VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

BASIC COURSE INFORMATION WITHIN THE STUDY PROGRAMME

SHORT PROFESSIONAL STUDY PROGRAMME

DIGITAL TECHNOLOGIES

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: 3D Technologies

Course Code:
DT212

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

Course Objective:
Acquisition of fundamental knowledge and skills in computer-aided spatial design and printing.

Course Content:
Elements of a geometric model. Feature-based modeling. Principles of creating a computer model and a product drawing. Principles of creating a computer model of an assembly and an assembly drawing of a product. Feature management for creating model configurations. Special areas of 3D design – creation of 3D models by surface modeling, design of thin-walled 3D models. Principles of creating a realistic appearance of a product – computer visualization of products. Additive technologies – 3D printing. Devices for rapid prototyping (3D printer and 3D scanner). Fundamentals of rapid prototyping.

Learning Outcomes:
After completing this course, students will be able to:
1. Explain the role of 3D CAD models in the product development process.
2. Identify the feature-based modeling method.
3. Design a computer-generated 3D model of a product.
4. Create a computer-generated 3D assembly of a product.
5. Prepare technical documentation of a product.
6. Perform the process of rapid prototyping of a product using a 3D printer.

Required Literature:

1. Ivo Slade: Drawing in the 3D Program SolidWorks
2. Fundamentals of 3D Design and Simulation, SolidWorks Education Edition 2018–2019, Dassault Systèmes, 2017.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Autonomous Systems

Course Code:
DT412

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

Course Objective:
Introduction to the fundamental concepts and methods of automatic digital control and microprocessor-based management, with applications in autonomous systems.

Course Content:
Development of automation and the importance of automation for the operation of modern technical systems. Classification and principles of automation: control, regulation, and guidance. Analysis and system requirements in the time and frequency domain. Description of dynamic systems. Control objects. Control devices: measuring element, control element, and actuator. Types of feedback loops. Analysis of control actions, accuracy, and stability. Fundamentals of digital control systems. Programmed control. Advanced methods in automation and expert systems. Description of control systems and control chains with examples.

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

1. Present acquired knowledge of the fundamental methods and concepts of automatic control.
2. Define open and closed control loops.
3. Compare the elements of analog and digital control loops.
4. Design a simulation of a simple dynamic system.
5. Select a controller and other elements of a control loop.
6. Demonstrate the application of autonomous systems.

Required Literature:

1. Vrhovski, Z.: Automatic Control, Polytechnic of Bjelovar, Bjelovar, 2013.
2. Novaković, B.: Methods of Control of Technical Systems: Applications in Robotics, Flexible Systems, and Processes, Školska knjiga, Zagreb, 1990.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Digital Techniques

Course Code:
DT103

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
1	2 + 2 + 0	60	6

Course Objective:
To present the operating principles of semiconductor components, the conversion of decimal to binary number systems, the application of mathematical logic principles (Boolean algebra) to system correctness, and the basic principles of signal transmission through multiplexers.

Course Content:
Calculation and measurement of basic electrical quantities in electrical circuits. Presentation of the operating principles of semiconductors (diodes, bipolar and MOSFET transistors). Integrated circuits. Two-state and three-state logic. Number systems (binary and hexadecimal). Conversion between number systems. Basic operations in the binary system (addition, subtraction, complementation, and logical operations). Basic digital gates (AND, OR, NOT, EXOR). Laws and theorems of Boolean algebra. Combinational and arithmetic logic. Encoders/decoders and multiplexers/demultiplexers. Flip-flops. Shift registers. Counters. A/D and D/A converters.

Learning Outcomes:
Upon successful completion of this course, students will be able to:
1. Calculate the values of electrical quantities in electrical circuits.
2. Explain the operating principles of semiconductor components.
3. Represent numerical values in binary and hexadecimal number systems.
4. Relate schematic diagrams of systems to the principles of Boolean algebra.
5. Interpret the operation of basic digital circuits.
6. Combine basic digital circuits into functional units.

Required Literature:

1. Ožegović, J. Digitalna i mikroprocesorska tehnika, Udžbenik, Veleučilište u Splitu, Split, 2002.
2. Peruško, Glavinić, Digitalni sustavi, Školska knjiga, Zagreb, 2005.
3. Vrhovski, Z.; Šumiga, I., Digitalna tehnika: zbirka riješenih zadataka, Visoka tehnička škola u Bjelovaru, 2015.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: English Language I

Course Code:
DT102

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

Course Objective:
The objective of this course is to acquire professional English vocabulary specific to the field of digital technologies, to consolidate the fundamentals of English grammar, and to apply them in spoken and written communication.

Course Content:
Introduction to the field of digital technologies and basic professional terminology (introduction to information technologies, writing job applications and CVs, computer systems, networks and the Internet, social media and virtual communication, cybersecurity). Basic verb tenses and grammatical structures (present and past tenses in English, adjectives, adverbs, and prepositions).

Learning Outcomes:
Upon successful completion of this course, students will be able to:
1. Correctly use grammatical structures: present and past verb tenses.
2. Use professional terminology and phrases related to the field, with an emphasis on information and communication technologies.
3. Explain fundamental professional concepts using the English language of their discipline.
4. Express their own opinions on selected topics in the field of digital technologies.
5. Write a CV and a job application in English using standard forms.

Required Literature:

1. Glendinning, E. H., McEwan, J.: Oxford English for Information Technology, 2nd Edition, Oxford University Press, Oxford, 2014.
2. Evans, V., Dooley, J., Wright, S.: Career Paths – Information Technology, Express Publishing, 2014.

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Course title: English Language II

Course Code:
DT203

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

Course Objective:
The objective of this course is to acquire professional English vocabulary specific to the field of digital technologies, to consolidate the fundamentals of English grammar, and to apply them in spoken and written communication.

Course Content:
Introduction to the field of digital technologies and basic professional terminology (smartphones, smart homes and smart cities, artificial intelligence, robotics and autonomous vehicles, computer translators). Basic verb tenses and grammatical structures (future tenses in English, definite and indefinite articles).

Learning Outcomes:
Upon successful completion of this course, students will be able to:
1. Correctly use grammatical structures: future tenses, definite and indefinite articles.
2. Use professional terminology and phrases related to the field, with an emphasis on information and communication technologies.
3. Explain fundamental professional concepts using the English language of their discipline.
4. Express their own opinions on selected topics in the field of digital technologies.

Required Literature:

1. Glendinning, E. H., McEwan, J.: Oxford English for Information Technology, 2nd Edition, Oxford University Press, Oxford, 2014.
2. Evans, V., Dooley, J., Wright, S.: Career Paths – Information Technology, Express Publishing, 2014.

VELEUČILIŠTE VELIKA GORICA
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Course title: Industry and Creative Society Levels 4.0 and 5.0

Course Code:
DT312

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

Course Objective:
To distinguish different work environments according to the influence of external and internal factors. To differentiate production systems based on the level of application of computer technology. To organize teamwork in multicultural environments.

Course Content:
Classification of types of industry according to the level of application of computer technology. Presentation of external influences on the organization and working conditions in production. Identification of the conditions required for specific production activities depending on job complexity and applied technology. Linking external influences on production with internal work organization. Presentation of basic features of teamwork. Presentation of the production cycle or life cycle cost analysis (LCC) of production systems.

Learning Outcomes:
Upon successful completion of this course, students will be able to:
1. Identify external and internal factors influencing production.
2. Categorize factors according to their level of threat and impact on the production process.
3. Distinguish between group work and teamwork.
4. Manage production systems that use digital monitoring and control.
5. Use computer technology for data analysis and team communication.

Required Literature:
1. Nousala, S., & Metcalf, G. (2024). Industry 4.0 to Industry 5.0: Explorations in the Transition from a Techno-economic to a Socio-technical Future.

VELEUČILIŠTE VELIKA GORICA
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Course title: Internet and Web Technologies

Course Code:
DT204

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
2	2 + 2 + 0	60	6

Course Objective:
To acquire fundamental knowledge of the Internet network and its services.

Course Content:
The Internet – the network of all networks. Transmission Control Protocol/Internet Protocol (TCP/IP) model. Connection via Local Area Network (LAN). Internet Service Provider (ISP). Point of Presence (POP). Transport layer of the Internet model: TCP and UDP. Internet backbone. Routers. Addressing. Structure of an IP address. Domains – Uniform Resource Locator (URL). Root Domain Name Server (DNS). NAT and DHCP. Web, mail, and FTP servers. BitTorrent protocol. Hypertext Transfer Protocol (HTTP). Other significant Internet services.

Learning Outcomes:
Upon successful completion of this course, students will be able to:
1. Explain the basic Internet protocols.
2. Analyze protocol operations using network traffic capture tools.
3. Configure simple web, mail, and FTP servers.
4. Manage (administer) web, mail, and FTP servers.
5. Test the functionality of fundamental Internet services.
6. Design an IP network in accordance with the available address space.

Required Literature:
1. Lebinac, Valenčić: Računalne mreže, textbook, VVG, 2013.

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Course title: Cybersecurity

Course Code:
DT402

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
4	2 + 2 + 0	60	6

Course Objective:
To introduce students to the fundamental concepts of cybersecurity, including confidentiality, integrity, availability, authentication, non-repudiation, and privacy. To familiarize students with the main activities involved in cybersecurity breaches.

Course Content:
Basic concepts of security. Business continuity and incident response. Physical and logical access controls. Computer networks and security. Data protection and system hardening. Cyber threat analysis. Threat modeling. Network protocols and security. Web security. Cloud security. Mobile device and application security. Security challenges in IoT devices and communication protocols. Advanced security technologies.

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

1. Demonstrate understanding of fundamental cybersecurity concepts, including confidentiality, integrity, availability, authentication, non-repudiation, and privacy.
2. Propose creative solutions to cybersecurity challenges while considering environmental and contextual factors.
3. Collaborate effectively in team environments to achieve shared goals in the field of cybersecurity.
4. Critically evaluate emerging threats and technologies in the area of cybersecurity.
5. Demonstrate independence in identifying and addressing security challenges.
6. Apply ethical principles in handling information and systems.

Required Literature:

1. Bishop, M. Introduction to Computer Security.
2. OWASP Top Ten, Open Web Application Security Project (OWASP).

Course title: Communication and Presentation Skills

Course Code:
DT402

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

Course Objective:
To introduce students to the skills necessary for successful communication and effective public speaking.

Course Content:
Elements of the communication process and principles of communication. Types and goals of communication. The importance of communication for the quality of interpersonal relationships. Communication barriers. Verbal communication. Nonverbal communication. Communication skills – active listening. Communication skills – assertiveness. Structure and preparation of a presentation. Audience analysis. Managing public speaking anxiety. Delivering a persuasive presentation to an audience.

Learning Outcomes:
Upon successful completion of this course, students will be able to:
1. Present the fundamental principles of successful communication.
2. Explain the principles of verbal communication.
3. Recognize and demonstrate nonverbal cues.
4. Create, design, and deliver an effective presentation to an audience.

Required Literature:

1. Tomić, Z., Jugo, D. (2021). Temelji međuljudske komunikacije. Pressum, Synopsis, Edward Bernays UC.
2. Weissman, J. (2006). Prezentacijom do uspjeha: Umijeće predstavljanja. Zagreb: Mate.

VELEUČILIŠTE VELIKA GORICA
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Course title: Communication Systems

Course Code:
DT303

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

Course Objective:
To introduce students to modern communication technologies, to enable understanding of the fundamental principles of communication systems, and to differentiate and identify contemporary telecommunication systems.

Course Content:
Fundamentals of communication networks. Transmission of digital information through conductors. Reflections and interferences. Protocols and coding. Serial and bus protocols (I^2C and CAN bus). Basics of electromagnetic waves – generation, propagation, and reception. Modulation, spectrum, and components. Antenna design and selection. Performance analysis of communication systems (speed, range, reliability, security). Overview of communication systems in modern practice (CAN bus, Ethernet, Wi-Fi, ISM protocols, 5G mobile networks). Case study: selection of a communication system in practical applications.

Learning Outcomes:
Upon successful completion of this course, students will be able to:
1. Distinguish the components of a communication system.
2. Present the process of electronic information transmission.
3. Identify issues related to communication systems.
4. Analyze the performance and specifications of communication systems.
5. Design an antenna for radio communication.
6. Present modern communication systems used in current practice.
7. Select an appropriate communication system for a specific application.

Required Literature:

1. Harris, M., Sklar, B. (2020). Digital Communications: Fundamentals and Applications. O'Reilly.
2. Valožić, P. (2005). Komunikacijski sustavi i mreže, lecture notes, TVZ.

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Course title: Quality and Compliance

Course Code:
DT302

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

Course Objective:
To provide students with knowledge in the field of quality management related to standards, compliance with requirements, quality control, techniques and tools for quality management, and continuous quality improvement.

Course Content:
Definition of quality and quality systems, terminology, aspects of quality and its historical development. Quality control, assurance, and management. Competitiveness. Standardization. ISO 9001 standard – core requirements, system creation within an organization. ISO 19011 standard – auditing and conformity assessment, implementation of audits, identification of nonconformities, corrective actions, and system certification. Accreditation bodies. Risk assessment and planning. Techniques and tools for improving quality systems. The international market and quality management. Education in quality. Knowledge, time, and change management.

Learning Outcomes:
Upon successful completion of this course, students will be able to:
1. Select and apply techniques and tools within a quality management system.
2. Choose and utilize appropriate methods for quality control and management.
3. Identify quality control points within processes.
4. Analyze procedures necessary for implementing a quality management system and evaluate their application within an organization.
5. Collect and interpret information relevant to achieving the required level of quality in processes.

Required Literature:
1. Kacian Ivetić, I. (2018). Osiguravanje i kontrola kvalitete. Iproz d.o.o., Zagreb.

Course title: Principles of Risk Management

Course Code:
DT211

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

Course Objective:
To familiarize students with the specific roles and importance of risk management within various economic contexts.

Course Content:
Theoretical concepts of risk management. The importance of the risk management function. Identification and classification of risks. Regulatory frameworks. Risk management processes. Introduction to ISO standards applied in risk management.

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

1. Define the concept of risk.
2. Analyze different types of risks.
3. Propose appropriate risk responses.
4. Interpret standards related to risk management.

Required Literature:

1. Miloš Sprčić, D. (2013). Upravljanje rizicima: Temeljni koncepti, strategije i instrumenti. Sinergija, Zagreb.

VELEUČILIŠTE VELIKA GORICA
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Course title: Organizational Psychology

Course Code:
DT411

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

Course Objective:
To introduce students to the fundamentals of organizational psychology, determinants of organizational behavior and performance, and possible psychosocial interventions aimed at improving organizational effectiveness and creating a positive and stimulating organizational climate and culture.

Course Content:
The concept of organization and organizational behavior. Introduction to organizational psychology: subject matter and research methods. Psychological models of the relationship between the individual and the organization. Individual differences and work performance: personality, abilities, motivation, and attitudes. Work groups, teams, and performance: group size, group norms, cohesion, communication, group motivation, team effectiveness, and team roles. Organizational climate: perception of the work environment and culture. Organizational culture: beliefs, values, and attitudes nurtured by the organization. Leadership. Fundamentals of managing organizational climate and culture. Stress, mobbing, and burnout at work. Psychosocial interventions within organizations.

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

1. Present the fundamental concepts of organizational psychology and organizational behavior.
2. Analyze the influence of individual differences on work performance.
3. Evaluate factors affecting organizational behavior at the individual, group, and organizational levels.
4. Select and propose various interventions to improve psychosocial working conditions within organizations.

Required Literature:

1. Wagner, J.A. & Hollenbeck, J.R. (2014). Organizational Behavior: Securing Competitive Advantage. Routledge.
2. Jex, S.M., & Britt, T.W. (2014). Organizational Psychology: A Scientist–Practitioner Approach. Wiley.

VELEUČILIŠTE VELIKA GORICA
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Course title: Fundamentals of Mathematics

Course Code:
DT101

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
1	2 + 2 + 0	60	7

Course Objective:
To develop mathematical reasoning skills and reinforce key elements of secondary school mathematics. To introduce the fundamentals of differential and integral calculus, and to apply mathematical software for problem solving and complex calculations.

Course Content:
NUMBERS. MATHEMATICAL LANGUAGE. Arithmetic expressions. Algebraic expressions. Equations and their applications. Coordinate systems.
FUNCTIONS. The concept of a function – functional rule, graph of a function, domain, and range. Continuity. Function sign, growth, decrease, and extrema. Turning points and inflection points. Limit behavior and the concept of a limit.
ELEMENTARY FUNCTIONS. Linear and quadratic functions. Polynomials and rational functions. Roots and powers. Exponential and logarithmic functions. Trigonometric and inverse trigonometric functions.
DIFFERENTIATION. The concept and calculation of derivatives. Applications of differentiation.
INTEGRATION. The concept of indefinite integrals and basic computation rules. Applications of indefinite integrals. The concept of definite integrals, computation rules, and applications of definite integrals.

Learning Outcomes:
Upon successful completion of this course, students will be able to:
1. Formulate equations based on problem situations.
2. Solve equations independently and with the assistance of mathematical software.
3. Analyze a function based on its graph.
4. Identify elementary functions.
5. Apply and compute derivatives independently and with software support.
6. Apply and compute indefinite and definite integrals independently and with software support.

Required Literature:
1. Čulina, B., & Zlopaša, Š. (2010). Matematika za visoke tehničke škole (Parts I, II, and III). Veleučilište Velika Gorica.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Fundamentals of IoT Device Programming

Course Code:
DT205

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
2	1 + 3 + 0	60	6

Course Objective:
To introduce students to the technologies that enable the implementation of Internet of Things (IoT) devices. To apply embedded operating systems and high-level programming languages. To develop a project utilizing IoT technology.

Course Content:
Overview of technologies enabling IoT device implementation. Embedded systems and their applications. Hardware and software environments and interfaces. Embedded operating systems. Software development and the basics of software engineering. Programming languages and tools. Architecture and infrastructure of IoT applications in practice. Implementation of IoT devices (configuration and programming).

Learning Outcomes:
Upon successful completion of this course, students will be able to:
1. Present key technologies that enable the implementation of IoT devices.
2. Explain the structure and use of embedded systems.
3. Identify issues related to network communication.
4. Demonstrate the architecture of IoT systems.
5. Use an embedded Unix operating system in IoT devices.
6. Develop and program an application to implement IoT functionalities.

Required Literature:

1. Macharla Vasu, M. Introduction to Internet of Things, IOTEDU (free).
2. Molloy, D. (2019). Exploring BeagleBone: Tools and Techniques for Building with Embedded Linux. Wiley.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Fundamentals of Web Design

Course Code:
DT304

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
3	1 + 3 + 0	60	5

Course Objective:
To train students to create and edit simple web pages using HTML and CSS. To introduce them to content management systems (CMS) and multimedia content design. To familiarize students with the basics of client-side scripting languages and their use in web development.

Course Content:
Design and publication of simple web pages using HTML and CSS according to given specifications. Working with content management systems (CMS): managing settings, defining user accounts, and ensuring secure use of plug-ins. Solving simple tasks using the JavaScript scripting language. Implementing client-side scripting in web page development.

Learning Outcomes:
Upon successful completion of this course, students will be able to:
1. Select appropriate HTML tags and CSS style elements.
2. Choose and embed suitable multimedia content within an HTML document.
3. Create a simple form for data collection.
4. Select suitable graphic controls for data display.
5. Define user accounts within a content management system.
6. Upload and manage content within a content management system.
7. Implement client-side scripting commands within an HTML document.

Required Literature:
1. Meloni, J., & Kyrnin, J. (2018). HTML, CSS, and JavaScript All in One: Covering HTML5, CSS3, and ES6. Sams Teach Yourself. Pearson Education, United Kingdom.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Applied Mathematics

Course Code:
DT202

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
2	2 + 2 + 0	60	7

Course Objective:
To introduce students to the basic concepts of binary and numerical mathematics, coding and encryption, graph theory, and matrix calculus. To acquire fundamental knowledge of probability theory and basic statistical procedures. To apply mathematical software for solving problems and performing complex calculations.

Course Content:
Binary Mathematics: Boolean functions, binary system, and computer numbers.
Numerical Mathematics: Approximate calculations and computational errors.
Encryption: Basic concepts; encryption using modular algebra (mod n).
Graphs: Modeling with graphs and fundamental concepts of graph theory; depth-first search for cycle detection; breadth-first search for shortest path problems; greedy and dynamic programming methods for shortest weighted path algorithms.
Matrices: Systems of linear equations, coordinate vectors, matrix operations, and solving linear systems.
Probability and Statistics: Populations, random phenomena, and random samples; probabilistic models and variables; data collection and statistical data processing.

Learning Outcomes:
Upon successful completion of this course, students will be able to:
1. Apply and compute Boolean functions.
2. Convert decimal numbers to binary form and perform binary arithmetic operations.
3. Calculate the effect of input errors on computational results.
4. Perform encryption using modular algebra (mod n).
5. Apply graph search algorithms.
6. Perform vector and matrix operations, both manually and using mathematical software.
7. Collect, process, and interpret data using appropriate statistical methods.

Required Literature:

1. Čulina, B., & Majstorović, N. (2012). Uvod u matematičku logiku i osnove matematike. Veleučilište Velika Gorica.
2. Čulina, B., & Zlopaša, Š. (2010). Matematika za visoke tehničke škole, treći dio. Veleučilište Velika Gorica.
3. Čulina, B., & Čulina, D. (2011). Elementarna vjerojatnost i statistika uz pomoć Excela. Veleučilište Velika Gorica.

VELEUČILIŠTE VELIKA GORICA
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Course title: Computer Hardware

Course Code:
DT201

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
2	2 + 2 + 0	60	6

Course Objective:
To introduce students to the organization and operational principles of digital computers, as well as to develop an understanding of peripheral device functionality and configuration.

Course Content:
Basic concepts of digital computers. Data representation in finite registers. Programmatic principles of digital computer operation. Machine code programming. Microprocessors and microcomputers. Structure of a simple microcomputer system. Instruction execution methods. Input/output data transfer (programmed I/O, interrupt-driven I/O, and direct memory access). Processor and control unit. Arithmetic and logic unit (ALU). Semiconductor memory. External memory devices. Memory management. Computer buses and interfaces. Input and output peripheral devices and their operation.

Learning Outcomes:
Upon successful completion of this course, students will be able to:
1. Sketch the logical organization of a digital computer.
2. Compare different methods of data representation in digital systems.
3. Explain models of input/output data transfer within a computer system.
4. Demonstrate the operation and synchronization of computer components.
5. Manage and configure peripheral devices.
6. Use technical literature and software tools for learning and self-study.

Required Literature:

1. Stallings, W. (2016). Computer Organization and Architecture (10th ed.). Pearson Education Inc.
2. Ribarić, S. (1990). Arhitektura mikroprocesora. Tehnička knjiga, Zagreb.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Computer Tools in Business

Course Code:
DT105

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
1	1 + 3 + 0	60	5

Course Objective:
To enable students to use basic computer tools and applications required for everyday work. To introduce them to the possibilities of information and communication technologies and the fundamental principles of their secure use. To develop skills in creating text documents according to given specifications, applying spreadsheet tools for simple business data and process analysis, creating multimedia presentations, and organizing work and resources in the cloud environment.

Course Content:
Basic concepts, structure, origin, and application of information technology. The Windows operating system: purpose, basic user functions, and practical use. Word processing software – basic and advanced document formatting functions. Presentation software – basic and advanced application features. Spreadsheet software – concepts and business functions in practical use. Fundamentals of working in a cloud environment.

Learning Outcomes:
Upon successful completion of this course, students will be able to:
1. Present the main concepts and components of information technology.
2. Use key user functions of the Windows operating system and applications from the Microsoft Office suite and alternative software solutions.
3. Use online tools for work in a digital environment.
4. Present professional content using appropriate applications.

Required Literature:

1. Lambert, J., & Frye, C. (2019). Microsoft Office 2019 Step by Step. Pearson Education, Inc.
2. Preppernau, J., Lambert, J., & Frye, C. (2010). Microsoft Office 2010 – Step by Step. Algoritam.

VELEUČILIŠTE VELIKA GORICA
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Course title: Satellite Navigation

Course Code:
DT313

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

Course Objective:
To present and explain the fundamental principles of global satellite positioning and navigation systems and their role in air, maritime, and land transport, as well as in other applications within the context of sustainable societal development.

Course Content:
The importance and historical development of navigation; fundamentals of inertial navigation. Local and global geographic coordinates. Operating principles and main segments of Global Navigation Satellite Systems (GNSS): satellite, control, and user segments. Satellite orbits around Earth (geosynchronous orbits) and satellite constellations. Basic characteristics of satellites; operation of atomic clocks and solar panels. Satellite communication: electromagnetic waves, frequency, amplitude and phase modulation, and signal coding.
Determination of global geographic coordinates using the trilateration method. The influence of atmospheric conditions, space weather, and anthropogenic structures on satellite positioning accuracy. Improvement of GNSS accuracy and integrity: differential systems and geostationary satellite-based augmentation systems (e.g., EGNOS). Applications of satellite positioning and navigation and their role in sustainable development.

Learning Outcomes:
Upon successful completion of this course, students will be able to:
1. Explain the physical principles of communication satellite orbits.
2. Interpret radio wave communication and satellite signal coding.
3. Explain the mathematical principle of determining global geographic coordinates using trilateration.
4. Present the operational principles of satellites.
5. Discuss the effects of atmospheric and space disturbances and anthropogenic structures on satellite communication.
6. Analyze applications of satellite navigation.

Required Literature:
1. Kaplan, E.D., & Hegarty, C.J. (2017). Understanding GPS: Principles and Applications (3rd Edition).

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Artificial Intelligence

Course Code:
DT301

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
3	2 + 2 + 0	60	6

Course Objective:
To introduce students to the fundamental concepts and historical context of artificial intelligence (AI) and its practical applications.

Course Content:
Introduction to Artificial Intelligence (AI): Historical overview and fundamental concepts of AI. Examination of AI applications in everyday life.
Machine Learning (ML): Basic principles and approaches of supervised, unsupervised, and reinforcement learning.
Deep Learning (DL): Understanding the core concepts and practical applications of deep learning in AI.
Natural Language Processing (NLP): Fundamentals of NLP with practical exercises in text data processing.
Computer Vision: Basics of image recognition and processing.
Audio Processing: Introduction to sound analysis and hands-on exercises with audio data.
Video Processing: Fundamentals and practical exercises with video data.
Python for AI: Syntax, data structures, and programming principles in Python with an emphasis on AI applications.
AI Project Development: Identification of potential AI applications in specific contexts; development of strategies for integrating AI into business processes. Basics of project management in AI development — planning, implementation, and monitoring.
Ethics and Legal Aspects of AI: Exploration of ethical dilemmas, societal implications, and regulatory frameworks surrounding AI technologies.

Learning Outcomes:
Upon successful completion of this course, students will be able to:
1. Critically evaluate the impact of artificial intelligence on societal development.
2. Apply basic techniques of supervised, unsupervised, and reinforcement learning.
3. Develop and implement simple AI projects using deep learning techniques, such as image recognition or text processing.
4. Present and discuss their perspectives and solutions regarding AI-related challenges.
5. Critically assess the suitability of different software tools for AI implementation.

Required Literature:

1. Stipaničev, D., Šerić, L., & Braović, M. (2021). Uvod u umjetnu inteligenciju. Edited by V. Papić. Split: Fakultet elektrotehnike, strojarstva i brodogradnje.
2. Kelleher, J.D., & Tierney, B. (2021). Znanost o podacima. Mate d.o.o. (www.ebook024.com)
3. Kelleher, J.D. (2021). Duboko učenje. Mate d.o.o. (www.ebook024.com)
4. Alpaydin, E. (2021). Strojno učenje. Mate d.o.o. (www.ebook024.com)

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Stress Management

Course Code:
DT112

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

Course Objective:
To familiarize students with the fundamental concepts related to the phenomenon of stress and to introduce techniques for managing stress at both the individual and organizational levels, with the aim of preventing stress and reducing or eliminating its harmful effects.

Course Content:
Definition of stress, stressors, and stress reactions. Physiological foundations of stress and its impact on health. Social and cognitive approaches to stress. Coping strategies. The role of humor in stress management. Social support and its importance in stress resilience. Stress measurement methods. Stress management approaches and selection of appropriate techniques. Specific forms of stress in modern environments, including techno-stress, workplace bullying (mobbing), and burnout.

Learning Outcomes:
Upon successful completion of this course, students will be able to:
1. Explain fundamental concepts related to stress.
2. Identify causes, signs, and symptoms of stress.
3. Describe the physiological, psychological, and social foundations of stress.
4. Propose coping strategies and stress management techniques at both the individual and organizational levels.
5. Demonstrate selected stress management techniques.

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

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Introduction to Databases

Course Code:
DT305

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
3	2 + 2 + 0	60	6

Course Objective:
To provide students with fundamental knowledge of database concepts and the use of relational databases within information systems.

Course Content:
Basic concepts of databases. Database management systems (DBMS). Relational databases and data structures. Introduction to SQL language. Entity-relationship (ER) model. Database normalization. Advanced SQL queries. Introduction to database programming. Fundamentals of PL/SQL programming language. Advanced techniques for database programming. Database security and data protection principles.

Learning Outcomes:
Upon successful completion of this course, students will be able to:
1. Present the functions and purposes of databases.
2. Administer and manage database systems.
3. Use SQL queries on relational databases.
4. Define user views of a database and collaborate in database team environments.
5. Adapt and organize database content at the organizational level.
6. Develop data models and translate them into relational models.

Required Literature:

1. Manager, R. (2012). Baze podataka. Element.
2. Connolly, T., & Begg, C. (2014). Database Systems. Addison-Wesley.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Introduction to Management

Course Code:
DT111

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

Course Objective:
The objective of this course is to introduce students to the fundamental concepts of management and its core functions. By completing the course, students will acquire basic competencies necessary for the effective application of management principles in business operations and organizational settings.

Course Content:
The role and significance of management in modern business environments; definition of management. Management functions, managerial levels, and skills. Management and the business environment. Planning — definition, process, and elements. Business decision-making. The organizing function. Human resource management. Leadership and motivation. The controlling function and performance monitoring.

Learning Outcomes:
Upon successful completion of this course, students will be able to:
1. Interpret the functions, development, and context of management.
2. Prepare a basic business plan.
3. Choose an appropriate organizational structure.
4. Discuss the role of human resources within business organizations.
5. Identify the characteristics of individual and group behavior, motivation, and leadership styles.
6. Design a control system for a business organization or one of its segments.

Required Literature:
1. Sikavica, P., Bahtijarević-Šiber, F., & Pološki Vokić, N. (2008). Temelji menadžmenta. Školska knjiga, Zagreb.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Introduction to Programming

Course Code:
DT104

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
1	1 + 3 + 0	60	7

Course Objective:
To understand, adopt, and apply the fundamental principles of programming in the Python programming language, and to develop the ability to systematically approach problem-solving in software development using the principles of structured programming.

Course Content:
Introduction to computer data processing. Programming languages (Python). Algorithms. Basic program structure. Data types. Assigning values to variables. Expressions. Output and input operations. Conditional statements (IF). Loops (for, while). Lists. Subroutines. Files. Functions. Modules. Error handling. Solving algorithmic problems using the Python programming language. Designing algorithms and program modules for solving mathematical and technical tasks.

Learning Outcomes:
Upon successful completion of this course, students will be able to:
1. Apply the structure of a programming language, including its lexical, syntactic, and semantic aspects.
2. Analyze program execution in the Python programming language.
3. Write simple and complex programs using fundamental data types and data structures in Python.
4. Apply the principles of structured and modular programming to solve practical problems within their field.
5. Use and adapt program modules created by other authors when writing their own programs.

Required Literature:

1. Python v3.x.x Online Documentation
2. Dovedan Han, Z. (2021). Progovorimo pythonski. Self-published: Zdravko Dovedan Han, Zagreb. ISBN: 978-953-49798-0-8

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Green Technologies and Sustainable Development

Course Code:
DT311

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

Course Objective:
The course Green Technologies and Sustainable Development aims to provide students with an understanding of innovative technologies and practices that support sustainable development and reduce environmental impact. Upon completion, students will possess comprehensive knowledge of the role of technology in achieving sustainability. They will be able to identify and analyze sustainability challenges, propose and implement green technology-based solutions, and critically evaluate ethical issues related to the use of technology in environmental preservation.

Course Content:
Definitions and concepts of sustainability. Global environmental and resource challenges. Environmental pollution and industry. Analysis of air, water, and soil pollution. Technological approaches to reducing negative impacts. Climate change: adaptation and mitigation through technological solutions. Sustainability policies and legal frameworks. National and international initiatives. IPCC directives. EU sustainability goals and initiatives. The European Green Deal. Renewable energy sources: solar, hydro, geothermal, wind, biomass, biofuels. Energy efficiency. Smart cities and buildings. Sustainable mobility. Biocomposites and advanced materials. Circular economy. Recycling and reuse of waste. Waste reduction and eco-design.

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

1. Explain the economic, ecological, and social aspects of sustainable development.
2. Identify global challenges related to the environment and resources.
3. Present applications of green technologies and the objectives of the EU Green Deal.
4. Describe the importance of environmental protection, sustainability policies, and legal frameworks.
5. Compare different renewable energy sources and technologies for their implementation.
6. Propose measures for sustainable waste management, eco-design application, and climate change adaptation.

Required Literature:

1. Kiš, D., Kalambura, S., Racz, A., Jovičić, N., & Brdarić, D. (2021). Održivi razvoj – odabrani pojmovi. Osijek: Faculty of Agrobiotechnical Sciences, Josip Juraj Strossmayer University of Osijek.
2. Kalambura, S., & Jovičić, N. (2018). Ekologija. Velika Gorica University of Applied Sciences.
3. Kiš, D., Jovičić, N., Kalambura, S., Vila, S., & Guberac, S. (2021). Novi trendovi obrade biomase – biokompoziti, in Neke mogućnosti iskorištenja nusproizvoda prehrambene industrije, Book 3. Osijek: Faculty of Food Technology, Josip Juraj Strossmayer University of Osijek.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

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Course Code:
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2. Kalambura, S., & Jovičić, N. (2018). Ekologija. Velika Gorica University of Applied Sciences.
3. Kiš, D., Jovičić, N., Kalambura, S., Vila, S., & Guberac, S. (2021). Novi trendovi obrade biomase – biokompoziti, in Neke mogućnosti iskorištenja nusproizvoda prehrambene industrije, Book 3. Osijek: Faculty of Food Technology, Josip Juraj Strossmayer University of Osijek.