life situations
2. Use professional terminology and phrases from the field and integrate them into new contexts
3. Apply oral communication skills related to professional topics and support opinions with arguments
4. Independently use professional literature in English
5. Produce written texts in English related to the professional field
6. Design and deliver an oral presentation (individually or in a team) using audio-visual aids

Required literature:
1. Rubić, I.: Motor Vehicle Maintenance – course script, published on Gaudeamus.
2. Additional course materials published on the Gaudeamus platform.

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 objectives:
To acquire and interpret fundamental laws of physics necessary for understanding and application in subsequent study courses 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, and the law of conservation of mechanical energy. Periodic motion: oscillation, forced oscillation, and resonance. Waves, reflection and refraction, wave superposition, standing waves. Sound waves. Electromagnetic spectrum. Visible light, colors, interference, refraction at the boundary of optical media, total internal reflection, waveguides. Ionizing radiation. Density of materials, 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, modern technologies.

General and specific competencies (knowledge and skills):
- Ability to organize and connect various physical concepts when interpreting real-world and professional problems.
- Logical and mathematically reasoned analysis of problems and qualitative discussion of solutions.

Learning outcomes:
Upon successful completion of this course, the student will be able to:
1. Predict the motion of bodies under external forces, calculate relevant dynamic quantities, and relate them to energy exchange between the system and its surroundings.
2. Compare natural oscillations and resonance properties of single- and multi-degree-of-freedom systems, as well as the types and characteristics of mechanical and electromagnetic wave propagation.
3. Examine pressure and forces acting on bodies immersed in a fluid and describe the basic characteristics of fluid dynamics.
4. Interpret electrical and thermal properties of matter at both macroscopic and microscopic levels and conceptually relate them to the physical principle of energy conservation.
5. Identify relevant information in problem-solving tasks, model and solve simplified physical problems using mathematical and computational tools.
6. Critically evaluate the influence of simplifications and mathematical approximations on the results of simplified models and qualitatively generalize them to real problem situations in everyday life and professional contexts.

Required literature:

1. Jelčić Dubček, D.: Physics (e-course), Veleučilište Velika Gorica, 2018.
2. Jelčić Dubček, D.: Physics – Collection of Problems (e-edition), Veleučilište Velika Gorica, 2019.
3. Paić, M.: Motion, Forces, Waves, Školska knjiga, Zagreb, 1997.
4. Paić, M.: Heat and Thermodynamics, Školska knjiga, Zagreb, 1994.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Hydraulics and Pneumatics

Course Code:
MV402

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

Course objectives:
To acquire fundamental knowledge of hydraulics and pneumatics, and to become familiar with basic hydraulic components used in mobile engineering applications.

Course content:
Hydraulic and pneumatic systems. Hydraulic pumps – types, classification, and regulation. Hydraulic motors and cylinders. Hydraulic control components, throttling elements, directional control valves, pressure and flow control valves, proportional valves, and distributors. Hydraulic servo systems. Basic hydraulic drives with open and closed circuits and their control methods. Energy calculation of a hydraulic system. Physical and chemical properties of oils, maintenance of hydraulic oil cleanliness. Sealing of moving and stationary elements. Hydraulic accumulators. Hydraulic installation components in motor vehicles. Pneumatic systems for braking and suspension. Pneumatic energy management devices – distributors, pressure valves, and flow valves. Pneumatic control systems – characteristics and methods of control. Design of pneumatic control systems and drawing pneumatic diagrams. Maintenance of hydraulic and pneumatic systems, key risk and failure factors, and basic principles of fault detection and troubleshooting.

General and specific competencies (knowledge and skills):
Students will gain fundamental knowledge of hydraulics and pneumatics. Through practical exercises, they will develop the ability to perform hydraulic energy calculations and read and interpret hydraulic diagrams. They will acquire the skills to identify and correct faults in hydraulic and pneumatic components and design and organize maintenance systems for such components in motor vehicles.

Learning outcomes:
Upon successful completion of this course, the student will be able to:

1. Describe the properties of hydraulic and pneumatic systems in motor vehicles and construction machinery
2. Create hydraulic and pneumatic diagrams for new and existing systems and devices
3. Use hydraulic and pneumatic diagrams to identify control and regulation functions
4. Calculate basic physical quantities and parameters — pressure, flow rate, forces, torques, and drive power
5. Independently select essential components of hydraulic and pneumatic systems and installation elements
6. Analyze malfunction issues and apply troubleshooting methods in hydraulic and pneumatic systems
7. Apply acquired knowledge in designing hydraulic and pneumatic control systems for vehicles and construction machinery
8. Assess and plan preventive and corrective maintenance measures for hydraulic and pneumatic systems and devices in motor vehicles and construction machinery

Required literature:

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

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Computer Science I

Course Code:
ZAJ106

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

Course objectives:
To enable students to use the basic functions and applications of computers in everyday work. To introduce students to the potential of information and communication technology (ICT) in developing information systems for business and other purposes.

Course content: Basic concepts and structure of information technology, their origin, importance, and application. Operating system Windows — purpose, basic user functions, and their practical use. Word processing software — basic and advanced document formatting functions. Presentation software — basic and advanced application features. Spreadsheet software — concepts and main business functions in use. Database software — fundamental functions and applications. Basic concepts of computer networks and technical and organizational measures for information system and data protection and security on computers.

General and specific competencies (knowledge and skills):
Ability to design seminar-level documents using advanced software tools.
Ability to independently create multimedia presentations meeting specified requirements.
Application of spreadsheet software in developing simple business applications.
Understanding the complexity of information systems and acquiring knowledge for their development.

Learning outcomes:
Upon successful completion of this course, the student will be able to:

1. Identify and explain the main concepts and components of information technology.
2. Use key user functions of the Windows operating system and standard Microsoft Office applications, and work with the Internet.
3. Present professional content using appropriate software tools.
4. Select essential technical and organizational measures for the protection and security of information systems and computer data.

Required 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: Motor Vehicle Testing

Course Code:
MV502

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

Course objectives:
To introduce students to the methods and procedures used in testing motor vehicles for the purpose of maintaining their operational condition, as well as to the principles and techniques applied in such testing.

Course content:
Basic concepts of motor vehicle testing, measuring methods, instruments, and installations.
Vehicle regulations: homologation standards, other national and international regulations, and norms.
Testing of vehicle properties: vehicle inspection procedures, traction and braking characteristics, braking performance, environmental impact, and load testing.
Stationary measurements. Vehicle identification. Vehicle dimensions, weight, payload, and center of gravity. Testing equipment and instruments. Power measurement. Exhaust gas composition measurement.
Vehicle safety: stability on-road and off-road, relevant regulations, rollover and crash behavior.
Reliability testing: test planning, simulation of operating conditions, accelerated testing methods.

General and specific competencies (knowledge and skills):
Students will be able to participate in the preparation and execution of vehicle performance and system measurement processes, as well as in the testing of complete motor vehicles. They will be capable of preparing detailed reports on conducted measurements and tests.

Learning outcomes:
Upon successful completion of this course, the student will be able to:
1. Apply appropriate electrical measurement techniques for physical quantities
2. Select adequate methods for verifying motor vehicle functionality
3. Analyze the results of technical vehicle inspections
4. Evaluate and choose suitable procedures for testing individual motor vehicle assemblies
5. Analyze traction and braking characteristics of vehicles
6. Assess compliance of test results with legal and regulatory standards

Required literature:
1. Šilić, Đ.: Ispitivanje motornih vozila, VVG, Velika Gorica, 2010, ISBN 978-953-7716-11-0.

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 objectives:
The objective of this course is to teach students to connect the fundamentals of chemical laws, organic chemistry, and chemical substances used in the aviation industry. Students will learn to relate the chemical properties of substances to the types of materials and compounds used in the manufacture and maintenance of aircraft.

Course content:
Introduction to the subject. Matter and energy. Measurement and the SI system. Types of substances and methods for separating mixtures. Chemical bonds, chemical laws, structure, and properties of matter. The periodic table of elements. Avogadro's law. Atomic mass. Relative atomic and molecular mass. The mole. Electrochemical reactions and their role in technology. Types of chemical bonds — ionic, covalent, and metallic. Complex compounds. Intermolecular bonding and solubility. Indicator reactions. Fundamentals of organic chemistry — acyclic and cyclic hydrocarbons. Organic solvents. Fuels and lubricants and their application in aviation. Types of polymerization and their application in aviation. Use of metals and composites in aviation.

General and specific competencies (knowledge and skills):
After completing the course, students will be able to integrate fundamental knowledge from applied chemistry, with an emphasis on types of substances, chemical laws, basic chemical calculations, and the properties and characteristics of chemical bonds in relation to technological maintenance processes in aviation.

Learning outcomes:
Upon successful completion of this course, the student will be able to:
1. Recognize the importance of chemistry and material technology
2. Present the fundamental chemical laws governing basic chemical reactions
3. Identify types of chemical bonds, structures, and properties of substances
4. Evaluate electrochemical reactions and their applications
5. Present the basic chemical characteristics of fuels and lubricants
6. Explain the use of adhesion and polymerization processes in the maintenance of aircraft and motor vehicles

Required literature:

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

Course title: Communication Skills

Course Code:
MV612

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
6	2 + 1 + 0	45	5

Course objectives:
To acquire knowledge of the communication process, types of communication, and effective communication skills.

Course content:
Introduction to communication studies. Conceptual definitions, key features of communication, and models of the communication process. Basic principles and common misconceptions about communication. Types of communication. Verbal and nonverbal communication. Sources of communication difficulties. Communication competence and communication skills.
Communication skills: assertiveness and "I" messages.
Communication skills: active listening.
Communication skills: questioning techniques and conversation management.
Communication skills: public speaking skills.
Nonviolent conflict resolution. Negotiation and mediation. Business communication. Debate.

General and specific competencies (knowledge and skills):
Understanding the communication process and successfully applying communication skills in personal and professional contexts.

Learning outcomes:
Upon successful completion of this course, the student will be able to:
1. Critically evaluate the communication process
2. Identify the main elements and types of communication
3. Explain fundamental principles and common barriers in business communication
4. Interpret the components of verbal and nonverbal communication
5. Analyze types of conflict and select appropriate conflict resolution styles
6. Choose and apply suitable communication skills in everyday and professional situations, and assess their effectiveness

Required literature:

1. Fox, R.: Poslovna komunikacija, Hrvatska sveučilišna naklada – Pučko otvoreno učilište, Zagreb, 2006 (pp. 11–145).
2. Reardon, K. K.: Interpersonalna komunikacija, Alinea, Zagreb, 1998.
3. Novosel Leinert, S.: Komunikacijski kompas, Plejada, Zagreb, 2012.
4. Tomić, Z., Jugo, D.: Temelji međuljudske komunikacije, Synopsis, Sarajevo, 2021.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Computer-Aided Design (CAD)

Course Code:
MV411

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

Course objectives:
To acquire fundamental knowledge and skills in computer-aided design and engineering (CAD).

Course content:
Types of engineering documentation. CAD documentation in the process of product manufacturing, use, and maintenance. Basic design principles, stages of the design process, and the development of engineering documentation. The importance and influence of standardization. Fundamental techniques of 3D modeling of parts and assemblies. Preparation of workshop documentation from 3D models using CAD software. Basic model verification using simulation tools (user-level approach). Feature-based modeling and configuration management. Introduction to rapid prototyping devices (3D printer and 3D scanner).

General and specific competencies (knowledge and skills):
General competencies: Understanding the principles of design, construction development, and preparation of technical documentation using computer tools.
Specific competencies: Feature management methods in CAD systems.

Learning outcomes:
Upon successful completion of this course, the student will be able to:

1. Analyze and interpret the role of CAD models in all phases of the product life cycle, including manufacturing and maintenance
2. Predict, optimize, and justify geometric and structural features of 3D models in accordance with functional design requirements
3. Create 3D computer models of components using modern CAD tools and principles of technical design
4. Design and evaluate 3D product assemblies while ensuring functionality, connections, and assemblability
5. Prepare technical product documentation in compliance with engineering drawing standards
6. Plan and propose an optimal product development process and corresponding modeling approach
7. Evaluate the feasibility of producing replacement parts using additive manufacturing technologies and prepare the technological setup for 3D printing

Required literature:

1. Kljajin, M., Karakašić, M.: Modeliranje primjenom računala, Strojarski fakultet u Slavonskom Brodu, Slavonski Brod, 2012.
2. SolidWorks Essentials, SolidWorks 2019 Training, Dassault Systèmes SolidWorks Corporation, 2018.

Course title: Logistics Engineering

Course Code:
ZAJ143

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

Course objectives:
To enable students to apply fundamental 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. Reliability of repairable systems. Availability (readiness). Maintainability. Maintenance theory.

General and specific competencies (knowledge and skills):
Ability to independently apply theoretical knowledge of technical system effectiveness in the fields of reliability and logistics support of complex systems, with emphasis on maintenance processes of technical systems.

Learning outcomes:
Upon successful completion of this course, the student will be able to:

1. Calculate indicators of reliability and maintainability of technical systems
2. Compare various technical systems from the perspectives of the user and the maintainer
3. Categorize historical data on system operation for the purpose of creating a database
4. Manage operational costs throughout the life cycle of technical systems
5. Standardize requirements and maintainability criteria for technical systems

Required 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 objectives:
To develop mathematical reasoning and analytical thinking. To connect calculated results with graphical representations of functions. To distinguish basic statistical concepts and methods of calculation.

Course content:
Mathematical language: Arithmetic and algebraic expressions. Equations – qualitative, analytical, and numerical solving. Applications of equations in analyzing geometric shapes and bodies and in physics.
Functions: Definition and properties of functions, function rules, graphs, domain and range, continuity, sign, monotonicity, extrema, curvature, inflection points, limits.
Elementary functions: Linear, quadratic, polynomial, and rational functions; roots and powers; exponential and logarithmic functions; trigonometric and inverse trigonometric functions. Applications to geometry and physics.
Basic statistical concepts: Population, random samples, and random events.
Probability models: Random events and probability.
Variables: Concept and classification, discrete and continuous variables, binomial, Poisson, normal, and exponential distributions.
Relationship between variables: Linear models, correlation, and regression.
Random samples: Point estimations, plug-in models.
Inferential statistics: Interval estimation and hypothesis testing.

General and specific competencies (knowledge and skills):
Understanding and applying mathematical language and software. Understanding and applying the concept of a function. Knowledge of elementary functions and their application in relevant contexts. Application of mathematics to the analysis of geometric shapes, physical problems, and statistical methods.

Learning outcomes:
Upon successful completion of this course, the student 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

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

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Mathematics II

Course Code:
MV206

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

Course objectives:
To master methods for analyzing the behavior of functions and their applications to optimization problems. To acquire integration techniques and apply them to the calculation of areas and volumes. To solve linear second-order differential equations and apply them to linear systems. To perform differentiation and integration of scalar functions of several variables and vector functions of one or more variables, with applications in classical mechanics and electromagnetism.

Course content: Function analysis: Calculation of limits and asymptotic behavior, growth, decrease, and extrema, optimization problems, inflection points, and curve sketching (analytically and using software). Integration techniques: Substitution, integration by parts, and other integration methods. Linear second-order differential equations: Equations with constant coefficients and simple non-homogeneous terms. Vector functions of one variable: Differentiation and integration, applications to motion and curves. Scalar functions of several variables: Partial derivatives, tangent plane, total differential, directional derivatives, and gradient. Double and triple integrals. Line and surface integrals: Integration of scalar and vector fields; conservative fields. Fundamental theorems of vector analysis: Gradient, divergence, and curl theorems and their application to basic laws of electromagnetism.

General and specific competencies (knowledge and skills):
Ability to analyze the behavior of functions, formulate and solve optimization problems, and evaluate complex integrals. Application of mathematical methods to determine areas and volumes. Understanding and solving linear second-order differential equations. Differentiation and integration over regions, curves, and surfaces. Application of mathematical tools in classical mechanics and electromagnetism. Proficiency in using the SageMath software package for mathematical problem-solving.

Learning outcomes:
Upon successful completion of this course, the student will be able to:

1. Analyze the behavior of functions analytically and using software tools
2. Formulate and solve optimization problems analytically and with software assistance
3. Compute complex integrals independently and using software
4. Calculate areas and volumes using analytical and computational methods
5. Solve linear second-order differential equations with constant coefficients using analytical and computational methods
6. Compute various derivatives (partial, directional, gradient, divergence, and curl) of scalar and vector functions of multiple variables
7. Evaluate integrals (over regions, volumes, curves, and surfaces) of scalar and vector functions
8. Identify the mathematical framework within fundamental equations of classical mechanics and electromagnetism
9. Apply mathematical concepts in analyzing and modeling multidimensional problems
10. Use differentiation, integration, and differential equation-solving techniques to reach problem solutions

Required literature:

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

Course title: Materials and Thermal Processing

Course Code:
MV207

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

Course objectives:
To acquire knowledge of engineering materials and the fundamentals of heat treatment.

Course content:
Introduction to materials science. Engineering materials – description and basic classification. Structure and composition of materials. Crystallography – the science of crystal structures. Metals and metal alloys. Iron–carbon alloys and phase diagrams (Fe–C diagram). Steel – classification, properties, and applications. Cast irons – classification and properties. Light metals and alloys – types, properties, and applications. Polymeric materials – properties and applications. Composite materials – properties and applications. Basic mechanical properties of engineering materials and testing methods. Fundamentals of heat treatment – annealing, quenching, tempering, and case hardening processes (carburizing, nitriding, boriding). Purpose and applications of heat treatment. Examples and fields of application of engineering materials in the automotive and aerospace industries. Superalloys – classification, properties, and applications. Structural ceramics – classification, properties, and applications. Wood as a structural material.

General and specific competencies (knowledge and skills):
Understanding the structure, composition, and properties of engineering materials. Selecting the optimal material for specific application conditions. Knowledge of the fundamental heat treatment processes and their purposes.

Learning outcomes:
Upon successful completion of this course, the student will be able to:

1. Differentiate between types of engineering materials based on their structure and composition
2. Test and interpret the basic mechanical properties of engineering materials
3. Analyze the requirements for selecting appropriate materials for specific applications
4. Distinguish between thermal and thermochemical treatment processes
5. Integrate acquired knowledge of engineering materials with application requirements

Required literature:

1. Špehar, S.: Materijali i toplinska obrada, Veleučilište Velika Gorica, 2021, lecture notes.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Mechanics

Course Code:
MV201

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

Course objectives:
To acquire fundamental knowledge of statics and dynamics sufficient for understanding vehicle operation and maintenance, particularly regarding components with mechanical functions.

Course content:
Introduction to mechanics. Motion – basic concepts, quantities, and motion types. Axioms of mechanics and classification of mechanics. Introduction to statics and its applications. Forces and systems of forces, static moment of a force, and couples. Reduction of force systems. Determination of the center of gravity. Free-body diagrams and equilibrium of bars, strings, particles, planar rigid figures, and rigid bodies. Equilibrium of systems of rigid bodies and planar trusses. Nature and types of friction. Equilibrium with friction, axial and radial bearing friction, rope friction. Introduction to dynamics – kinematic and kinetic approaches, fundamental problems in dynamics. D'Alembert's principle.
Rectilinear motion – force states, equations of motion, differential equations, and kinematic diagrams. Translational motion – equations of motion in Cartesian, cylindrical, and spherical coordinates. Motion of a particle in a natural coordinate system. General kinetic laws of particle motion. Dynamics of particle systems.
Rotation about a fixed axis – forces, equations of motion, angular velocity and acceleration, differential equations of motion, kinetic energy, work and power, moments of inertia, and the law of kinetic energy. Kinematics and kinetics of rotational motion in transmission systems. Dynamic reactions in supports. Planar motion of a rigid body – kinematics of planar motion, instantaneous center of rotation, geometric determination of velocities and accelerations, and the law of kinetic energy. Rotation of a body about a point.

General and specific competencies (knowledge and skills):
Ability to independently solve engineering problems in statics and dynamics.
Learning outcomes:
Upon successful completion of this course, the student will be able to:

1. Calculate the resultant of a system of forces
2. Determine the coordinates of the center of gravity
3. Calculate reaction forces based on equilibrium conditions for rigid bodies and systems of rigid bodies
4. Solve equilibrium problems involving friction
5. Develop mechanical and mathematical models for real-world problems in dynamics
6. Apply D'Alembert's principle to calculate unknown quantities in kinetostatic equilibrium
7. Solve first and second dynamic problems for rectilinear, translational, and rotational motion about a fixed axis
8. Apply the law of kinetic energy to the motion of particles and rigid bodies

Required literature:
Teaching materials published on the Gaudeamus platform

Course title: Management and Entrepreneurship

Course Code:
MV405

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

Course objectives:
To enable students to make responsible business decisions as employees or entrepreneurs in accordance with the principles of economic efficiency, professionalism, and social responsibility. To develop knowledge and skills that allow students to recognize business opportunities and initiate and implement their own entrepreneurial or professional projects in the field of motor vehicles.

Course content:
Application of management functions in motor vehicle maintenance. Introduction to the business environment (internal and external). SWOT and TOWS analysis, PESTLE analysis, and their application in vehicle maintenance. Professional and responsible management of teams and resources; team dysfunctions. Marketing strategies (generic strategies) and competitive advantage. Entrepreneurial project (purpose, structure, and presentation).

General and specific competencies (knowledge and skills):
Acquisition of fundamental knowledge and skills for starting and managing a business. Students develop organizational and entrepreneurial abilities, analytical reasoning, result interpretation, presentation, and teamwork skills.

Learning outcomes:
Upon successful completion of this course, the student will be able to:

1. Analyze and apply fundamental management functions (planning, organizing, leading, and controlling) for effective management of motor vehicle maintenance processes
2. Analyze internal and external business environment factors using tools such as SWOT/TOWS and PESTLE analysis
3. Apply principles of professional and responsible behavior in managing teams and resources in vehicle maintenance activities
4. Identify team dysfunctions in the context of managing a vehicle service facility
5. Design an entrepreneurial or social responsibility project following guidelines from start-up or similar competitions
6. Present an entrepreneurial project according to start-up or similar competition standards

Required literature:

1. Belak, V.: Menadžment u teoriji i praksi, Belak Excellens d.o.o., Zagreb, 2015.
2. Golob, B.: Inovacija od ideje do tržišta, Dragon d.o.o., Rijeka, 2009. (e-book, contact: een@bicro.hr

Course title: Measurements in Mechanical Engineering

Course Code:
MV205

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

Course objectives:
To acquire fundamental knowledge in the field of measurement and metrology.

Course content:
Basic concepts of measurement and metrology. Measurement units and measurement systems. Measuring instruments for physical quantities. Standards and reference instruments. Measurement errors. Accuracy, precision, and uncertainty. Measurement methods. Metrological organizations. Length measurement. Verification of shape and surface arrangement. Measurement of angles and cones. Surface roughness measurement. Strain gauge measurement. Measurement of force and mass. Pressure measurement. Temperature measurement. Measurement of sound and noise.

General and specific competencies (knowledge and skills):
Understanding measurement systems, methods, and instruments used in engineering measurements. Ability to perform independent measurements of various physical quantities and analyze measurement results.

Learning outcomes:
Upon successful completion of this course, the student will be able to:

1. Analyze and compare the elements of the SI and non-SI measurement systems
2. Present instruments and devices used for measuring mechanical and electrical quantities
3. Demonstrate procedures for measuring non-electrical physical quantities by electrical means
4. Critically analyze methods of measuring mechanical and electrical physical quantities
5. Plan and conduct measurements of basic mechanical and electrical quantities
6. Evaluate the accuracy, precision, and errors of measurements to improve the quality of results

Required literature:

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

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Engines

Course Code:
MV303

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
3	3 + 1 + 0	60	6

Course objectives:
To acquire fundamental knowledge of the theory and design of internal combustion engines (ICE).

Course content:
Introductory considerations and fundamental definitions: history of development, general structure of engines, basic definitions and properties, classification of engines, definition of a modern engine.
Engine theory: thermodynamic engine cycles – Otto, Diesel, and Sabathé cycles.
Real working cycles: operating principles and real cycles of four-stroke Otto and Diesel engines; combustion in Otto and Diesel engines; operation principles and real cycles of two-stroke Otto and Diesel engines. Valve timing diagrams for four-stroke and two-stroke engines.
Engine characteristics: indicator diagrams, work, specific work, mean indicated pressure; calculations of indicated and effective power for Otto and Diesel engines; measurement of effective power; engine performance diagrams; efficiency and thermal balance.
Engine design: fundamental engine components – piston mechanism, forces on the piston mechanism, vibrations, valve train.
Systems in Otto and Diesel engines: fuel supply, ignition (for Otto engines), lubrication, cooling, starting, exhaust, and air conditioning. Supercharging – compressor and turbocharged engines.
Basic concepts of multi-fuel engines and gas turbines.

General and specific competencies (knowledge and skills):
Knowledge and skills necessary for independent calculation of basic engine parameters, performance measurement, and diagram preparation (external characteristics). Ability to analyze and compare engine design solutions regarding complexity, originality, accessibility, durability, efficiency, and environmental impact.
Competence in evaluating engine operation principles, system performance, and constructional suitability, as well as proposing improvements. Ability to assess parameter values for acceptability in all engine operating modes and to recommend regimes for economical, efficient, and environmentally compliant operation. Capability to propose maintenance plans based on engine design characteristics.

Learning outcomes:
Upon successful completion of this course, the student will be able to:

1. Identify the parameters of basic thermodynamic engine cycles
2. Calculate power, torque, and specific fuel consumption at full-load operation; draw and compare external (speed) characteristic diagrams of Otto and Diesel engines
3. Analyze key influences on engine performance, thermal balance, and environmental efficiency
4. Interpret and analyze block diagrams of systems, devices, and mechanisms
5. Critically analyze the effects of engine operating characteristics on the functionality of constructional designs
6. Identify and analyze the working conditions and functionality of basic parts, systems, and mechanisms of engines

Required literature:

1. Hnatko, E.: Motori – Osnove teorije motora s unutarnjim izgaranjem, Veleučilište Velika Gorica, Velika Gorica, 2016.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Motor Vehicles

Course Code:
MV304

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
3	3 + 1 + 0	60	6

Course objectives:
To acquire knowledge of vehicle motion theory and the design principles of motor vehicles.

Course content:
Development of motor vehicles. Vehicle categorization. Vehicle wheels. Theory of vehicle motion. Driving resistances and required power. Static and dynamic reactions. Vehicle motion equation. Traction characteristics of vehicles. Braking properties and parameters. Vehicle stability—longitudinal and lateral stability. Active stability systems (ABS, ASR, ESC).
Vehicle chassis design. Power transmission system: clutches, gearboxes, differentials, propeller shafts, and wheels. Steering system and wheel geometry. Braking system. Suspension system. Vehicle body and design. Vehicle comfort and safety.

General and specific competencies (knowledge and skills):
General: Analysis of vehicle motion and understanding of vehicle design, components, and systems.
Specific: Evaluation of motor vehicle characteristics and performance.

Learning outcomes:
Upon successful completion of this course, the student will be able to:
1. Explain and analyze the development and evolution of motor vehicles
2. Formulate the vehicle motion equation
3. Construct the traction characteristic diagram of a motor vehicle
4. Present and interpret traction diagram analysis
5. Analyze the design of vehicle chassis and body structures
6. Explain the operating principles of transmission, braking, steering, and suspension systems
7. Identify, compare, and analyze active stability systems in vehicles

Required literature:
1. Mikulić, D.: Motorna vozila, Veleučilište Velika Gorica, 2020. ISBN 978-953-7716-89-9
2. Mikulić, D.: PowerPoint lectures – Motorna vozila, VVG.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Vehicle Maintenance

Course Code:
MV501

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

Course objectives:
To introduce students to the fundamental concepts of vehicle maintenance and modern maintenance technologies.

Course content: Theoretical foundations of motor vehicle maintenance. Maintenance procedures for engines and systems: inspections and technical diagnostics, disassembly and assembly procedures, defect detection, replacement of assemblies and components, and adjustments of fuel and air supply systems, cooling, lubrication, ignition, and electronic and electrical equipment. Vehicle maintenance procedures: vehicle inspections, technical diagnostics, disassembly and assembly, defect detection, replacement of assemblies and parts, and adjustments of the clutch, gearbox, differential, shafts, suspension, and wheels. Diagnostics and maintenance of suspension, steering, and braking systems. Diagnostics and maintenance procedures for active electronic and electrical systems and equipment in motor vehicles.

General and specific competencies (knowledge and skills):
General: Theoretical and practical knowledge of technological processes in engine and chassis maintenance.
Specific: Management of engine and vehicle system maintenance processes.

Learning outcomes:
Upon successful completion of this course, the student will be able to:

1. Critically evaluate the characteristics and influence of operational conditions on motor vehicles
2. Identify operational processes in complex vehicle systems
3. Explain maintenance processes and select optimal maintenance procedures
4. Use modern diagnostic methods and devices to determine the technical condition of vehicles
5. Apply appropriate organizational and technological maintenance procedures
6. Standardize technological maintenance processes

Required literature:

1. Čerlek, S.: Održavanje sustava za napajanje gorivom Ottovih i dizelskih motora, VVG, 2013. ISBN 987-953-7716-42-4
2. Čerlek, S.: Električna i elektronička oprema u vozilima, VVG, 2011. ISBN 987-953-7716-14-1

Course title: Organization of Servicing

Course Code:
MV601

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
6	2 + 1 + 0	45	5

Course objectives:
To provide students with fundamental knowledge of service organization and vehicle maintenance technologies.

Course content:
Modern approaches to motor vehicle maintenance organization and global trends. Service operation organization. Classification of equipment (machines, devices, and technical systems). Equipment manufacturers and service providers. Classification of services by activity and affiliation. Types of service delivery. Commercial operations of service centers. Strategy selection in organizing service activities. Creating and defining maintenance processes for various service operations. Service logistics organization, storage, inventory, and spare parts planning. Optimization of selected processes for typical maintenance tasks. Business organization: cyclic maintenance operations, fault repairs, general overhauls, reconstructions, modernization, logistics support, information systems, organizational structures, and staff training.

General and specific competencies (knowledge and skills):
Design and monitoring of organizational and supporting processes within the vehicle maintenance system.

Learning outcomes:
Upon successful completion of this course, the student will be able to:

1. Analyze business processes within organizations engaged in vehicle maintenance
2. Organize and plan service operations
3. Manage technical and commercial aspects of service activities
4. Analyze business performance results
5. Assess personal professional and ethical responsibility in vehicle maintenance
6. Evaluate the need for lifelong learning and professional development

Required literature:

1. Čerlek, S., Čerlek, N.: Organizacija servisa motornih vozila, VVG, Velika Gorica, 2016. ISBN 978-953-7716-71-4

Course title: Quality Assurance and Control

Course Code:
MV305

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

Course objectives:
To acquire knowledge of quality concepts, methods, techniques, procedures, and tools used in quality control and assurance systems.

Course content:
Quality systems: definition of quality and quality systems, aspects of quality and historical development, quality control, quality assurance, quality management, and supervision. Principles, methods, techniques, and tools for establishing a quality system; process approach. Integrated management systems. Basic requirements, directives/guidelines, conformity with essential requirements, conformity assessment systems; authorization and certification (accreditation, certification). Standardization. Education in quality, and management of knowledge, time, and change.

General and specific competencies (knowledge and skills):
Understanding of the principles and methods for establishing and maintaining quality systems. Knowledge of fundamental standards and standardization systems. Ability to participate in quality systems through knowledge of the required documentation. Familiarity with institutions and the operation of quality systems at the international, EU, and national levels.

Learning outcomes:
Upon successful completion of this course, the student will be able to:

1. Select and apply methods for managing quality management systems
2. Demonstrate methods, techniques, and tools for quality management and identify appropriate control methods
3. Verify, review, and identify control points within the management system to detect non-conformities and opportunities for continuous improvement
4. Plan and organize the implementation of quality management and assurance systems
5. Collect relevant information at national and international levels and apply it to the organization's quality management and control processes

Required literature:

1. Kacian Ivetić, I.: Osiguravanje i kontrola kvalitete, Textbook for Professional Study Students, IPROZ d.o.o., Zagreb, 2018.

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 for the technical maintenance of motor vehicles through the application of theoretical knowledge of automatic control.

Course content:
Automation, control, and regulation; application of control in mechatronic system technology. Mathematical modeling of dynamic systems. Analysis of the fundamental characteristics of control loops. Description of automatic control systems and 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. Analysis and tuning of controllers.

General and specific competencies (knowledge and skills):
Ability to critically evaluate the performance of automatic control systems and their dynamic components. Competence in analyzing system characteristics of automatic control through examples in motor vehicles. Determination of system parameters for maintenance purposes.

Learning outcomes:
Upon successful completion of this course, the student will be able to:

1. Critically analyze the structure and type of automatic control systems
2. Design a linear model and control system 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 graphical-analytical methods
5. Create block diagrams for examples of automatic control systems in motor vehicles
6. Identify systems and issues specific to motor vehicles
7. Present physical parameters of automatic control in motor vehicles
8. Explain the operation principles of automatic control components and devices in motor vehicles

Required literature:

1. Kuljača, Lj., Vukić, Z.: Automatsko upravljanje – analiza linearnih sustava, Kingen d.o.o., Zagreb, 2004.

Course title: Fundamentals of Ecology

Course Code:
ZAJ131

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
1	2 + 0 + 0	30	3

Course objectives:
To provide students with knowledge about the disturbances in nature caused by human activity and the measures that need to be taken to restore ecological balance.

Course content:
Definitions, scope, and divisions of ecology; ecology of individuals; population and its parameters; population growth; geographic and ecological space; ecological niche and tolerance; habitat, biological community, and ecosystems; origin, structure, exchange, and stability of biological communities; biodiversity and protected areas; cycles and circulation of matter in ecosystems; ecological zoning; vegetation. Industry and society: industrial development trends and environmental impact; natural resources and social perspectives; life cycle of industrial products (source of raw materials, processing, useful life, and post-disposal fate); maintaining balance between industrial development and natural ecosystems; industrial society and climate change; water, soil, and air as ecological factors; global environmental changes; anthropogenic impact on the environment; ecological accidents; global ecological issues; radiation effects on the environment; sustainable development; transport and environment.

General and specific competencies (knowledge and skills):
Basic understanding of ecological trends, types of pollution, and the impact of industry and human activity on climate and the environment. Students will be able to identify fundamental ecological concepts and understand ecological principles and anthropogenic impacts on ecosystems.

Learning outcomes:
Upon successful completion of this course, the student will be able to:

1. Explain basic ecological concepts and classifications, and interpret laws and regulations related to environmental and nature protection
2. Apply fundamental ecological principles in analyzing ecological processes and ecosystem dynamics
3. Identify and connect the causes and consequences of environmental pollution
4. Analyze the impact of transportation, emissions, and radiation on the environment and human health, and propose measures to reduce harmful effects
5. Assess environmental pollution risks and apply sustainable development principles in waste management, including waste classification and efficient disposal of materials and components
6. Evaluate the implementation of green technologies, renewable energy sources, and strategies for reducing environmental pollution risks

Required literature:

1. Kalambura, S., Jovičić, N.: Ekologija, Veleučilište Velika Gorica, 2018.

Course title: Fundamentals of Technical Safety

Course Code:
MV306

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
3	2 + 1 + 0	45	4

Course objectives:
To familiarize students with the organization of occupational safety and the procedures to be followed in the event of sudden and unforeseen incidents.

Course content:
Fundamental principles for organizing, regulating, and implementing occupational safety. Risk assessment for hazards in motor vehicle maintenance. Hazard prevention and elimination; application of regulations, rules, and safety measures at work. Legal framework of occupational safety. Use of work facilities, machinery, equipment, and personal protective gear, as well as work procedures. Testing of the work environment and equipment. First aid procedures. Maintenance of required records and reporting obligations related to safety conditions. Fire protection, evacuation, and rescue. Personal protective equipment and safety signs. Internal transport and storage. Employer's contracts and decisions related to occupational safety arrangements. Labor inspection and employer obligations toward supervisory authorities. Internal monitoring of the implementation of occupational safety rules.

General and specific competencies (knowledge and skills):
Ability to independently analyze and assess risks and hazards in vehicle service facilities. Competence in defining procedures to be followed in case of sudden or unforeseen incidents.

Learning outcomes:
Upon successful completion of this course, the student will be able to:

1. Identify and critically assess hazards present in vehicle service facilities
2. Calculate the residual risk from identified hazards
3. Develop measures to eliminate or reduce identified risks
4. Prepare a risk assessment report for vehicle service operations
5. Recommend appropriate personal protective equipment for work in vehicle service facilities
6. Maintain the required occupational safety records
7. Propose appropriate safety warning signs for ensuring safe work environments in vehicle service facilities

Required literature:

1. Priručnik za pripremu stručnog ispita za stručnjaka zaštite na radu, Ministry of Labour, Pension System, Family and Social Policy, Republic of Croatia, 2022. Available at:

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Fuels and Lubricants

Course Code:
MV307

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
3	2 + 1 + 0	45	4

Course objectives:
To provide students with knowledge of the characteristics, use, handling, and storage of all types of propulsion fuels and lubricants.

Course content:
Fuels: Definition of technical fuels. Classification of fuels. Elemental composition of fuels. Basic properties of solid, liquid, and gaseous fuels. Technological processing of crude oil. Chemical structure of liquid fuels. Classification and characteristics of liquid fuels by purpose: diesel fuels, motor gasoline, jet fuels, biodiesel, LPG (liquefied petroleum gas), and CNG (compressed natural gas). Physicochemical properties of fuels: density, calorific value, lubricity. Detonation combustion in spark-ignition engines. Octane rating of fuels. Detonation combustion in diesel engines. Ignition delay. Cetane number of fuels. Fuel additives. Fuel stability and aging processes. Fuel storage and transportation.
Lubricants: Fundamentals of tribology, friction, and types of lubrication. Physicochemical properties of lubricants. Classification of lubricating oils. Lubricating oils for internal combustion engines. SAE viscosity classification of motor oils. API performance classification of motor oils. Use and classification of lubricating greases. Oils and fluids for special purposes. Storage and handling of lubricants.

General and specific competencies (knowledge and skills):
Students will acquire knowledge and skills required for performing maintenance operations on road and special-purpose motor vehicles, with emphasis on the correct selection and application of fuels, lubricants, and special-purpose fluids.

Learning outcomes:
Upon successful completion of this course, the student will be able to:

1. Distinguish between basic processes and raw materials used in the production of fuels and lubricants
2. Analyze key physical and chemical properties of fuels
3. Select appropriate procedures for fuel storage and for minimizing environmental impacts
4. Analyze the influence of fuels on the combustion process in internal combustion engines
5. Analyze key physical and chemical properties of lubricants
6. Select appropriate storage procedures and measures to reduce the environmental impact of lubricants
7. Choose suitable lubricants for motor vehicles

Required literature:

1. Šilić, Đ., Stojković, V., Mikulić, D.: Goriva i maziva, Veleučilište Velika Gorica, 2012. ISBN 978-953-7716-37-0.

Course title: Production Technologies

Course Code:
MV412

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

Course objectives:
To provide students with fundamental knowledge in the field of mechanical material processing.

Course content:
Casting. Welding. Brazing. Adhesive bonding. Metal forming processes. Material processing by chip removal. Technological equipment for various material processing methods. Production and processing of polymers and composite materials. Basic technological parameters for different mechanical processing procedures. Examples of technological procedures for repair and manufacturing of parts for engines, vehicles, and aircraft.

General and specific competencies (knowledge and skills):
Ability to combine technological processes of material processing with and without chip removal. Planning technological equipment for various processing procedures. Defining technological processes for repair or manufacturing of spare parts.

Learning outcomes:
Upon successful completion of this course, the student will be able to:

1. Analyze and evaluate casting processes in terms of functional requirements, quality, and production context
2. Select and compare appropriate welding, brazing, and adhesive bonding techniques based on structural and material constraints
3. Evaluate and apply metal forming processes
4. Analyze and justify the selection of machining (chip removal) processes
5. Compare and assess the suitability of different polymer processing and composite manufacturing techniques
6. Plan, integrate, and coordinate multiple technological processes and corresponding equipment into a complete system for manufacturing and repair of mechanical components

Required literature:

1. Šavar, Š.: Obrada odvajanjem čestica, Part I & II, Fakultet strojarstva i brodogradnje, Zagreb, 1977–1978.
2. Budić, I.: Posebni ljevački postupci, Strojarski fakultet u Slavonskom Brodu, 2006.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Psychology of Stress

Course Code:
MV112

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
1	2 + 0 + 0	30	3

Course objectives:
To familiarize students with the circumstances of the onset and effects of psychosocial stress on human experience, behavior, and health, as well as with possible approaches to prevent, alleviate, and manage stress.

Course content:
Introduction to the subject: historical development of stress concepts; overview and definition of key terms — stressor, stress, and stress reaction; types and forms of stressors, stress, and stress responses.
Biological basis of the stress response: the role of the nervous and endocrine systems in regulating stress; stress and immune functioning; the relationship between stress and illness; somatic diseases associated with stress.
Theoretical approaches to stress: psychodynamic theory, fight-or-flight theory, general adaptation syndrome, life change theory, transactional stress model, and diathesis-stress model.
Mediators and moderators of stress: situational factors (intensity, frequency, controllability, developmental aspects) and individual factors (demographics, personality traits).
Coping with stress.
Specific sources of stress and their consequences: workplace stress, burnout, mobbing, traumatic stress, and post-traumatic stress disorder.
Communication as a source of stress and stress prevention through effective communication.
Techno-stress: negative effects of technology use.
Stress management and prevention: organizational climate, treatment approaches, lifestyle and habits, physical activity, nutrition, and leisure time.

General and specific competencies (knowledge and skills):
Knowledge:
- Understanding fundamental concepts and classifications of stress.
- Comprehending the effects of stress on the psychophysical state of individuals.
- Knowing different theoretical approaches to stress.
- Understanding coping strategies.
- Familiarity with principles of stress prevention in the workplace.

Skills:
- Ability to explain key concepts related to stress.
- Connecting causes and consequences of stress.
- Critically evaluating different stress models and approaches.
- Analyzing and distinguishing types of coping with stress.
- Designing concrete measures and interventions for stress prevention and reduction in organizational settings.

Learning outcomes:

Upon successful completion of this course, the student will be able to:

1. Explain fundamental concepts related to stress, including stressors, stress, and stress reactions, and describe their interrelations and classifications.
2. Describe how various causes of stress affect an individual's health, perception, and behavior.
3. Evaluate different theoretical approaches to stress, including psychophysiological, social, cognitive, and integrative models.
4. Analyze coping strategies and distinguish between adaptive and maladaptive coping mechanisms in the context of maintaining physical and mental health.
5. Propose activities for stress reduction and prevention, with emphasis on interventions in organizational and workplace contexts typical for engineering professions.

Required literature:

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

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Practical Work

Course Code:
SP-MV

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
5	0 + 15 + 0	225	20

Course objectives:
To provide students with professional knowledge and practical skills in the process of motor vehicle maintenance.

Course content:
Preparation of students for the implementation of professional internship in the automotive industry.
Familiarization with maintenance systems and management methods in motor vehicle service operations.
Understanding the organization and processes of production and maintenance of motor vehicles.
Introduction to application software used in business operations. Preparation of spare parts and tools for maintenance.
Application of diagnostic equipment for vehicle maintenance. Monitoring of quality assurance systems in maintenance processes.
Implementation of occupational safety and environmental protection measures.
Performance of service advisor tasks.

General and specific competencies (knowledge and skills):
General: Identification of motor vehicle maintenance processes. Acquisition of practical skills in the maintenance of motor vehicles.
Specific: Application of diagnostic tools and equipment in vehicle maintenance operations.

Learning outcomes:
Upon successful completion of this course, students will be able to perform the following tasks:

1. Explain the organization, management, and operation of a company, service center, or workshop for motor vehicle maintenance, or a project in the automotive field.
2. Prepare the technological process of vehicle maintenance or technical support for maintenance activities.
3. Implement quality assurance procedures in the process of vehicle maintenance or technical support.
4. Apply software tools and applications in the process of vehicle maintenance or technical support.
5. Apply environmental protection and occupational safety measures during maintenance or technical support processes.
6. Communicate effectively with colleagues and clients in the context of vehicle maintenance or technical support.

Required literature:

1. Čerlek, S.: Organizacija servisa motornih vozila, Veleučilište Velika Gorica, 2016.

Course title: Technical Drawing and Computer Graphics

Course Code:
MV107

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

Course objectives:
To provide students with fundamental knowledge and practical skills in technical drawing and the preparation of engineering documentation.

Course content:
Concept of projection and types of projections. Lines, technical lettering, formats, scales. Spatial visualization. Sketching in orthogonal projection. Dimensioning. Surface texture and machining symbols on technical drawings. Tolerances and fits on workshop and assembly drawings. Use of computers in the preparation of technical documentation. Introduction to 2D CAD (AutoCAD) computer graphics.

General and specific competencies (knowledge and skills):
Understanding projection types and projection principles. Ability to independently create and use engineering documentation. Competence in applying computer tools for technical documentation creation.

Learning outcomes:
Upon successful completion of this course, the student will be able to:

1. Analyze and apply standardized elements and tools of technical drawing in accordance with engineering drawing standards.
2. Critically compare different projection methods of geometric bodies, including ISO and ANSI projection standards.
3. Create orthogonal projections and develop spatial visualization of technical parts.
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 technical standards.
6. Evaluate constructional and technological symbols on part and assembly drawings according to functional product requirements.
7. Create an assembly drawing with accompanying workshop drawings in accordance with the principles of product technical documentation.
8. Integrate CAD tools in the creation of technical documentation.

Required literature:

1. Opalić, M., Kljajin, M.: Inženjerska grafika, Strojarski fakultet u Slavonskom Brodu, 2010.
2. Herold, Z.: Računalna i inženjerska grafika, Fakultet strojarstva i brodogradnje u Zagrebu, 2003.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Thermal Dynamics

Course Code:
MV208

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

Course objectives:
To provide students with knowledge of thermodynamic systems, energy exchanges and their efficiency, thermodynamic states and state variables, and processes and cycles of ideal gases and gas mixtures.

Course content:
Fundamentals of thermodynamics: Heat and work. Thermodynamic systems and states. State variables and the equation of state for ideal gases. Basic gas laws.
First law of thermodynamics: Internal energy, work, p–V diagram, enthalpy, heat capacities. Mixtures of ideal gases.
Second law of thermodynamics: Reversible and irreversible processes, entropy, T–S diagram.
Basic thermodynamic processes: Isochoric, isobaric, isothermal, adiabatic, and polytropic processes.
Thermodynamic cycles: Analysis of circular processes and their efficiency.
Flow without impact (steady flow).
Selected topics in thermotechnics: Heat transfer — conduction, convection, radiation.
Moist air: State parameters, Mollier h–x diagram, moisture content changes.
Combustion: Chemistry and kinetics of combustion, heat release, heating values of fuels, and combustion losses.

General and specific competencies (knowledge and skills):
Knowledge and skills necessary for independently setting up, describing, and calculating thermodynamic states and processes of heat engines — both for individual components and the system as a whole. Ability to perform both design and verification calculations of thermal parameters.
Competence in defining the quality and amount of water vapor as a working medium, as well as in describing and calculating parameters of vapor state changes.
Ability to select suitable fuels, calculate required fuel and air quantities, determine combustion efficiency, and evaluate environmental acceptability.
Skills for solving problems and calculations related to heat transfer processes — including heat engine cooling and thermal insulation design.

Learning outcomes:
Upon successful completion of this course, students will be able to:

1. Analyze and calculate thermodynamic state variables and the equation of state for ideal gases.
2. Interpret and analyze the fundamental laws of thermodynamics.
3. Compare and compute basic thermodynamic processes (isochoric, isobaric, isothermal, adiabatic, and polytropic), determining initial and final states for quasi-static and non-equilibrium transformations.
4. Present thermodynamic cycles of heat engines, calculate characteristic state points and efficiencies, and apply this knowledge to the analysis of processes in gas turbines and internal combustion engines.

5. Analyze the combustion process and perform a mass balance of combustion reactions.
6. Present the process of one-dimensional heat transfer, calculate heat flux, and apply these principles to the analysis of heat exchanger operation.

Required literature:

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

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Special Purpose Vehicles

Course Code:
MV414

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

Course objectives:
To provide students with knowledge of the theory of motion of military tracked vehicles and the specific features of transmission design in such systems.

Course content:
Analysis of forces and torques acting on tracked vehicles during straight-line motion.
Procedures for traction calculations in straight-line motion of tracked vehicles.
Construction of traction diagrams for straight-line motion of tracked vehicles.
Kinematics of tracked vehicle turning.
Analysis of external forces and torques acting on tracked vehicles during turning.
Traction calculations and construction of traction diagrams for tracked vehicle turning.
Transmissions of armored tracked vehicles: planetary gearboxes, forces, and torques acting on planetary transmission elements.
Calculation of torques on friction elements in the control system of planetary transmissions.
Calculation of load distribution in complex planetary transmissions.
Characteristic examples of turning mechanism designs for armored tracked vehicles.
Definition of kinematic possibilities of turning mechanisms.

General and specific competencies (knowledge and skills):
Ability to analyze the dynamic characteristics of straight-line and turning motion of tracked vehicles.
Competence in evaluating the design, assemblies, and mechanisms of armored tracked vehicles.
Capability to assess how transmission system design affects maintenance and operational performance.

Learning outcomes:
Upon successful completion of this course, students will be able to:

1. Calculate and analyze motion resistances, tractive and adhesive forces for straight-line motion, and determine the required engine power using computational tools for specific motion conditions of tracked vehicles.
2. Create traction diagrams for straight-line motion using computer tools and analyze and compare tractive-dynamic properties of different military vehicles.
3. Compute, analyze, and graphically represent motion resistances and traction characteristics of tracked vehicles in turning maneuvers using computational methods.
4. Compare and evaluate tractive-dynamic properties of different military vehicles during turning.
5. Calculate gear ratios, angular velocities, and torques in elements of complex planetary transmissions using computer software.
6. Compare and analyze different planetary gearbox designs, recognizing the advantages and disadvantages of various engineering solutions.
7. Analyze and explain the kinematic capabilities of different turning mechanisms.
8. Identify the advantages and disadvantages of various turning mechanism designs to assess their performance and quality.

Required literature:

1.Stojković, V.: Upravljanje specijalnim vozilima – Planetarni mjenjači i mehanizmi zaokreta, Veleučilište Velika Gorica, Velika Gorica, 2013. ISBN: 978-953-7716-46-2.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Diploma Thesis

Course Code:
ZR-MV

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
6	0 + 5 + 0	75	20

Course objectives:
To enable students to independently prepare, write, and defend a professional final thesis based on practical and theoretical knowledge acquired during the study program.

Course content:
Independent preparation, writing, and defense of a professional thesis related to the field of motor vehicles. The work involves identifying and solving a specific technical or organizational problem, applying theoretical knowledge to practice, and demonstrating the ability to use relevant professional and scientific methods.

General and specific competencies (knowledge and skills):
The student will demonstrate the ability to independently research, analyze, and present professional issues in the field of motor vehicles, integrating technical, organizational, and management knowledge. The final thesis confirms the student's readiness for professional practice and lifelong learning in the engineering profession.

Learning outcomes:
Upon successful completion of this course and defense of the final thesis, students will be able to:

1. Independently analyze motor vehicle systems.
2. Independently prepare the organization and process for vehicle maintenance.
3. Apply computer support systems in vehicle maintenance.
4. Implement and evaluate quality assurance systems in vehicle maintenance.
5. Demonstrate organizational abilities for managing a vehicle service workshop.
6. Exhibit professional and ethical responsibility in the field of vehicle maintenance.