



ВИСОКА ТЕХНИЧКА ШКОЛА
СТРУКОВНИХ СТУДИЈА
у Новом Саду

COURSE CATALOGUE

WEB DESIGN

Undergraduate applied studies

NOVI SAD,

May 2023

Table 5.2.a – Course catalogue of the WEB DESIGN undergraduate study programme

No.	Course code	Course title	Field of Study	Semester	Lecture	Lab	Other Forms of Teaching	Other Hours	ECTS
1	2053	Fundamentals of programming	Electrical and Computer Engineering	1	3	1	1	0	7
2	2092	Fundamentals of photography	Applied Arts and Design	1	2	2	0	0	5
3	2010	Fundamentals of computing	Electrical and Computer Engineering, Technological engineering	1	1	1	1	0	6
4	Elective option 1 (select 1 of 2)								
	2001	Business communications	Cultural Studies and Communications, Applied Arts and Design	1	3	1	0	0	6
	2132	Business law	Legal Sciences	1	3	1	0	0	6
5	2068	Introduction to web design	Electrical and Computer Engineering, Applied Arts and Design	2	2	2	0	0	6
6	2055	Computer graphics	Technological Engineering, Mechanical Engineering, Applied Arts and Design	2	1	2	1	0	6
7	2084	Elements of art	Applied Arts and Design	2	2	2	0	0	6
8	2075	Theoretical basis of visual communications	Applied Arts and Design	2	3	1	0	0	6
9	2056	Fundamentals of web technologies	Electrical and Computer Engineering	2	2	3	0	0	6
10	Elective option 2 (select 1 of 2)								
	2054	Object-oriented programming	Electrical and Computer Engineering	2	3	2	0	0	7
	2089	Book and newspaper design	Applied Arts and Design	2	2	2	0	0	6
11	2070	Computer animations	Electrical and Computer Engineering, Mechanical Engineering, Technological Engineering	3	2	1	1	0	6
12	2085	Fundamentals of design	Applied Arts and Design	3	2	1	1	0	7
13	2057	Web design	Electrical and Computer Engineering, Applied Arts and Design	3	2	2	1	0	7
14	2059	Relational databases	Electrical and Computer Engineering	3	2	2	0	0	6
15	Elective option 3 (select 1 of 2)								
	2072	Fundamentals of graphic production	Technological Engineering	3	2	2	0	0	6
	2076	Typography	Applied Arts and Design, Cultural Studies and Communications, Technological Engineering	3	3	2	0	0	6

16	2015	English	Philological Sciences	4	2	0	0	0	3
17	2069	Audio and video technologies	Electrical and Computer Engineering, Technological Engineering	4	3	3	0	0	7
18	2062	Web databases	Electrical and Computer Engineering	4	2	2	0	0	6
19	2060	Client programming	Electrical and Computer Engineering, Математичке науке	4	2	1	1	0	6
20	2086	Graphic design	Applied Arts and Design	4	2	1	1	0	6
21	2058	Computer networks	Electrical and Computer Engineering	5	3	2	0	0	7
22	2018	Specialist English	Philological Sciences	5	2	0	0	0	3
23	2071	Website optimization	Electrical and Computer Engineering, Математичке науке	5	2	1	0	0	6
24	Elective option 4 (select 1 of 2)								
	2064	Development of e-business applications	Electrical and Computer Engineering	5	3	1	1	0	7
	2077	Printing form preparation	Technological Engineering	5	3	1	1	0	7
25	Elective option 5 (select 1 of 2)								
	2042	Modelling and 3D printing	Mechanical Engineering, Technological Engineering,	5	3	1	1	0	7
	2087	Packaging	Technological Engineering	5	2	3	0	0	7
26	2106	Work practicum	Legal Sciences, Environmental and Occupational Safety Engineering, Cultural Studies and Communications, Technological Engineering	6	4	4	0	0	7
27	2107	Theoretical and experimental bases of professional work	Mechanical Engineering, Electrical and Computer Engineering, Cultural Studies and Communications, Technological Engineering	6	6	4	0		9
28	2125	Professional practice	Electrical and Computer Engineering	6	0	0	0	0/6	4
29	2145	Preliminary thesis	Electrical and Computer Engineering	6	0	0	0	2/0	2
30	2146	Final thesis	Electrical and Computer Engineering	6	0	0	0	0/3	8

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Table 5.2. – Course Specification

Study programme: Web design			
Course title: Fundamentals of programming			
Teacher: Ninoslava Tihi			
Course status: Compulsory			
Number of ECTS: 7			
Prerequisite course: None			
Course objective The objective of the course is for students to master the basics of procedural programming and to become capable of solving concrete problems by designing appropriate algorithms and creating console applications in the C# programming language.			
Learning outcomes Students are capable of independently creating console applications in the C# programming language to solve concrete problems by applying the universal principles of procedural programming.			
Course contents <i>Theoretical teaching</i> Algorithms: Properties of algorithms – finiteness, definiteness, effectiveness, and generality. Representing algorithms using flowcharts. Input/output blocks, computational blocks, and decision blocks. Sequential, branching, and cyclic algorithms. Application of mathematical logic in programming. Logical operations and their role in decision blocks. Basics of the C# Programming Language: Downloading, installing, and using the Microsoft Visual Studio Integrated Development Environment (IDE). Creating a console application. Writing and compiling code. Using the debugger. Variables: initialization, declaration, and value assignment. Operators: arithmetic, logical, and comparison operators. Variable type conversion. Enabling data input via the console window using the Console.ReadLine() statement. Displaying data on the screen using the Console.Write() and Console.WriteLine() methods. Control structures: if(), if()-else, else if(), and switch(). Application of logical operators within control structures. User input validation. The role of try and catch blocks in error handling. Loops: for(), while(), and do-while(). Counters. Arrays and array manipulation: array declaration, array creation, array elements, and array length. Methods: Methods without input parameters and return values (applying the void keyword). Methods with input parameters and methods with return values. Preparing a program for standalone execution: Creating .exe files. <i>Practical teaching</i> Application of sequential, branching, and cyclic algorithms in problem-solving. Application of mathematical logic in problem-solving. Working within the Microsoft Visual Studio development environment. Creating applications with user input. Applying control structures, data type conversions and try/catch blocks in processing user input data. Developing programs using loops and working with arrays. Utilizing methods for code organisation. Implementing methods with and without input parameters. Implementing methods with and without return values. Creating executable versions of programs (.exe files).			
Literature Krunic, T.; Osnovi programiranja, VTŠSS, Novi Sad, 2017 Miles R.: C# osnove programiranja, Računarski fakultet Beograd, 2017 Kraus L., Rešeni zadaci iz programskog jezika C#, Akademska misao, Beograd, 2017 Krunic, T.; Uvod u programiranje, VTŠSS, Novi Sad, 2010 Gocić M., Programski jezik C#: pitanja, odgovori i rešeni zadaci, Mikroknjiga, 2013			
Active teaching classes: 75		Theoretical teaching: 45	Practical teaching: 30
Teaching methods Monologic, interactive, laboratory.			
Assessment (maximum number of points 100)			
Pre-exam obligations	Points	Course exam	Points
Active participation in classes		Written exam	50
Practical work		Oral exam	
Interim exam/s	30		
Project presentation	20		

Study programme: Web design			
Course title: Fundamentals of photography			
Teacher: Sibila Petenji Arbutina			
Course status: Compulsory			
Number of ECTS: 5			
Prerequisite course: None			
Course objective Teaching students the analytical observation of photography, including technical, aesthetic, and creative aspects, alongside the fundamentals of digital photography. Introducing students to different fields of photography, their types, and their application in graphic design, web design, and industrial product design.			
Learning outcomes Students will develop the ability to recognize and select high-quality photographs from various photographic fields and apply them to graphic design, web design, and industrial product design. Proficiency in operating DSLR cameras.			
Course contents <i>Theoretical teaching</i> The origin and development of photography. The position and interpretation of photography throughout history. Photography today. Reading photography and its application. The importance of photography in applied arts. Stock photography agencies. Legal use of photography. Photography quality. Fields and types of photography. Cameras – types and purpose. Lenses – types and purpose. Additional photographic equipment. Light. Aperture. Exposure. Sharpness and depth of field. ISO value. Film sensitivity. White balance. Black and white photography. Colour photography. Photographic accessories. Analog and digital photography. Photographic studio and equipment. Framing and composition. Camera angle. Digital photo processing. <i>Practical teaching</i> Techniques of shooting photographs in exterior, interior, and photographic studio environments using adequate equipment. Practical work in a photographic studio and on location (exterior). Basic digital photo editing. Photography analysis.			
Literature Petenji, S.: Osnove fotografije, nastavni materijal u elektronskoj formi, 2021 Lazic, D.: Tatarevic V., Fotografija, Zavod za udžbenike, Beograd, 2014 Kelby, S: Digitalna fotografija 1, 2, 3, 4, Mikroknjiga, Beograd, 2006., 2007., 2010., 2017 Hedgecoe, J: Sve o fotografisanju, Mladost Zagreb, 1977 Wels, L: Fotografija, Clio, Beograd 2011			
Active teaching classes: 60		Theoretical teaching: 30	Practical teaching: 30
Teaching methods: Monologic, dialogic, interactive, demonstrative			
Assessment (maximum number of points 100)			
Pre-exam obligations	Points	Course exam	Points
Active participation in classes		Written exam	
Practical work	30	Oral exam	
Interim exam/s	20	Project assignment	50
Seminar paper/s			

Study programme: Web design			
Course title: Fundamentals of computing			
Teacher: Lazo Manojlović			
Course status: Compulsory			
Number of ECTS: 6			
Prerequisite course: None			
Course objective To enable students to learn the fundamental concepts of information technology related to computer components, hardware, software, the concepts of primary memory (RAM) and external storage, information networks, and internet security. Additionally, students should learn to use word processing software such as Word, spreadsheet software such as Excel, raster graphics editing software such as Photoshop, and presentation software such as PowerPoint, or similar applications, in their daily work.			
Learning outcomes Proficient use of Word, Excel, Photoshop, PowerPoint, or similar applications in daily life, further education, and future career. Students are equipped to use the Windows operating system and to properly and safely utilize the internet and its services. By understanding the basic functions and services of computers, students will be able to further develop more detailed, specific knowledge depending on their future profession.			
Course contents <i>Theoretical teaching</i> Computer development to date and future development directions. Number systems. Binary number system and arithmetic operations. Data encoding in a computer. Code pages. Boolean algebra and its application. Logic gates in a computer. Computer organization and architecture. Computer hardware components. Processor (CPU). Motherboard. Primary memory (RAM). Types of external storage. Input devices. Output devices. Video system. The role and importance of the internet. Internet services. Types of computer software. The role of the operating system. The concept of an information system. Types of computer applications. Safe computer operation. <i>Practical teaching</i> Basics of using the Windows operating system. Basics of using the Internet. Working with software applications: word processing (Word or similar), spreadsheets (Excel or similar), photo editing (Photoshop or similar), and presentations (PowerPoint or similar).			
Literature Ružić Dimitrijević, Lj., Lovreković, Z., Subić, N.: Računari i praktikum, VTŠ, Novi Sad, 2015 Zoranović, T.: Informatika, Poljoprivredni fakultet, Univerzitet u Novom Sadu, Novi Sad, 2021 Jovanović, P.: Računajte na računare (digitalna edicija), Računajte na računare, 2010 Eremić, Ž.: Računari - udžbenik, Visoka tehnička škola strukovnih studija u Zrenjaninu, Zrenjanin, 2021 Frye C.: Microsoft Office Excel 2019: korak po korak, CET, 2019			
Active teaching classes: 45		Theoretical teaching: 15	Practical teaching: 30
Teaching methods Monologic, interactive, laboratory.			
Assessment (maximum number of points 100)			
Pre-exam obligations	Points	Course exam	Points
Active participation in classes	5	Written exam	50
Practical work	45	Oral exam	
Interim exam/s			
Seminar paper/s			

Study programme: Web design			
Course title: Business communications			
Teacher: Jovana Kopanja			
Course status: Elective			
Number of ECTS: 6			
Prerequisite course: None			
Course objective To equip students for written and oral communication within the organization and with its environment under contemporary business conditions, and to provide them with insights into the relevant social, cultural, sociological, economic, and political factors.			
Learning outcomes Based on the mastered material, the student will understand the process, functions, models, forms, and channels of business communications, as well as their strategic importance and role in creating the enterprise's identity, reputation, and value. The student will be able to communicate successfully within and outside the enterprise while understanding an interconnected yet culturally, religiously, and socio-politically diverse world. The student will master basic grammatical rules, know how to select adequate vocabulary, and independently write a business letter and email, respecting the rules of business correspondence.			
Course contents <i>Theoretical teaching</i> Language in communication: Defining the terms language and communication. Elements and phases of communication. Language and speech. Language and script. Oral and written speech. Speech culture. Cultivated speech. Attributes of good speech. Orthography: Basic spelling rules. Sound changes: Sound change rules and examples of deviations. Communicative competence: The concept of linguistic culture. Levels of speech culture. Grammatical norm. Use of foreign words. Social and individual language stratification. Speech constants. Criteria for assessing communicative competence. Personal appearance in business communication: Business communication. Verbal and non-verbal communication. Paralinguistic cues. Distance between interlocutors. Pauses in speech. The importance of active listening in communication. Business conversation. Telephone conversation. Elements of business presentation. Forms of personal appearance. The concept of empathy. Public relations: Manipulation in mass communication. Disinformation. Advertising. Propaganda. Defining the concept of public relations and its role. Communication procedures in public relations. Public relations tools. Advantages and disadvantages of public relations. Written business communication: Written business communication. Advantages and disadvantages of written business communication. Electronic communication. Visual communication. Culture and language culture: Culture as thinking and process. The relationship between culture and language culture. Creativity and communication - techniques of creative thinking: The concept of creativity. Intelligence and creativity. Negotiation: Motives for negotiations. Approaches to negotiation. Methods of negotiation. Preparation for negotiations. The negotiation process. Conclusion and implementation of agreements. Society, state and nation: Explanation of the concepts of society, state and nation. Man and organization, organizational culture: Formal and informal communication. The concept of bureaucracy. Bureaucratic style. Vertical and horizontal forms of formal communication. Types of organizations. Socio-cultural and psychological barriers to communication and their overcoming. Communication between cultures and communication strategies. Communication and cultural context. Cultural differences. Business communication contexts: Idea formation. Oral presentation. Business meetings and negotiation strategy. Types of power in communication. Business communication contexts: Marketing communications. Stakeholder philosophy. Problem-solving and decision-making. <i>Practical teaching</i> In practical classes, students will master the principles of good written and oral communication through practical examples, written and listening exercises. Using examples and exercises, students will become familiar with grammatical rules at the levels of phonology, morphology, syntax, and vocabulary. Students will write a business letter and email and prepare for a business conversation and meeting.			
Literature Šipka, M.: Pravopisni rečnik srpskog jezika, Novi Sad, Prometej, 2010 Čokorolo R.: Poslovne komunikacije, Novi Sad, Alfagraf, 2008 Pešikan, M., Pižurica, M., Jerković, J.: Pravopis srpskog jezika, Novi Sad, Matica Srpska, 2017 Pavić, Ž.: Etika i poslovne komunikacije, Beograd, Univerzitet Singidunum, (elektronska verzija), 2011 Šulc fon Tun, F.: Kako razgovaramo? Problemi i rešenja, Beograd, Laguna, 2020 Šulc fon Tun, F.: Kako razgovaramo 2: Stilovi, vrednosti i razvoj ličnosti, Beograd, Laguna, 2020			
Active teaching classes: 60		Theoretical teaching: 45	Practical teaching: 15
Teaching methods: Oral presentation, conversation, discussion and demonstration.			
Assessment (maximum number of points 100)			
Pre-exam obligations	Points	Course exam	Points
Active participation in classes		Written exam	50
Practical work		Oral exam	
Interim exam/s	50		
Seminar paper/s			

Study programme: Web design			
Course title: Business law			
Teacher: Ivan Bulatović			
Course status: Elective			
Number of ECTS: 6			
Prerequisite course: None			
Course objective The aim of this course is to familiarize students with the legal framework of business and managerial decision-making. Students acquire foundational knowledge of general legal concepts, core institutes of various branches of law, business entities, and their business relationships. In addition to theoretical fundamentals, this course provides systematized practical insights necessary for understanding and resolving specific business issues. Furthermore, students will develop practical skills in drafting contracts, formulating offers, and executing acceptances. They will explore the differences between Serbia's Law on Personal Data Protection and international privacy regulations. Finally, the course covers the basics of drafting copyright agreements, as well as preparing patent applications and structuring invention descriptions.			
Learning outcomes By mastering the course content, students acquire the following specific competencies: thorough knowledge and understanding of the principles of law, and the ability to solve specific problems by connecting basic knowledge from different branches of law, such as property law, law of obligations, and intellectual property law. Students acquire and improve their ability to apply innovations in the profession by following current regulations and legal commentaries in professional literature. In addition, they develop skills for independent work and the practical application of knowledge (drafting contracts, making offers, and accepting offers). Students will also familiarize themselves with drafting <i>service agreements</i>, preparing patent applications, and structuring invention descriptions within those applications.			
Course contents <i>Theoretical teaching</i> General concepts in law: State, legal order and legal system, legal norm, concept and attributes of a legal entity. Concept and types of property rights: Concept of property rights, things, state property, ownership rights. Law of obligations: Contracts, types of contracts, formation of a contract, offer, acceptance of an offer, subject matter of a contract, legal instruments for securing contract performance and liability for damages. Right to privacy and data processing: Privacy – concept, Law on Personal Data Protection in Serbia and global privacy protection laws. Jurisdictional challenges. Intellectual property: Forms of intellectual property. Copyright and related rights: Copyrighted work as an object of protection. Scope of protection of copyrighted work. Classification of copyrighted works. Subject of copyright - author and copyright holder, as well as co-authors and joint works. Origin and content of subjective copyright: Moral rights. Economic rights. Limitations of subjective copyright and its duration. Database producer's right: Database as an object of protection. Subject matter and content of protection. Duration of rights. Rights of the first publisher of an unprotected work: Subject matter, scope and content of protection. Duration of rights. Industrial property rights: Patent law. Invention as an object of protection. Patentability criteria. Invention right - right to patent protection: Conflict between two independent inventors over the right to a patent. Lawsuit for determining inventor status. Lawsuit for challenging the right to protection. Specifics of the patent granting procedure: Patent application, sufficient description of the invention in the application, unity of invention – divisional application, supplementary application, right of priority, publication of the invention and substantive examination. Origin, duration and termination of the patent: Termination with <i>ex nunc</i> effect. <i>Practical teaching</i> During practical classes, students will review the covered material and analyze real-world case studies. They will engage in drafting various types of contracts, as well as making and accepting offers. Through case analysis, students will examine and identify the differences between Serbia's Law on Personal Data Protection and international privacy regulations. Furthermore, they will practice drafting copyright agreements, evaluating patentability criteria, preparing patent applications, and structuring invention descriptions within those applications.			
Literature Ljubojević, G., Milošević, I., Poslovno pravo, Visoka poslovna škola strukovnih studija, Novi Sad, 2020 Vernart, B., Međunarodno pravo i poslovanje, Visoka poslovna škola strukovnih studija, Novi Sad, 2022 Marković, S., Popović, D., Pravo intelektualne svojine, Pravni fakultet univerziteta u Beogradu, Beograd, 2022 Spirović-Jovanović, L., Dabić, L., Poslovno pravo, Beograd, Ekonomski fakultet Beograd, 2015 Šogorov, S., Radoman, M., Poslovno pravo, Univerzitet Singidunum, Beograd, 2007			
Active teaching classes: 60		Theoretical teaching: 45	Practical teaching: 15
Teaching methods: Oral presentation, conversation, discussion and demonstration.			
Assessment (maximum number of points 100)			
Pre-exam obligations	Points	Course exam	Points
Active participation in classes	10	Written exam	50
Practical work		Oral exam	
Interim exam/s	40		
Seminar paper/s			

Study programme: Web design			
Course title: Introduction to web design			
Teacher: Željko Eremić			
Course status: Compulsory			
Number of ECTS: 6			
Prerequisite course: None			
Course objective Introduction to the basic principles and current trends of web design and their practical application. Mastering the techniques of designing website mockups and developing responsive websites using a development environment based on a grid system.			
Learning outcomes Upon successful completion of the course, students will be able to independently create a mockup and develop a responsive website based on it, utilizing a grid system development environment. Throughout the process, students will successfully apply contemporary web design trends to the final product.			
Course contents <i>Theoretical teaching</i> Basic principles of web design. Usability and accessibility of a website. Methods for checking the accessibility and usability of websites. W3C organization and standards in web design. Structure and elements of a website. Navigation menus, headers, footers, sidebars. Trends in web design: Parallax effect (applied to photos and web pages), one-page website, hero-image, giant typography, ghost button, card layout, animated backgrounds, motion animation, etc. The concept of responsive web design: Planning web page content that will be adaptable to various devices and screen sizes. Grid system and its role in responsive web design. Planning the layout of web page content on a grid system. Technical aspects of optimizing web page elements for mobile phones. Optimization of images and video materials. Mobile-first and Desktop-first approaches to website planning. Website planning models. Mockups and working environments for creating website mockups: Balsamiq Mockups and Pencil. Creating desktop, tablet, and mobile versions of mockups. Inserting content: placeholders for images, video, and text, contact form elements, etc. Connecting pages with links. Importing and exporting mockups to HTML and PDF. Introduction to application programs for creating websites: Wix. <i>Practical teaching</i> Developing a mockup of a responsive website that follows the aforementioned web design principles and contemporary trends, while respecting the element layout on a grid system. Building a responsive website using the appropriate software application (Wix). The newly developed website must align with the core principles of web design, as well as the modern trends presented to students throughout the course.			
Literature Krunić T.: Uvod u veb dizajn, Materijal sa predavanja u elektronskoj formi, 2017 Grant W.: 101 princip za dobar UX dizajn, Kompjuter biblioteka, Beograd, 2018 Dimitrijević Ružić Lj.: Uvod u veb dizajn, Visoka tehnička škola strukovnih studija, Beograd, 2010			
Active teaching classes: 60		Theoretical teaching: 30	Practical teaching: 30
Teaching methods: Monologic, interactive.			
Assessment (maximum number of points 100)			
Pre-exam obligations	Points	Course exam	Points
Active participation in classes		Written exam	50
Practical work		Oral exam	
Interim exam/s			
Seminar paper/s			
Project tasks*	50		

Study programme: Web design			
Course title: Computer graphics			
Teacher: Biljana Gemović			
Course status: Compulsory			
Number of ECTS: 6			
Prerequisite course: None			
Course objective Introduction to displaying and creating graphics on a computer and mastering relevant software in accordance with current advances in information technology.			
Learning outcomes Ability to professionally perform jobs and tasks that are functionally and content-wise related to the use of computers (graphic designers, television designers, animators, graphic interface designers, web programmers, graphic software engineers), and mastering current programs related to computer graphics.			
Course contents <i>Theoretical teaching</i> Introduction: Visual communications. Computer graphics. Interactive computer graphics. Dynamics in interactive computer graphics. History: Development of computer graphics. First applications of computer graphics. Emergence of personal computers and computer graphics systems. Graphics output technology: Vector technology, display method, advantages and disadvantages. Raster technology, display method, advantages and disadvantages. Raster and colors. Printers. Plotters. Video technologies. Panel technologies. Graphics input technology: Keyboard, mouse, light pen, digitizer, panels, trackball, scanner, camera. Graphics software: Development of graphics software. Types of graphics software. Graphics systems: Parts of graphics systems. Graphics transformations. Interaction processing. Image processing. Application of computer graphics: Design; Business application; Publishing; Image processing; Science; Education; Web graphics; Advertising. <i>Practical teaching</i> Computer-based exercises. Practicing training in relevant current computer programs (CorelDraw, InDesign, Adobe Photoshop and AutoCad) and preparing for practical computer lab assignments.			
Literature Gemović, B. Kompjuterska grafika, Visoka tehnička škola strukovnih studija u Novom Sadu, Novi Sad, 2020 Kovačević S., Gemović B. CAD, Visoka tehnička škola strukovnih studija u Novom Sadu, Novi Sad, 2009 Kelby S., Photoshop CC knjiga za digitalne fotografije, Mikroknjiga, Beograd, 2017 Cvetković D., Računarska grafika, Mikroknjiga, Beograd, 2006 Aleksić Z., Coreldraw 12, Čačak, 2005			
Active teaching classes: 60		Theoretical teaching: 30	Practical teaching: 30
Teaching methods Monologic, interactive, and demonstrative.			
Assessment (maximum number of points 100)			
Pre-exam obligations	Points	Course exam	Points
Active participation in classes	10	Written exam	50
Practical work		Oral exam	
Interim exam/s	40		
Seminar paper/s			

Study programme: Web design			
Course title: Elements of art			
Teacher: Sibila Petenji Arbutina			
Course status: Compulsory			
Number of ECTS: 6			
Prerequisite course: None			
Course objective Introducing students to visual elements and their role in visual arts and expression. Teaching their application within various visual media. Developing analytical thinking and aesthetic analysis of visual work.			
Learning outcomes Students are able to meaningfully apply artistic elements in visual expression. They can analytically think, aesthetically analyze, and stylistically evaluate a visual work.			
Course contents <i>Theoretical teaching</i> The importance of visual elements for the structure of visual expression. Basic principles of shaping and building a visual work. Visual elements and methods of application in different areas of visual media. Fine and applied art. Types of visual media. Mediums and materials of a visual work. Creative process. Light and perception of form. Perception of differences in the visual field. Light and visibility. Perceptual processes. Visual and structural relationships. Visual structure. Space. Composition. The relationship of elements in a composition. Balance. Principles of composition. Repetition. Harmony. Contrast. Gradation. Dynamics. Rhythm. Dominance. Unity. Elements of composition. Point. Line as a factor of form. Form and shape. Connecting shapes. Texture. Size. Golden ratio. Value. Organization of value. Perspective. Color. Color characteristics. Color mixing. Color classification. Colour harmony. Colour contrast. Colour rhythm and balance. Symbolism and psychology of colour. Function of form and expression. Form and content. Reading a picture. Aesthetic evaluation. Aesthetic analysis on examples. <i>Practical teaching</i> Application of visual elements in different media – graphic and web design, product design, photography. Composition, linear drawing, connecting shapes, materialization of objects, three-dimensional representation of objects in different materials using different media. Analysis of images and graphic design products.			
Literature Petenji, S.: Likovni elemnti, nastavni materijal u elektronskom obliku, 2021 Bogdanović, K.: Teorija forme, Zavod za udžbenike, Beograd, 1991 Sudić, D., Jezik stvari, Službeni glasnik, 2021 Mitrović, M.: Forma i oblikovanje, Naučna knjiga, Beograd, 1990 Arnheim, R.: Umetnost i vizuelno opažanje, Univerzitet umetnosti u Beogradu, SKC, Beograd, 1998			
Active teaching classes: 60		Theoretical teaching: 30	Practical teaching: 30
Teaching methods Monologic, dialogic, interactive.			
Assessment (maximum number of points 100)			
Pre-exam obligations	Points	Course exam	Points
Active participation in classes		Project assignment	50
Practical work	30	Oral exam	
Interim exam/s	20		
Seminar paper/s			

Study programme: Web design			
Course title: Theoretical basis of visual communications			
Teacher: Karolina Mudrinski Palanački			
Course status: Compulsory			
Number of ECTS: 6			
Prerequisite course: None			
Course objective Introducing students to the basic principles and elements of visual communication. Sign and symbol. Visual identity. Analysis of the development of visual art and graphic design, as well as the most significant examples of a trademark as a contemporary graphic sign.			
Learning outcomes Students' competence in the domain of visual communications and their application of the acquired knowledge to practical works in the fundamentals of applied graphic arts.			
Course contents <i>Theoretical teaching</i> Visual communications as speech, written language, images in messages. Images are aesthetically pleasing, they create a connection between the audience and the sender of the message, intellectual and emotional levels. Image as a carrier of relevant information. Image – the relationship between the sender and the recipient of the message in visual language. Graphic designer as an interpreter and translator of the message. Precise, simple design – the goal of all forms of communication. Sender (company or organization), decoder (graphic designer) and recipient of the visual message (target group). Icons – symbols – indices – simplified visual language. The role of semiotics and meaning in visual communications. Changing the meaning of signs and symbols over time. Perception – sensation – emotion – intellect – identification – echo effect – spirituality (seven levels of depth of meaning and colour association). Visual communications in everyday life and in the professional process of creating visual arts. <i>Practical teaching</i> Creation of a personal trademark (signum, monogram). Creation of a group of pictograms on a specific topic. Initial creation of these two practical tasks in pencil, then in 2D software. Through a series of proofs, the student modifies their graphic conceptual solution. Creating of the positive, negative, and reduction of the personal trademark, without colour (black and white). Mastering vector graphics software. Submission of printed conceptual solutions created in vector software.			
Literature Žiljak Gršić J., Jugović M., Maksan Leiner J., Dizajn vizualnih komunikacija, Školska knjiga, Zagreb, 2022 Bosiok D.: Vizuelne grafičke komunikacije, VTS, Novi Sad, 2008 Harmshire M., Icons, Symbols, Pictograms, Rockport, 2008 Mitrović M.: Forma i oblikovanje, Ves, Beograd, 1990 Uvod u likovne elemente, Tašen, Keln, 2005 Vuković R.: Znakovito-logotipi, Gras, Beograd, 2002 Vuković R.: Znakovito-piktogrami, Gras, Beograd, 2002			
Active teaching classes: 60		Theoretical teaching: 45	Practical teaching: 15
Teaching methods Monologic, dialogic, interactive, demonstrative, practical.			
Assessment (maximum number of points 100)			
Pre-exam obligations	Points	Course exam	Points
Active participation in classes		Written exam	50
Practical work	20	Oral exam	
Interim exam/s	30		

Study programme: Web design			
Course title: Fundamentals of web technologies			
Teacher: Lazar Kopanja, Goran Savić			
Course status: Compulsory			
Number of ECTS: 6			
Prerequisite course: None			
Course objective To introduce students to the three core elements that make up the technological architecture of the web: Uniform Resource Locators (URL), Hypertext Transfer Protocol (HTTP), Hypertext Markup Language (HTML), as well as to master the HTML language and acquire practical skills reflected in applying this knowledge to create simple websites.			
Learning outcomes Students understand the core elements that make up the technological architecture of the web and are capable of independently creating web pages with appropriate content using HTML.			
Course contents <i>Theoretical teaching</i> Basic elements of web technological architecture: Uniform Resource Locators (URL), Hypertext Transfer Protocol (HTTP), Hypertext Markup Language (HTML). HTML development environments. Fundamentals of the HTML4 hypertext markup language. HTML4 tags and attributes. Web page structure: Header (<head>) and body (<body>) of the page. Working with text on the page: paragraphs, headings, heading levels, special characters and character entities, text styling. Ordered and unordered lists. Creating tables and working with tables (table title, table structure, types, cells, merging multiple rows or multiple columns into one). Creating hyperlinks to other pages and to sections of a page on the same or another page. Working with images: Inserting an image into a web page, and adjusting its dimensions using absolute and relative units, adding alternative text for the image using the alt attribute. Creating contact forms: single-line and multi-line text input fields, password input field, check boxes and radio buttons, drop-down menus, multi-purpose button, buttons for sending and resetting data entered into the form, action and method attributes, disabling certain fields using the disabled and readonly attributes, using the value, selected, checked attributes, etc. Using the size attribute to determine the size of the input field and the maxlength attribute to determine the maximum number of characters that can be entered into the input field. HTML5 basics: New structural tags <header>, <footer>, <section>, <article>, <aside>, <nav> and their application on a web page. Using the new HTML5 <figure> and <figcaption> tags to add image captions. Using the <picture> tag to create responsive images. Creating SVG graphics: lines, polylines, circle, ellipse, polygon, rectangle and their application in creating more complex graphics. New form elements in HTML5: <fieldset>, <legend>, <datalist>, etc. New input field types: color, date, number, range, search. Attributes of new input fields: min, max, etc. Implementation of new attributes for input validation: required, placeholder, email, url, etc. HTML5 tags for inserting multimedia content directly into a web page using the <audio> and <video> tags. Implementation of the src, muted, loop, autoplay, poster, preload, etc. attributes for managing video content. Placing multimedia content on YouTube and including it on a page using the <iframe> tag. Embedding Google Maps on a web page. <i>Practical teaching</i> Fundamentals of working with HTML. Successive development of all the web page elements mentioned above (text, links, images, tables, lists, and forms). Application of SVG graphics on web pages.			
Literature Krunić T.: Osnove veb tehnologija, materijal sa predavanja u elektronskoj formi, 2017 Gauchat J.D.: HTML5, CSS i JavaScript, Mikro knjiga, Beograd, 2014 Lemay, L.: HTML5, CSS3 i JavaScript za razvoj veb strana, Kompjuter biblioteka, Beograd, 2016 Frain B.: HTML5 I CSS3 – Prilagodljiv veb dizajn, Kompjuter biblioteka, Beograd, 2014 Robbins J. N.: Naučite veb dizajn - vodič kroz HTML, CSS, Javascript i veb grafiku, Mikro knjiga, Beograd, 2014 Loson B.: Uvod u HTML za programere, Mikro knjiga, Beograd, 2012 Hil J.: Briljantno HTML5 i CSS3, CET, Beograd, 2011			
Active teaching classes: 75		Theoretical teaching: 30	Practical teaching: 45
Teaching methods: Monologic, interactive.			
Assessment (maximum number of points 100)			
Pre-exam obligations	Points	Course exam	Points
Active participation in classes		Written exam	50
Practical work		Oral exam	
Interim exam/s	30		
Project presentation	20		

Study programme: Web design			
Course title: Object-oriented programming			
Teacher: Lazar Kopanja, Goran Savić			
Course status: Elective			
Number of ECTS: 7			
Prerequisite course: None			
Course objective To introduce students to the core concepts of object-oriented programming and to enable them to acquire the skills necessary for creating object-oriented applications in the C# programming language.			
Learning outcomes Students master the core concepts of object-oriented programming. They are capable of independently creating object-oriented applications in the C# programming language.			
Course contents <i>Theoretical teaching</i> Lists and their application in programming. Declaration, initialization, and creation of lists. Adding new elements to a list, deleting elements, inserting elements at a specific position, sorting lists, checking if an element exists in a list, etc. Application of the foreach loop when working with lists. Application of dictionaries. Core concepts of object-oriented programming. Differences between procedural and object-oriented programming. Differences between value types and reference types. Defining classes and instantiating objects. Core elements of an object – state and behavior. The concept of scope – local variables, object fields, and class fields. Using constructors during class instantiation. Constructor structure and constructor overloading. Static versus non-static methods and their applications. Method overloading. The principle of encapsulation. Using different access modifiers. Differences between public, private, and protected class members. Implementing getter and setter methods and properties to access and modify attributes. Class relationships: Composition, aggregation, and association relations between classes and their implementation methods. Using inheritance to design specialized classes. Inheritance types in the C# programming language. Method overriding during class inheritance. Calling base class constructors in derived classes using the base keyword. Abstract methods, abstract classes, and interfaces. Polymorphism, virtual methods, and overriding. Nested classes and their applications. <i>Practical teaching</i> Developing object-oriented applications using the C# programming language that feature base and derived classes through the principle of inheritance, along with constructors, properties, and methods. Creating applications containing classes interconnected by association, aggregation, or composition relationships. Creating applications that incorporate abstract classes, abstract methods, interfaces, and nested classes.			
Literature Krunić T: Objektno orijentisano programiranje na jeziku C#, VTŠNS, 2021 Miles R: C# osnove programiranja, Računarski fakultet Beograd, Beograd, 2017 Vajsfeld M.: Objektno orijentisani način mišljenja-priznato rešenje, CET, Beograd, 2003 Popović J.: Moderni dizajn šabloni – kroz realne C# primere, CET i Računarski fakultet, Beograd, 2020 Baptista G.: C# 9 i .Net 5: arhitektura softvera, Kompjuter biblioteka, 2021 Craig I.: Object-oriented Programming Languages, Springer, 2007			
Active teaching classes: 75		Theoretical teaching: 45	Practical teaching: 30
Teaching methods: Monologic, interactive.			
Assessment (maximum number of points 100)			
Pre-exam obligations	Points	Course exam	Points
Active participation in classes		Written exam	50
Practical work		Oral exam	
Interim exam/s	30		
Project presentation*	20		

Study programme: Web design			
Course title: Book and newspaper design			
Teacher: Srdan Dimitrov			
Course status: Elective			
Number of ECTS: 6			
Prerequisite course: None			
Course objective Introducing students to the fundamental principles and elements of book and newspaper design, alongside the practical execution of coursework.			
Learning outcomes Students will acquire knowledge in the fields of book and newspaper design and publishing. They will develop the ability to create graphic solutions for book and magazine design, as well as to create and apply illustrations within publishing design. Students will also master the graphic software necessary for the implementation and finalization of conceptual solutions.			
Course contents <i>Theoretical teaching</i> The history and evolution of the book. Book elements. Book genres. Expression through visual art forms. Analysis of visual content (line, color, stylization, character psychology, etc.). Illustration by character (children's book illustration). Illustration genres. Framing and scene composition (environment). Book design. The development and role of newspapers through history. Types and categories of newspapers. Classification of newspapers by frequency of publication (daily, weekly, etc.). Newspaper elements: typography, types of newspaper page layouts. Periodicals and magazines by thematic areas (informative, educational, sports, culture, etc.). <i>Practical teaching</i> Creation of book covers and dust jackets. Illustration of children's content (fairy tales, fables, short stories, poems, etc.). Concept development and layout design of fundamental newspaper and magazine elements: front cover, masthead/logotype design, page layout, typography selection. Modes of expression through visual art forms within the field of illustration. Study of basic visual elements (line, color, character psychology, character stylization). Illustration by thematic area. Style-independent subject matter. Children's theme illustration. Technical and technological project execution. Creation of a themed magazine as a medium for everyday communication. High-frequency periodicals and newspapers (daily or weekly publications). Solving organizational problems of visual elements that comprise a newspaper page. Application of typography and definition of general elements applied to specific content. Children's book illustration. Character development and analysis for a given theme. Creation of a themed magazine. Layout and analysis of specified design elements.			
Literature Heller S., Vienne V., 100 ideas that changed graphic design, Laurence King, 2022 Talley S., Collectors edition: Innovative packaging and graphics, Thames & Hudson, 2014 Grozđanić M.: Put do knjige, Publikum Beograd, 2007 Wiedemann J., Illustration Now, Taschen, 2005 Heiermann H, The Best of Graphis Editorials, Page, 1993 Street R, Creative Newsletters, Rockport publishers, 2001			
Active teaching classes: 60		Theoretical teaching: 30	Practical teaching: 30
Teaching methods Monologic, dialogic, interactive, demonstrative.			
Assessment (maximum number of points 100)			
Pre-exam obligations	Points	Course exam	Points
Active participation in classes		Written exam	50
Practical work	40	Oral exam	
Interim exam/s	10		
Seminar paper/s			

Study programme: Web design			
Course title: Computer animations			
Teacher: Biljana Gemović			
Course status: Compulsory			
Number of ECTS: 6			
Prerequisite course: None			
Course objective Gaining basic knowledge of 3D modelling and visualization. Developing a clear understanding of photorealistic 3D model creation and methods for generating dynamic graphics.			
Learning outcomes Upon successful completion of this course, the student is capable of applying foundational knowledge in graphic design, cinematic language, web design, and programming. Furthermore, the student is equipped to integrate these disciplines within a multimedia environment functionally and conceptually linked to computer applications, computer graphics, and computer animation.			
Course contents <i>Theoretical teaching</i> Graphics programs, divisions and categories; Film script; Storyboarding; Character design in computer animation; Set design; Colour theory; Perspective; Basics of cinematic language and frame composition; Shot types; Elements of rhythm; Visualization goals; Virtual reality; Software for modeling, design, computation, and animation; NURBS modeling; Layout and animation; Scene organization; Rendering; Reflection and shading models; 3D animation creation process; Animation by fundamental phases; Modelling: CAD modeling of three-dimensional objects: Three-dimensional coordinate systems and construction planes; Defining a user coordinate system in 3D space; Orientation conventions; Multi-view drawings and standard 3D object projection layouts; Creating surface models: 3D surface models; Surface modelling with Bézier curves, Koons patches, and B-splines; Modelling solid objects: 3D solid models; boundary representation (B-Rep) of solid models; Creating solids by revolving 2D profiles; Modelling thin-walled objects; Creating photorealistic 3D models: Visualization of three-dimensional objects; Formation of rendered 3D models; Setting up light sources and scenes for rendering; Role of shadows in modelling objects and environments; Scene management and set design; Rendering and working with material properties; Project documentation management; Animation in CSS and AutoCAD: Computer animation; Animation methods in CAD; Camera and object positioning; Creating animations; Animation algorithms, Testing and verification of modelling algorithms; Developmental trends in CAD systems from a database perspective; Practical application examples. <i>Practical teaching</i> Computer-based laboratory exercises focused on working within the 3ds Max software suite through the creation of practical 2D and 3D environment and scene designs, texturing, configuring light sources and shadows, generating computer animations, and final rendering.			
Literature Gemović, B.: Kompjuterska animacija sa praktikumom, VTŠ, Novi Sad, 2022 Gemović, B., Subić, N: Kompjuterska grafika, VTŠ, Novi Sad, 2020 McFarland, J.: 3D studio Max, edicija: Vizuelni brzi vodič, 2011 Pandey, J.: AutoCAD 2023, 2D crtanje i 3D modelovanje, Kompjuter biblioteka – Beograd, 2023 Letić, D., Desnica, E: 3D modelovanje i vizuelizacija, Tehnički fakultet u Zrenjaninu, Zrenjanin, 2007			
Active teaching classes: 60		Theoretical teaching: 30	Practical teaching: 30
Teaching methods: Monologue, interactive, laboratory.			
Assessment (maximum number of points 100)			
Pre-exam obligations	Points	Course exam	Points
Active participation in classes	10	Written exam	50
Practical work	10	Oral exam	
Interim exam/s	30		
Seminar paper/s			

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Study programme: Web design			
Course title: Fundamentals of design			
Teacher: Srđan Dimitrov			
Course status: Compulsory			
Number of ECTS: 7			
Prerequisite course: None			
Course objective To introduce students to the fundamental principles and elements of graphic design alongside the practical execution of design tasks to acquire knowledge and apply it within graphic software. To explore the historical significance and evolution of the brandmark from its origins to the present day, emphasizing both its functionality and utility.			
Learning outcomes Students have acquired knowledge in the field of visual identity. They can create a brandmark and apply it on visual constants, as well as master the graphic software necessary for the implementation of conceptual solutions.			
Course contents <i>Theoretical teaching</i> Development of graphic design through history. Principles and elements of design. Visual identity and identity elements (typography, colour, book of brand standards). Analysis of graphic design by periods. Sociological and cultural cross-section of design in recent history, its importance and influence in contemporary visual communication. Design process/discussion of the problem, development of a creative brief, concepts, refinement and execution, implementation, printing. Designer-client relationship, target audience and competition, what is a visual problem and how to solve it. Developing an idea and visualizing the idea. Presentation of design solutions. Reflections on implementation (on the process and type of printing). The final product denotes the process of developing the concept, composition and creative elaboration of the idea itself. Reflections on fonts, selection and application. Photography and illustration. Visual hierarchy (contrast and shape size). Corporate visual identity. Brandmark and logotype. <i>Practical teaching</i> 1. Basics of visual identity. The sign or logo is the basis of visual identity. Each student creates and searches for their own visual identity in five different proposals. The best solution is further developed: 2. a) positive, b) negative, c) outline, d) construction, e) colour f) possible reductions. The continuation of the exercise requires precise development of the sign by individual items when students apply theoretical knowledge to practical work. 3. The third practical exercise involves applying the sign to business paperwork: Business cards, memorandum, envelopes and folders. All of this, when placed in a folder, is the beginning of a portfolio but also a small book of brand standards.			
Literature Dabner D., Graphic design school, Thames & Hudson, 2022 Wiedemann J., Logo design, Taschen, 2019 Popović T., Dobar dizajn, Makart, Novi Sad, 2014 Vuković, R., Znakovito-logotipi, Gras Beograd, 2001 Popović T., Dobar dizajn, Makart, Novi Sad, 2014 Vuković R., Znakovito-logotipi, Gras Beograd, 2001			
Active teaching classes: 60		Theoretical teaching: 30	Practical teaching: 30
Teaching methods Monologic, dialogic, interactive, demonstrative, practical.			
Assessment (maximum number of points 100)			
Pre-exam obligations	Points	Course exam	Points
Active participation in classes		Written exam	50
Practical work	30	Oral exam	
Interim exam/s	20		
Seminar paper/s			

Study programme: Web design			
Course title: Web design			
Teacher: Ninoslava Tihi, Tanja Krunić, Nenad Badovinac			
Course status: Compulsory			
Number of ECTS: 7			
Prerequisite course: None			
Course objective Introducing students to methods of styling web pages and adapting them to different screen sizes, as well as acquiring practical skills in this area in order to enable them to independently create a styled and responsive website using the CSS language, as well as the Bootstrap class library.			
Learning outcomes The student masters the methods of styling web pages and their adaptation to different screen sizes, and has acquired practical skills in this area in terms of the ability to independently create a stylized and responsive website using the CSS language, as well as the Bootstrap class library.			
Course contents <i>Theoretical teaching</i> Cascading Style Sheets (CSS) and their application in website styling. Built-in styles, inline styles and external styles, their import and linking to a web page. Applying CSS to edit text, lists, tables, creating background images and watermarks. Styling contact forms and their elements. Frames: setting line thickness, frame color, and frame line style. Styling links, navigation buttons and menus, applying the hover and active pseudo-classes. Horizontal and vertical navigation menus. Creating more complex navigation menus. Creating fixed navigation menus. Managing margins and internal space of web page elements – Box Model. Relative and absolute arrangement of HTML elements on a page. Z-index and overlapping elements. Floating elements. Styling image galleries. Application of CSS classes for styling HTML elements of a specific type. Application of id in styling individual elements. Role of the <div> tag in grouping elements and their styling. Class hierarchy. Selectors and their application in styling web page elements. Styling tables. Advanced techniques: element transformations, edge rounding, shadows, gradients, transitions, animations. Use of fonts applying the @font-face property. Application of Font Awesome icons. Introduction to responsive web design. Role of display, min-width, max-width, etc. properties in responsive design. Application of CSS3 media queries for adapting web page content to different devices (mobile phones, tablets) and screen dimensions. Viewport configuration. Application of media print queries for creating a special style for editing a web page intended for printing. Application of Flexbox in arranging web page elements. Application of various pseudo-classes such as :nth-child, :first-child, :last-child, :checked, :disabled, :focus, :not and others. Grid system, application of Bootstrap framework in creating a responsive web page. Using CDN for downloading styles. Working with columns. Using ready-made web components: panel, carousel, modal, card, Font Awesome, etc. Bootstrap Studio framework and its application in creating responsive websites. <i>Practical teaching</i> Successive styling of various parts of web pages (navigation menus, headers, footers, sidebars, images, forms, etc.). Creation, editing (stylization) and adaptation of complete web pages to different devices and screen sizes using the above techniques.			
Literature Krunić T.: Tehnike stilizovanja veb stranica, materijal sa predavanja u elektronskoj formi, 2017 Lemay L.: HTML5, CSS3 i JavaScript za razvoj veb strana, Kompjuter biblioteka, Beograd, 2016. Frain V.: HTML5 i CSS3 prilagodljiv veb dizajn, Kompjuter biblioteka, Beograd, 2014 Jakobus B.: Naučite Bootstrap 4 i gradite prilagodljive, dinamičke i mobile-first aplikacije na vebu pomoću Bootstrap 4, Kompjuter biblioteka, Beograd, 2018 Hil J.. Briljantno HTML5 i CSS3, CET, Beograd, 2011			
Active teaching classes: 75		Theoretical teaching: 30	Practical teaching: 45
Teaching methods: Monologic, interactive, laboratory.			
Assessment (maximum number of points 100)			
Pre-exam obligations	Points	Course exam	Points
Active participation in classes		Written exam	50
Practical work	20	Oral exam	
Interim exam/s	30		
Seminar paper/s			

Study programme: Web design			
Course title: Relational databases			
Teacher: Lazar Kopanja, Nenad Badovinac			
Course status: Compulsory			
Number of ECTS: 6			
Prerequisite course: None			
Course objective To acquire the skills necessary for the design, development, and application of relational databases at the SQL query level.			
Learning outcomes Students are capable of independently designing and implementing relational databases, as well as executing SQL queries on databases.			
Course contents <i>Theoretical teaching</i> The concept of a database and the application of databases in information systems. The concept of a data model. The concept of entities, attributes and relationships in a database model (<i>Entity-Relationship model</i>). Types of relationships: 1:1, 1:N (one-to-many), and M:N (many-to-many). Unary relationships. Examples of relationships. Designing Entity-Relationship diagrams. Weak entities. Identifying keys: candidate keys, primary keys, and foreign keys. Criteria for selecting a primary key. The concept of a relational data model. Tables, fields (columns), and records (rows). Rules for mapping an Entity-Relationship model into a relational schema. Database normalization: First (1NF), Second (2NF), and Third (3NF) normal forms. Advanced normalization and denormalization. Practical examples of justified database denormalization. Principles of database management systems. Specifics of web databases. Multi-user and multi-tasking database management systems. The MySQL database management system. Data types and field characteristics in MySQL tables. Storage engines and their specific features. Using the phpMyAdmin application for database administration. Basics of the relational query language SQL. Utilizing SQL for Database Definition (DDL) to create and modify relational table structures. Syntax and implementation of SQL for data retrieval, insertion, updates, and deletion (SELECT, INSERT, UPDATE, and DELETE). Joining tables in SELECT queries using the JOIN clause. Types of table joins (inner, left, right). Other essential SQL commands: SHOW, DROP, DESCRIBE, and ALTER. <i>Practical teaching</i> Designing Entity-Relationship (ER) diagrams based on a given problem description. Selecting primary keys according to the specific problem. Mapping Entity-Relationship diagrams into relational database schemas. Normalizing source data tables. Utilizing software tools for database management and structure modification (phpMyAdmin). Practicing data manipulation using SELECT, INSERT, UPDATE, and DELETE statements on created databases. Using the WHERE clause and SQL functions (SUM, AVERAGE, MIN, MAX, etc.). Practicing table joins using the JOIN clause within SELECT queries. Applying other essential SQL commands such as SHOW, DROP, DESCRIBE, and ALTER.			
Literature Riordan, R.: Projektovanje baza podataka, Mikroknjiga, Beograd, 2006 Lovreković, Z.: Osnove PHP i MySQL, samostalno izdanje autora, Novi Sad, 2020 Prettyman S., Naučite PHP 7: Objektno-orijentisano modularno programiranje korišćenjem HTML5, CSS3, Javascript, XML, JSON i MySQL, Kompjuter biblioteka, Beograd, 2016 Meloni J. C.: Samostalno naučite PHP7, MySQL i Javascript u jednoj knjizi, Kompjuter biblioteka, Beograd, 2018 Welling L., Thomson L.: PHP i MySQL: razvoj aplikacija za veb, prevod 5. izdanja, Mikro knjiga, Beograd, 2017			
Active teaching classes: 60		Theoretical teaching: 30	Practical teaching: 30
Teaching methods: Frontal, interactive.			
Assessment (maximum number of points 100)			
Pre-exam obligations	Points	Course exam	Points
Active participation in classes		Written exam	50
Practical work	25	Oral exam	
Interim exam/s	25		
Seminar paper/s			

Study programme: Web design			
Course title: Fundamentals of graphic production			
Teacher: Petra Tanović			
Course status: Elective			
Number of ECTS: 6			
Prerequisite course: None			
Course objective The aim of the course is to introduce students to graphic technology and its development enabling them to acquire knowledge in the field of graphic technologies. Through lectures and practical exercises, students gain key insights into graphic technologies, as well as the essential foundational knowledge required for graphic product cost estimation, production planning, creating work orders, and defining work schedules and standards. Students learn to understand all stages within the field, identify emerging issues, and propose potential solutions. They are prepared to effectively communicate with clients and provide offers for the production of graphic products.			
Learning outcomes Students are introduced to the basics of graphic technology through lectures. They are trained to create work orders. They are trained to calculate paper and ink consumption for various graphic products. They are familiar with the basic principles of preparing graphic production. Students are trained to communicate with clients. They know how to control graphic products. They are familiar with digitalization in the graphic industry. The acquired knowledge is used as a starting point for studying more specialized subjects.			
Course contents <i>Theoretical teaching</i> History of the graphic industry. Printing in Serbia. Graphic activity in the future. Important years in the history of printing. Basic concepts in graphic technologies. Division of graphic technologies. Development of graphic technologies. Graphic production. Basic parts (procedures) in graphic production. Contracting and job planning. Basic production elements. Determining work standards. Paper sheets and printed sheets. Paper formats. Paper formats from rolls. Management in graphic technology. Cooperation with clients, preparation of offers, specifications. Work orders. Legal issues in graphic technology. Communication technologies. Basic graphic products (books, brochures, magazines, newspapers, advertising products, etc.) Formats of graphic products. Division of graphic activity. Preparation of graphic production. Preparation of work. Standardization of graphic production. Calculations and their importance in graphic production. Pre-calculations and periodic calculations. Document recording in appropriate formats. Basic mechanical principles of printing. Basic division of printing techniques. Surface tension. Adsorption and adhesion. The importance of adsorption and adhesion in the formation of printable and non-printable surfaces. Mechanization and automation of graphic production. Digitalization of graphic production. Environmental pollution by graphic production. Development of modern technologies in the function of environmental protection. <i>Practical teaching</i> Graphic production and basic procedures in graphic enterprises. Determining work standards. Principles of cost calculation. Pre-calculation and product cost calculation. Creating offers for clients. Sheet paper formats. Determining the maximum number of sheets of a specific format from the starting sheet format. Calculation of the required amount of paper for printing simple graphic products (labels, flyers.). Calculation of the required amount of paper for brochures. Calculation of the required amount of paper for brochures on machines of different machine formats. Calculation of the required amount of ink.			
Literature Novaković, D: Uvod u grafičke tehnologije, Fakultet tehničkih nauka u Novom Sadu, Novi Sad, 2020 Novaković, D, Dedijer S., Vladić G.: Uvod u grafičke tehnologije- praktikum za vežbe, Fakultet tehničkih nauka u Novom Sadu, Novi Sad, 2016 Ban, D: Štampa danas - tehnike materijaki i procesi, Agencija za marketing, izdavaštvo i trgovinu knjigama, Beograd, 2010 Novaković, D: DTP - priručnik za stono izdavaštvo, Institut za nuklearne nauke Vinča, Centar za permanentno obrazovanje, Beograd, 1998 Konstandinović, V. i Petrović, A: Osnovi grafičke tehnike, Beograd, 1998			
Active teaching classes: 60		Theoretical teaching: 30	Practical teaching: 30
Teaching methods Monologic, dialogic, interactive, demonstrative, practical. Teaching is carried out using modern didactic means and methods in the form of lectures and practical exercises accompanied by examples.			
Assessment (maximum number of points 100)			
Pre-exam obligations	Points	Course exam	Points
Practical work	14	Written exam	50
Interim exam/s	36	Oral exam	

Study programme: Web design			
Course title: Typography			
Teacher: Srdan Dimitrov			
Course status: Elective			
Number of ECTS: 6			
Prerequisite course: None			
Course objective Introducing students to basic concepts related to the history of the development of writing; Classification of script and acquiring knowledge about the rules for using typeface in in designing book, newspaper, and jobbing composition.			
Learning outcomes Students become familiar with typographic fonts as well as the rules of composition in book, newspaper, magazine and commercial typography, and are trained to carry out a part of graphic preparation in a high quality manner, and to use the acquired knowledge in graphic design. Students acquire the most important information, data and terms related to the history of writing. Students understand the importance of the historical and cultural context for the creation of writing and books.			
Course contents <i>Theoretical teaching</i> Predecessors of writing. Materials and writing tools. The meaning and function of writing from its origin to the present day. History of writing. Typographic writing. Pictorial writing. Conceptual writing. Syllabic writing. Ideogram. Classification and division of letters. Minuscule. Antique writing. Other forms of writing. The concept of typography. Typographic styles – historicism, free style, art nouveau style, framed block style, closed block style, expressionist style, elementary typography style, constructivist style. Epigraphy. Latin paleography. Slavic paleography. Printed book. Woodcut, lithography, copper engraving. Gutenberg's printing press. Incunabula. Old Serbian printing presses. Serbian printing in the 18th and 19th centuries. Glagolitic and Cyrillic scripts (Cyril and Methodius). Serbian Cyrillic monuments. Miroslav's Gospel. Cyrillic in the 18th century. Vuk's language reform of the script. Book typography. Selection and use of script. Basics of title page typography. Basics of book page typography. Basics of end page typography. Newspaper typography. Font selection and usage. Page markers and running headers. Types of newspaper layouts. Typography on the newspaper front page. Magazine typography. Magazine cover page, magazine illustration. Typography of jobbing composition. Types of jobbing typography. Special types of jobbing typography. Web typography. Website typography. The relationship between typeface and substrate. Using kinetic typography for animation. <i>Practical teaching</i> Application of theoretical knowledge in creating practical work. Font application in book typography. Analysis of ratios and sizes. Font application in newspaper and jobbing typography. Analysis of web applications from the aspect of typography. Through the creation of seminar papers, students approach individual thematic units in detail and acquire knowledge related to the history of type and books, basic typographic rules, the function and importance of typography.			
Literature Campe C., Rausch U., Designing fonts, Thames & Hudson, 2022 Saltz, I., TYPOGRAPHY ESSENTIALS 100 Design Principles for Working with Type, Rockport, 2019. Saltz I., Typography 35, Art directors club, New York, 2014 Nedeljković S., U: Pismo i tipografija, Fakultet tehničkih nauka, Novi Sad, 2012. Nedeljković, S., Tipografsko oblikovanje, Timpograf, Novi Sad, 2002 Nikolić R., Mali rečnik pisma i tipografije, Štampa IGPP „Nova prosveta“, Beograd, 1996. Kason L., Biblioteke starog sveta, Clio, Beograd, 2004 Barbije F., Istorija knjige, Clio, Beograd, 2009			
Active teaching classes: 75		Theoretical teaching: 45	Practical teaching: 30
Teaching methods Monologic, dialogic, interactive, demonstrative.			
Assessment (maximum number of points 100)			
Pre-exam obligations	Points	Course exam	Points
Active participation in classes		Written exam	50
Practical work	30	Oral exam	
Interim exam/s			
Seminar paper/s	20		

Study programme: Web design			
Course title: English			
Teacher: Branka Petrović			
Course status: Compulsory			
Number of ECTS: 3			
Prerequisite course: None			
Course objective Mastering the basic structures and functions of the English language through everyday life situations, while developing speaking, reading, writing, and listening comprehension skills, as well as gaining familiarity with the culture and lifestyle of English-speaking countries.			
Learning outcomes Communication at an elementary level of English language proficiency (CEFR level A2).			
Course contents <i>Theoretical teaching</i> <u>Phonetic system and orthography</u> : introduction to the sound system of the English language; the alphabet; spelling; phonetic transcription symbols. <u>Language functions</u> : asking for and giving personal information; filling out forms; greetings; introducing oneself and others; expressing possession, desires, likes/dislikes, and opinions; orientation in space; telling the time; giving directions; inviting and accepting or declining invitations; telephone conversations; ordering in a restaurant; shopping; describing objects and people; conversations about family, habits, daily activities, the past, and the future. <u>Grammatical structures</u> : personal and demonstrative pronouns; articles; nouns (regular and irregular plural, word formation, and Saxon genitive); possessive and indefinite adjectives; cardinal and ordinal numbers; quantifiers; prepositions; comparison of short adjectives; existential there; adverbs of frequency and definite time; modal verbs can, may, and must; the imperative; Present Simple, Present Continuous, Past Simple (regular and irregular verbs), and Future Simple tenses, and the going to construction. <u>Vocabulary</u> : words and expressions necessary for communication at an elementary level of English proficiency. <i>Practical teaching</i> Although separate practical classes are not explicitly scheduled, due to the nature of the course, to a certain extent – depending on the specific teaching units – lectures include activities that involve the practical oral and written application of the English language by the students.			
Literature Kovačević, J: Engleski jezik, drugi strani jezik – prva godina učenja, za gimnazije, Zavod za udžbenike i nastavna sredstva, Beograd, 2006 Nastavni materijal predmetnog nastavnika, 2023 Dimitrijević, N., Radovanović, K: Your first English tests, zbirka testova za engleski jezik, Zavod za udžbenike i nastavna sredstva, Beograd, 2007			
Active teaching classes: 30		Theoretical teaching: 30	Practical teaching:
Teaching methods Combined method (monologue, dialogue, demonstration, illustration, and text-based method along with appropriate organizational forms: frontal, individual, group, pair, and team/interactive work).			
Assessment (maximum number of points 100)			
Pre-exam obligations	Points	Course exam	Points
Active participation in classes		Written exam	50
Practical work		Oral exam	
Interim exam/s	50		
Seminar paper/s			

Study programme: Web design			
Course title: Audio and video technologies			
Teacher: Dragan Rastovac			
Course status: Elective			
Number of ECTS: 7			
Prerequisite course: None			
Course objective To explain the relevant aspects of audio and video technologies, and recording standards, along with the transmission and reproduction of audio and video signals. Furthermore, it covers audio, video, and signal transmission techniques in radio and television studios, as well as audio and video recording formats, and tools for digital processing of audio and video signals in multimedia.			
Learning outcomes Upon successful completion of the course, students will have mastered contemporary audio and video technologies and standards. Additionally, students are expected to understand the technical and user-centric aspects of applying audio and video technologies.			
Course contents <i>Theoretical teaching</i> Media development, concept, and structure. Signal, signal digitization. Physical and physiological characteristics of sound and image. Analog and digital video/audio technologies. Standards for encoding/compression and transmission of audio and video signals (AAC, WAV, MPEG, 3D, and others). Power supply and grounding of audio/video devices. Measuring equipment in analog and digital TV systems. Media for connecting video devices: coaxial, optical, and UTP cables. Interfaces. Devices for recording and reproducing sound and image (microphones, speakers, and headphones; cameras, monitors, and projectors). Audio and video systems and services. Multimedia systems and services. Fundamentals of acoustics. Acoustic design of the input and output environment. Television systems and monitoring (CRT, LCD, plasma, LED, multiview). <i>Practical teaching</i> Fundamentals of non-linear editing software. Workspace. Material import and processing. Editing. Adobe Premiere. Audio-visual editing. Editing tools. Ableton Live 9. Creation of intros, jingles, and lower thirds. Application of filters and effects. Development of two project assignments: Synchronization – production of a trailer and soundtrack (pixel, block, frame, shot, film). Digital audio and image processing: Sound Forge, Ableton Live 9, Cubase, Adobe Premiere.			
Literature Delić, V.: Audio izdanje udžbenika i prezentacija u okviru, UTS, Novi Sad, 2018 Farkaš, R.: Zbirka radova iz Multimedija – Digitalna Produkcija, 2018 Mijić, M.: Audio sistemi, Akademska Misao, Beograd, 2011 Fischer, W.: Digital Video and Audio Broadcasting Technology, Cham: Springer, 2020			
Active teaching classes: 90		Theoretical teaching: 45	Practical teaching: 45
Teaching methods: Monologic, dialogic, interactive.			
Assessment (maximum number of points 100)			
Pre-exam obligations	Points	Course exam	Points
Active participation in classes		Written exam	50
Practical work	25	Oral exam	
Interim exam/s	25		
Seminar paper/s			

Study programme: Web design			
Course title: Web databases			
Teacher: Željko Marčićević			
Course status: Compulsory			
Number of ECTS: 6			
Prerequisite course: None			
Course objective To acquire skills in the design, development, and implementation of database management web applications within the context of the internet economy and e-business, utilizing open-source systems.			
Learning outcomes Students are capable of independently designing and implementing web applications that utilize relational databases, and executing SQL queries on databases using server-side scripting.			
Course contents <i>Theoretical teaching</i> A brief overview of database structures (relational databases, RDBMS, web databases, Apache and MySQL administration, SQL queries, transactions). PHP as a language for accessing and manipulating web databases: characteristics of server-side scripting, variables and constants in PHP, data types, operators in PHP, program flow control statements, built-in and user-defined functions, function properties, arrays, strings, working with files and folders in PHP, and using HTML forms. Working with date and time. Multi-user database access. MySQLi extension (procedural access): connecting to the MySQL server and selecting a database using mysqli_connect() and mysqli_close(). Database queries (INSERT, DELETE, UPDATE, SELECT) from PHP code using functions: mysqli_query(), mysqli_num_rows(), mysqli_affected_rows(), mysqli_fetch_row(), mysqli_fetch_assoc(), mysqli_fetch_array(), and mysqli_fetch_object(). Application of PHP code for transactions, prepared statements, stored procedures, and triggers. Web database security: SQL injection attacks and protection methods. Filter functions. Regular expressions. Sessions: starting a session, working with session variables (string type), deleting session elements, destroying a session, and passing the session ID in a query string. <i>Practical teaching</i> Installing the MySQL database management system. Defining users – assigning a username and password to access the MySQL server. Tasks for applying data types, operators, and data type conversion. Tasks focusing on the implementation of linear, branched, and cyclic program structures. Tasks applying built-in PHP functions and creating user-defined PHP functions with or without arguments, and with or without return values. Tasks involving code for string manipulation. Tasks involving code for manipulating files and directories (files and folders). Tasks applying HTML forms and arrays \$_POST, \$_GET, and \$_FILES. Tasks applying date and time functions in PHP code. Creating code to connect to the MySQL server, select and utilize a specified database, and terminate the server connection. Writing code to perform CRUD operations on a database. Writing code to execute transactions, stored procedures, and triggers. Adding functionality to the code to prevent SQL injection attacks. Writing code that utilizes sessions.			
Literature Lovreković, Z.: Osnove PHP i MySQL, samostalno izdanje autora, Novi Sad, 2020 Williams, H., Lane, D.: Web aplikacije i baze podataka - PHP i MySQL, Mikro knjiga, Beograd, 2003 Prettyman S.: Naučite PHP 7: Objektno-orijentisano modularno programiranje korišćenjem HTML5, CSS3, Javascript, XML, JSON i MySQL, Kompjuter biblioteka, Beograd, 2016 Meloni J. C.: Samostalno naučite PHP7, MySQL i Javascript u jednoj knjizi, Kompjuter biblioteka, Beograd, 2018 Welling L., Thomson L.: PHP i MySQL: razvoj aplikacija za veb, prevod 5. izdanja, Mikro knjiga, Beograd, 2017			
Active teaching classes: 60		Theoretical teaching: 30	Practical teaching: 30
Teaching methods: Monologic, interactive.			
Assessment (maximum number of points 100)			
Pre-exam obligations	Points	Course exam	Points
Active participation in classes		Written exam	50
Practical work	25	Oral exam	
Interim exam/s	25		
Seminar paper/s			

Study programme: Web design			
Course title: Client programming			
Teacher: Tanja Krunić, Aleksandar Stoisavljević			
Course status: Compulsory			
Number of ECTS: 6			
Prerequisite course: None			
Course objective To introduce students to the fundamentals of client-side web programming using JavaScript and related technologies, such as XML, JSON, and AJAX, which are used to create interactive web pages.			
Learning outcomes Students are capable of independently adding interactivity to web pages using the JavaScript scripting language and related technologies, such as XML, JSON, and AJAX.			
Course contents <i>Theoretical teaching</i> JavaScript basics. Variables, declaration, and initialization. Dynamically typed data and primitive types. Data type conversion (type casting). Arrays, objects, control structures, loops, and functions. Date() object and its application. Dynamic generation of HTML elements. Dynamically changing web page styles based on user actions or date and time constraints. Domain object model (DOM). Selecting specific elements on a page (by ID, name, tag, or class name) and modifying their content. Utilizing the innerHTML property to inject dynamically generated content into HTML elements. Creating, modifying, and deleting elements, attributes, and classes. Windows. Dialog boxes: prompt(), alert(), and confirm(). Creating popup windows with dynamically generated content and setting their dimensions. Redirecting web browsers. Event handling (e.g., onclick, onmouseover, onload). Processing form data. Retrieving values from input fields, multi-line text areas, drop-down menus, radio buttons, and checkboxes. Form data validation. Using regular expressions (Regex). Cookies and tracking user actions. Utilizing cookies to facilitate website navigation. Resetting cookie values. Creating web animations using JavaScript. Implementing image sliders with manual (on-click) and automatic image transitions. Strings and string manipulation. Finding substrings within a given string, utilizing the indexOf() method, and splitting strings based on specific criteria using the split() method. XML and JSON data storage formats. Fetching data from XML and JSON files using AJAX and dynamically rendering it on a web page. Applying linters and code validators to ensure JavaScript code correctness. Best practices for saving JavaScript code in external files and embedding them into HTML pages. <i>Practical teaching</i> Successive adding of interactivity to web page components (forms, animations, image sliders, and dynamic style modification of page elements). Developing interactive web pages using JavaScript by applying the above-mentioned techniques.			
Literature Krunić T.: Klijentsko programiranje, materijal sa predavanja u elektronskoj formi, 2017 Haverbeke M., JavaScript elokventno, savremeni uvod u programiranje, Mikro knjiga, Beograd, 2019 Simpson K., Naučite JavaScript, Mikro knjiga, Beograd, 2016 Flanagan D.: JavaScript sveobuhvatan vodič, Mikro knjiga, Beograd, 2021 Svekis L. L.: JavaScript od početnika do profesionalca, Kompjuter biblioteka, Beograd, 2022 Crute A.: Coding HTML, CSS Javascript made easy, Flame Tree, Beograd, 2016 Gauchat J.D.: HTML5, CSS i Javascript, Mikro knjiga, Beograd, 2014			
Active teaching classes: 60		Theoretical teaching: 30	Practical teaching: 30
Teaching methods: Monologue-based, interactive, laboratory methods.			
Assessment (maximum number of points 100)			
Pre-exam obligations	Points	Course exam	Points
Active participation in classes		Written exam	50
Practical work – project presentation	20	Oral exam	
Interim exam/s	30		
Seminar paper/s			

Study programme: Web design			
Course title: Graphic design			
Teacher: Srdan Dimitrov			
Course status: Compulsory			
Number of ECTS: 6			
Prerequisite course: None			
Course objective Introduction to theoretical and practical methods and implementation of complex graphic forms in the field of graphic design. Understanding the function and importance of design and packaging in the industry. Acquiring basic knowledge of poster styles and forms, conceptual solutions, and realization. Gaining knowledge about the poster through history and its importance in visual communications.			
Learning outcomes Students have acquired knowledge in the field of packaging design and are able to create graphic and conceptual solutions for packaging design and its thematic areas. They have gained knowledge in the field of poster design and ability to create graphic and conceptual solutions for the poster and its thematic areas (film, music, theater, promotional posters, etc.). They master graphic software necessary for the execution and finalization of design concepts.			
Course contents <i>Theoretical teaching</i> The concept and role of graphic design in industry and its division depending on its application in a wide range of consumer products. Defining packaging design - recognition, function and communication. Typography and packaging design. Colour communication –geographical meaning of colours, connection between colours and food products. Illustration and photography in packaging design. Implementation and realization of graphic design solutions on packaging (paper, cardboard, glass, plastic). History of posters. Classification and styles throughout the history of posters. Artistic and graphic elements of posters (visual components of composition, colours, illustrations, photography, etc.). Classification of posters (illustrative, informative, constructive, typographic, and experimental posters). Classic, multi-part, and giant posters (billboards). Classification by purpose (commercial, social, economic, cultural, tourism, sports, exhibition/fair, health-humanitarian, political). <i>Practical teaching</i> Creation and application of a creative graphic solution for packaging product design (labels, graphic packaging artwork). Aluminum packaging. Creation of conceptual designs for posters across various genres (music/festival poster, socially engaged poster, theater poster).			
Literature Dabner D., Graphic design school, Thames & Hudson, 2022 Pentawards, Package design 2, Taschen, 2012 Žak, Ž., Evrard B.: Dizajn pakovanja, Tašen, 2010 Bosiock D.: Plakat, VTŠSS Novi Sad, 2008			
Active teaching classes: 60		Theoretical teaching: 30	Practical teaching: 30
Teaching methods: Monologic, dialogic, interactive, demonstrative, practical.			
Assessment (maximum number of points 100)			
Pre-exam obligations	Points	Course exam	Points
Active participation in classes		Written exam	50
Practical work	30	Oral exam	
Interim exam/s	20		
Seminar paper/s			

Study programme: Web design			
Course title: Computer networks			
Teacher: Dragan Rastovac, Lazar Kopanja, Nebojša Jovanović			
Course status: Compulsory			
Number of ECTS: 7			
Prerequisite course: None			
Course objective To acquire theoretical and practical knowledge regarding network hardware and software, computer networking methods, computer network topologies, configuration and operation of computer networks, as well as network protocols and applications.			
Learning outcomes Students are capable of designing, maintaining, and operating computer networks, as well as utilizing network protocols and applications.			
Course contents <i>Theoretical teaching</i> Reasons for networking. Historical development. The concept of a protocol. Standardization in computer networks. Network hardware. Cables, bridges, repeaters, hubs, switches, routers, gateways. Network software. Topologies and types of computer networks. Reference models (OSI, TCP/IP). Comparison of reference models. Encapsulation and packets. Horizontal and vertical communication. Protocol convergence. The importance of layering. Data link layer. Network layer services - types of data transfer Datagrams. Network adapters. Frames. Marking the beginning and end of a frame. Sources of errors. Error control. Error detection. Hamming distance. Parity check. LRC. Checksum and CRC. Basic data link layer protocols. Medium access control. Channel assignment problem. Multi-user access protocols. ALOHA. CSMA/CD. Ethernet. Network layer. Network layer design. Packet routing algorithms. Datagram subnet. Packet routing. Virtual circuit subnet. Static and dynamic routing. Distance vector protocol and Link state protocol. Optimality principle. Shortest path routing. Distance vector routing. Link state routing. Hierarchical routing. Congestion management. Routing protocols. IGP and EGP protocols. RIP, OSPF, BGP Quality of service. IP protocol. IP addresses. IPv6 protocol. Transport layer. Role of the transport layer. Segments and transport address. Ports and sockets. Multiplexing and demultiplexing. Elements of transport protocols. UDP protocol. TCP protocol. Application layer Telnet, SSH, DNS. Electronic mail. FTP. MIME. WWW. Overview of web architecture. HTTP protocol. Multimedia. VOIP. Security and protection in computer networks. Introduction to cryptography. Encryption algorithms. Digital signatures. Email security. Web security. <i>Practical teaching</i> Cabling and network device connection techniques. Introduction to the Cisco Packet Tracer software package. Designing network topology using Packet Tracer. Configuring DNS and Web servers alongside client workstations. Configuring active network devices (routers, workstations and switches). Simulation and analysis of HTTP and ICMP traffic. Simulation of HTTP and DNS traffic. NAT/PAT network address translation and DNS integration. Using TCP and UDP protocols. Installing and configuring a Windows network server. Installing and configuring a Linux network server. Network security – encryption algorithms. Digital signatures.			
Literature Tanenbaum, S., A., Računarske mreže, prevod V izdanja, Mikro knjiga, Beograd, 2012 Bigelow, S., J.: Računarske mreže – instaliranje, održavanje i popravljjanje, Mikro knjiga, Beograd, 2004 Gajin S.: Principi konfigurisanja računarskih mreža, Akademska misao, 2018 Kurose J.: Umrežavanje računara. CET Computer, Beograd, 2018 Stojanović M.: Savremene IP mreže, arhitekture, tehnologije i protokoli, Akademska misao, Beograd, 2012 Ciampa M.: Security + guide to network security fundamentals, Microsoft Press, 2012			
Active teaching classes: 75		Theoretical teaching: 45	Practical teaching: 30
Teaching methods: Monologic, interactive.			
Assessment (maximum number of points 100)			
Pre-exam obligations	Points	Course exam	Points
Active participation in classes		Written exam	50
Practical work		Oral exam	
Interim exam/s	50		
Seminar paper/s			

Study programme: Web design			
Course title: Specialist English			
Teacher: Branka Petrović			
Course status: Compulsory			
Number of ECTS: 3			
Prerequisite course: None			
Course objective Mastering the structures and functions of the English language at an intermediate level and expanding professional vocabulary through field-specific topics and situations, alongside further development of speaking, reading, writing, and listening comprehension skills.			
Learning outcomes Communication at an intermediate level of English language proficiency (CEFR level B1).			
Course contents <i>Theoretical teaching</i> <u>Language functions</u> : writing emails; interpreting technical data; professional telephone conversations; ordering and purchasing devices; writing a curriculum vitae (CV); applying for a job. <u>Grammatical structures</u> : comparison of long and irregular adjectives; relative, possessive, indefinite, and reflexive pronouns; adverbs of manner; the gerund; Past Continuous, Present Perfect, Present Perfect Continuous, and Past Perfect tenses; the passive voice; reported speech (commands, as well as declarative and interrogative sentences without backshift of tenses); the three basic types of conditionals; question tags. <u>Vocabulary</u> : words and expressions necessary for communication at an intermediate level of English proficiency, with an emphasis on field-specific situations and topics arising from the profession as presented in the textbook. <i>Practical teaching</i> Although separate practical classes are not explicitly scheduled, due to the nature of the course, to a certain extent – depending on the specific teaching units – lectures include activities that involve the practical oral and written application of the English language by the students.			
Literature Evans V., Dooley J., Wright S., Career Paths: Information Technology, Express Publishing, Newbury, UK, 2013 Lloyd Ch., Frazier J.A., Career Paths: Engineering, Express Publishing, Newbury, UK, 2011 Evans V., Dooley J., Rogers H.P., Career Paths: Art & Design, Express Publishing, Newbury, UK, 2013 Nastavni materijal predmetnog nastavnika Dimitrijević N., Radovanović K.: Test Your English, zbirka testova za engleski jezik, Zavod za udžbenike i nastavna sredstva, Beograd, 1992			
Active teaching classes: 30		Theoretical teaching: 30	Practical teaching:
Teaching methods Combined method (monologue, dialogue, demonstration, illustration, and text-based method along with appropriate organizational forms: frontal, individual, group, pair, and team/interactive work).			
Assessment (maximum number of points 100)			
Pre-exam obligations	Points	Course exam	Points
Active participation in classes		Written exam	50
Practical work		Oral exam	
Interim exam/s	50		
Seminar paper/s			

Study programme: Web design			
Course title: Website optimization			
Teacher: Tanja Krunić			
Course status: Compulsory			
Number of ECTS: 6			
Prerequisite course: None			
Course objective The objective of the course is to acquire knowledge and practical skills in the field of search engine optimization (SEO) for websites.			
Learning outcomes Students are equipped to independently undertake a series of steps to optimize websites for search engines.			
Course contents <i>Theoretical teaching</i> Web search engines (Google, Yahoo, Bing, etc.) and their working principles. Crawlers and their databases. Indexing and ranking of sites (Google PageRank). On-page and off-page ranking factors. SEO (Search Engine Optimization). On-page optimization: formation of a set of keywords and phrases. Refinement of a keyword set. Using online tools to assess the demand for keyword phrases and obtain data on the competition strength for a given phrase. Incorporating keywords into the content of a web page. Meta tags and their optimization. Meta description and meta keywords tags, and their importance in website optimization. Optimization of meta tags for social networks. Optimization of title tags, heading tags, and alt attributes for images. Optimization of anchor text. The influence of website age and content originality on search engine ranking. Changing the structure of a website for optimization purposes. Website publishers on free hosting. Tools for checking website optimization (Lipperhey, SEO Site Checkup, Woorank, etc.). The robots.txt file and its role in search engine optimization. The importance of a website XML sitemap for SEO. Using tools to create an XML sitemap. Optimizing website loading speed. Image optimization. Code optimization. Using tools for minifying and concatenating CSS and JavaScript files. Tools for checking website loading speed. The role of responsive web design in search engine optimization. Social networks and their role in SEO. Adding plugins for sharing content on social networks as an alternative way to increase inbound traffic to the website. Adding Google Analytics tracking code to the website header. Getting to know Google Analytics data and its interpretation: bounce rate, exit rate, average time spent on the site, and average number of visitors. Building blogs for SEO optimization. Creating a blog using WordPress. The role of YouTube channels in search engine optimization. Optimizing video content for search engines. Off-page optimization. Backlinking techniques: cross-linking, backlink checking tools, backlink quality checking tools, guest posting, and other methods for attracting backlinks. <i>Practical teaching</i> On-page website optimization using the techniques mentioned above. Deploying a website to a domain. Creating a thematic blog in WordPress and linking it to the website being optimized. Off-page optimization in practice.			
Literature Krunic T: Optimizacija veb sajtova, materijal sa predavanja u elektronskoj formi, 2017 French G.: Ultimate guide to Link Building, Entrepreneur Media, 2020 Marshall, P., Todo B., Rhodes M.: Definitivni vodič za Google Ads, Kompjuter biblioteka, Beograd, 2021 Krol, K.: WordPress 4* u celosti, Kompjuter biblioteka, 2015 Hussey T.: Naučite Wordpress, Mikro knjiga, Beograd, 2011			
Active teaching classes: 45		Theoretical teaching: 30	Practical teaching: 15
Teaching methods: Monologic, interactive.			
Assessment (maximum number of points 100)			
Pre-exam obligations	Points	Course exam	Points
Active participation in classes		Written exam	50
Practical work – project presentation	20	Oral exam	
Interim exam/s			
Seminar paper/s	30		

Study programme: Web design			
Course title: Development of e-business applications			
Teacher: Lazar Kopanja, Nebojša Jovanović			
Course status: Elective			
Number of ECTS: 7			
Prerequisite course: None			
Course objective To acquire skills in the design, development, and application of e-business elements and systems using open-source software.			
Learning outcomes Students are capable of independently developing e-business applications, such as content management systems (CMS), e-commerce software, management information systems (MIS), and personalized report generation, utilizing object-oriented PHP and MySQL.			
Course contents <i>Theoretical teaching</i> E-business: business functions, B2B and B2C, ERP and MIS systems, e-commerce, e-banking, e-auctions. Classes and objects in PHP, PHP exceptions. Regular expressions and user input validation. MySQLi extension: classical queries, prepared statements, transactions, stored procedures, and triggers. PDO extension: classical queries, prepared statements, transactions, stored procedures, and triggers. Concept and functions of a content management system (CMS), MVC (Model-View-Controller) software architecture, Active Record, and object-relational mapping (ORM). Development of WYSIWYG editors, file upload functionality. Development of CMS models. Development of CMS controllers. Controller for the client side. Controller for the administrator side of the CMS. Development of CMS views. View components for the client side. View components for the administrator side of the CMS. Application for personalized report generation – FPDF library. AJAX. E-shop as a specific type of CMS: creation of storefronts, shopping carts, and payment systems. Web-based MIS: functions of management information systems, decision support systems, systems for defining business processes. Web forums. <i>Practical teaching</i> Closely follows the lectures and consists of developing simpler web applications for database manipulation, followed by the development of a specific web application in the form of a project assignment.			
Literature Prettyman, S.: Naucite PHP 7 Objektivno orijentisano modularno programiranje HTML 5, CSS 3, JavaScript, XML, Json i MSQl, Kompjuter biblioteka, Beograd, 2016 Lovreković Z.: Napredni PHP i MySQL, samostalno izdanje autora, Novi Sad, 2020 Gejts, B., Poslovanje brzinom misli, Prometej, Novi Sad, 2001 Dimitrijević Ružić Lj.: Elektronsko poslovanje – praktikum, Visoka tehnička škola strukovnih studija, Novi Sad, 2013			
Active teaching classes: 75		Theoretical teaching: 45	Practical teaching: 30
Teaching methods: Monologue, dialogue, interactive, and laboratory-based methods.			
Assessment (maximum number of points 100)			
Pre-exam obligations	Points	Course exam	Points
Active participation in classes		Written exam	50
Practical work		Oral exam	
Interim exam/s			
Project assignment	50		

Study programme: Web design			
Course title: Printing form preparation			
Teacher: Petra Balaban, Srđan Dimitrov			
Course status: Elective			
Number of ECTS: 7			
Prerequisite course: None			
Course objective Mastering theoretical and practical knowledge in the field of prepress preparation, as well as the use of techniques and technologies related to software preparation. Students should become familiar with the procedures for making printing forms for flat, letterpress, gravure and screen printing.			
Learning outcomes Competence for professional performance of work in the graphic industry and related activities related to prepress.			
Course contents <i>Theoretical teaching</i> Light sources in reprography. Densitometry. Raster photography. Formation of raster dots. Raster tone value. Tinting. Color management. Dynamic range of scanning. Raster characteristics. Electronic raster. Stochastic rasterization. Occurrence of moiré effect. Application of raster depending on printing technique and paper quality. Colour mixing (additive and subtractive synthesis). RGB and CMYK color systems. Electronic page layout. Production of printing plates for planographic printing: formation of non-image and image areas. Production of offset printing plates using conventional methods. Manual layout. Electronic layout. Production of printing plates using Computer-to-Plate (CtP) technology on silver halide and thermal plates. Production of printing plates for relief printing: block-making using electrolytic etching and electromechanical engraving. Block-making on copper plates. Production of text and drawings on metal – metallography. Block-making on photopolymer plates. Production of embossing plates. Photopolymer plates for print coating in offset printing. Production of printing plates for flexographic printing. Production of printing plates for gravure printing: production of printing forms for conventional photogravure. Production of printing forms for autotypical, combined, and engraved rotogravure. Electromechanical, electronic, and laser cylinder engraving. Production of printing plates on photopolymer plates. Clichés and production of printing forms for pad printing. Production of printing screens for screen printing: procedures for screen making. Manual and photomechanical procedures for screen making. <i>Practical teaching</i> Flyer design preparation; Brochure design preparation; Book design preparation; Electronic editing; Creation of printing plates for flatbed printing using CtP technology; Computer preparation for screen printing. Coating, copying and developing screens; Computer preparation and production of printing plates for pad printing.			
Literature Balaban P.: Priprema za štampu - skripta u elektronskoj formi, VTŠSS, Novi Sad, 2021 Tanović, P.: Izrada štamparske forme, VTŠ, Novi Sad, 2013 Novaković, D., Pavlović, Ž., Dedijer, S.: Od kompjutera do štampe, Computer to Plate tehnologije, FTN, 2013 Dedijer, S., Tomić, I., Milić, N.: Nauka o boji, Praktikum za vežbe, FTN, 2018. Kiurski J.: Fiičko-hemijske osnove izrade štamparskih formi, FTN, 2005 Pešterac Č.: Elektronska reprodukcija tehnika, FTN, 2000			
Active teaching classes: 75		Theoretical teaching: 45	Practical teaching: 30
Teaching methods: Monologic, dialogic, interactive, demonstrative, practical.			
Assessment (maximum number of points 100)			
Pre-exam obligations	Points	Course exam	Points
Active participation in classes	5	Written exam	50
Practical work	15	Oral exam	
Interim exam/s	30		
Seminar paper/s			

Study programme: Web design			
Course title: Modelling and 3D printing			
Teacher: Nenad Janjić, Branko Savić			
Course status: Elective			
Number of ECTS: 7			
Prerequisite course: None			
Course objective To introduce students to 3D volumetric modelling, preparation for 3D printing, and printing using various 3D printing technologies.			
Learning outcomes Students have acquired the knowledge to independently create 3D models, prepare them for printing, and print models using various 3D printing technologies.			
Course contents <i>Theoretical teaching</i> Product lifespan. Product development. Rapid Prototyping, Rapid Tooling, Rapid Manufacturing, Reverse Engineering. Time to market – the period required for a product to become available for sale. Product lifecycle and computer applications in the product lifecycle (PLM). Concurrent engineering. Reverse engineering. Types, significance, and application areas of three-dimensional models. Modern processes for three-dimensional model fabrication: Liquid-based processes (Solidification of liquids): Stereolithography (SLA), Solid Ground Curing (SGC), Fused Deposition Modeling (FDM). Powder-based processes: Selective Laser Sintering (SLS), 3D printing (3DP). Solid-based processes: Laminated Object Manufacturing (LOM). Application of 3D scanners in the design and fabrication of 3D models. Modern three-dimensional modeling software and its capabilities: CAD, Inventor, 3ds Max, IronCAD, SolidWorks, Pro/ENGINEER, Creo Parametric, Rhinoceros. <i>Practical teaching</i> Designing three-dimensional models in Autodesk Inventor and creating technical documentation. Assembly design utilizing three-dimensional models. Designing kinetic models and assemblies with moving parts – operation and motion simulation. Frame design using standard components and frame analysis. Design of welded structures. Designing sheet metal models and components. Creating animations and motion graphics. Hands-on fabrication of 3D models using Binder Jetting (3D printing), Stereolithography (SLA), and Fused Deposition Modeling (FDM).			
Literature Janjić, N.: 3D modelovanje - osnove i zadaci, VTŠSS, Novi Sad, 2021 Plančak, M.: Brza izrada prototipova, modela i alata, FTN, Novi Sad, 2009 Dimitrijević, N., Janjić, Z., Janjić, N.: Zbirka zadataka iz CAD-a – Autodesk Inventor, VŠPSS u Vranju, 2012 (elektronsko izdanje).			
Active teaching classes: 75		Theoretical teaching: 45	Practical teaching: 30
Teaching methods: Interactive, demonstrative and laboratory.			
Assessment (maximum number of points 100)			
Pre-exam obligations	Points	Course exam	Points
Active participation in classes		Written exam	
Practical work		Oral exam	50
Interim exam/s	20		
Seminar paper/s	30		

Study programme: Web design			
Course title: Packaging			
Teacher: Petra Tanovic, Petra Balaban			
Course status: Elective			
Number of ECTS: 7			
Prerequisite course: None			
Course objective Introduction to packaging design tasks, packaging materials (paper, cardboard, plastic, metal and glass), design methodology, evaluation and selection of packaging with regard to aesthetic-ergonomic and technical-technological requirements, with special emphasis on graphic elements of packaging.			
Learning outcomes Students are able to design and select appropriate packaging considering the type of products to be packed, paying special attention to the graphic elements of their packaging.			
Course contents <i>Theoretical teaching</i> Historical development of packaging (social and economic changes, technical achievements, etc.). Introduction to the field of packaging as a graphic product. Types of packaging and packaging functions: protective, ecological, sales. Good packaging requirements. Packaging in the function of product sales. Active and intelligent packaging. Requirements and tasks of packaging design. Main elements of packaging and graphic presentation of products. Aesthetics of packaging. Application of visual elements in packaging design. Application of photography, typography and illustration in packaging design. Printing. Design methodology, evaluation and selection of packaging. Production processes of various types of packaging. Paper packaging. Types of paper for packaging production. Fabrication and structural design of paper packaging. Cardboard packaging. Cardboard boxes. Examples of structural design (grids). Computer application in the preparation, design of cutouts and production of stackable cardboard boxes. Packaging made of flat and corrugated cardboard. Analysis of well-known examples of packaging design. Labels. Polymer packaging, types of polymer materials for packaging. Production of packaging films and production of polymer packaging. Decoration of polymer packaging (labeling and printing). Glass packaging, production, characteristics, assortment and graphic decoration of glass packaging. Metal packaging, forms of metal packaging and graphic decoration. Wooden packaging. Textile packaging. Packaging standards. Packaging quality requirements. Ecological materials for packaging production. Ecological aspects of packaging and environmental protection. <i>Practical teaching</i> Application of creative and aesthetic elements in various types of packaging products. Work in packaging design programs and realization of conceptual solutions with the creation of mockups. Realization and presentation of final solutions for given packaging. Creation of packaging mockups.			
Literature Tanović, P.: Skripte sa predavanja u elektronskoj formi, VTŠSS, Novi Sad, 2021. Balaban P.: Skripte sa predavanja u elektronskoj formi, VTŠSS, Novi Sad, 2021 Novaković D., Pal M., Đurđević S. : Grafička amabalaža - praktikum, Fakultet tehničkih nauka, Univerziteta u Novom Sadu, Novi Sad, 2022 Vujković, I., Galić, K., Vereš, M.: Ambalaža za pakiranje namirnica, Tectus, Zagreb, 2007 Lazić V., Novaković D.: Ambalaža i životna sredina, Tehnološki fakultet - Univeritet Novi Sad, 2010. Cvetković D., Marković D.: Dizajn pakovanja, Singidunum, 2010			
Active teaching classes: 75		Theoretical teaching: 30	Practical teaching: 45
Teaching methods: Interactive			
Assessment (maximum number of points 100)			
Pre-exam obligations	Points	Course exam	Points
Active participation in classes	5	Written exam	50
Practical work	20	Oral exam	
Interim exam/s	25		
Seminar paper/s			

Study programme: Web design			
Course title: Work practicum			
Teacher: Branko Babić, Ivan Bulatović, Jovana Kopanja			
Course status: Compulsory			
Number of ECTS: 7			
Prerequisite course: None			
Course objective To introduce students to basic occupational health and safety measures and fire safety protocols in order to prevent workplace injuries and fatalities, while familiarizing them with the applicable legal regulations and laws related to launching a business venture. The course aims to enable students to effectively source information regarding government subsidies and financial assistance for first employment and startup initiatives. Furthermore, students will gain insight into the specific procedures and practical examples of business registration, exploring realistic opportunities, development phases, and entrepreneurial prospects within relevant industries. Finally, through hands-on exercises in specialized fields, students will acquire practical experience on advanced machinery and equipment not available within the institution, thereby preparing them for professional practice and direct integration into modern production plants.			
Learning outcomes Upon successful completion of the course, students will possess a foundational knowledge of occupational health and safety regulations and fire safety protocols, enabling them to implement prescribed personal protection measures in the workplace and apply the code of business conduct. Furthermore, students will understand legal instruments used for securing contracts, such as loan and current account agreements, and will master the formal procedures required to establish their own company. They will be able to evaluate realistic opportunities, development phases, and entrepreneurial potential within relevant industries. Finally, students will acquire practical, hands-on experience by operating advanced machinery and specialized equipment not available within the institution, thoroughly preparing them for professional practice and seamless integration into modern production facilities.			
Course contents <i>Theoretical teaching</i> 1. Training students in the field of occupational safety and health (OSH) to ensure safe participation in work processes and environments. Through professional OSH training, students acquire foundational knowledge regarding the obligations and responsibilities of employers, the rights and duties of employees, the organization of workplace safety, and the personal protective equipment used in work processes. During their practical work within the company, students apply this knowledge to minimize the risk of workplace injuries and fatalities. 2. Fire safety training provides students with fundamental knowledge about fire behavior, combustion products, smoke toxicity, fire classes, and safe extinguishing techniques. It covers preventive measures, alerting Fire and Rescue Services, and operating portable fire extinguishers. Students apply and practice these skills within a limited, controlled scope during their practical placement. 3. Individual organizational characteristics, corporate representation, ownership and property relations, and special regulations governing internal company relations. 4. Cash deposits, savings deposits, loan agreements, and current account contracts. 5. Core rules of business etiquette, dress code, principles of ethics and integrity, conflict resolution mechanisms in professional relationships, and strategies for achieving business goals and navigating diverse workplace scenarios. 6. Preparation for establishing a business and the foundations of the regulatory framework, including: the Constitution of the Republic of Serbia, the Labor Law, the Law on Companies, the Law on the Registration Procedure with the Serbian Business Registers Agency (APR), the Law on Safety and Health at Work, the Law on Mandatory Social Security Contributions, the Law on Health Care, the Law on Pension and Disability Insurance, the Law on Health Insurance, and relevant bylaws issued by the Ministry of Labor. 7. The concept and legal nature of trade secrets, and their relationship with the protection of exclusive intellectual property rights. 8. Students undergo a practical knowledge assessment based on the first two topics, which serves as a prerequisite for implementing prescribed safety and security measures during their company placement. <i>Practical teaching</i> Students deliver presentations on the procedures and practical examples of launching their own business. The course also includes company site visits to help students understand real-world opportunities, development phases, and the broader potential of entrepreneurship. Within these partner enterprises, students conduct practical exercises in relevant fields, operating modern machinery and advanced equipment not available within the institution. This hands-on approach ensures that students are thoroughly prepared for their professional practice and ready to operate within modern production facilities.			
Literature Zakon o bezbednosti i zdravlju na radu („Sl. glasnik RS“, br. 35/2023) Zakon o zaštiti od požara, Službeni glasnik RS, broj 111/2009, 20/2015, 87/2018 i 87/2018 – dr. zakoni. Normativno-pravna regulativa iz oblasti rada Marković, S., Popović, D.: Pravo intelektualne svojine (Beograd, Pravni fakultet univerziteta u Beogradu), 2022 Ljubojević, G., Milošević, I.: Poslovno pravo (Novi Sad, Visoka poslovna škola strukovnih studija), 2020 Vernart, B.: Međunarodno pravo i poslovanje (Novi Sad, Visoka poslovna škola strukovnih studija), 2022			
Active teaching classes: 120		Theoretical teaching: 60	Practical teaching: 60
Teaching methods: Monologic, dialogic, interactive, demonstrative.			
Assessment (maximum number of points 100)			
Pre-exam obligations	Points	Course exam	Points
Active participation in classes	5	Written exam	50
Practical work	15	Oral exam	
Interim exam/s	30		

Study programme: Web design			
Course title: Theoretical and experimental bases of professional work			
Teacher: Božo Ilić, Jovana Kopanja, Branko Savić			
Course status: Compulsory			
Number of ECTS: 9			
Prerequisite course: None			
Course objective Introduction of students to the methodology of producing various types of professional papers. Training students for engineering research in practice, as well as for conducting experimental and other types of research using various scientific and professional methods.			
Learning outcomes Upon successful completion of the course, students will be able to independently produce various types of professional papers by effectively applying diverse scientific and professional research methodologies. Additionally, students will demonstrate the ability to conduct experimental and other engineering research projects using advanced methodological frameworks.			
Course contents <i>Theoretical teaching</i> Basic concepts of science and publication. Scientific papers. Scientific versus professional papers. Types of professional papers (Final paper, Specialist paper, Project, Technical study, Professional report, etc.). Methodology for writing professional papers: Selecting a research topic; Choosing and reviewing literature (collecting relevant data on the addressed problem); Structuring the paper (preface, table of contents, introduction, main body, conclusion, literature, appendices). Core rules for drafting professional papers. Scientific and professional methods in research: Analysis method. Synthesis method. Generalization method. Proof method. Refutation method. Comparative method. Statistical method. Sampling method. Mathematical method. Modeling method. Cybernetic method. Experimental method. Counting method. SWOT analysis. Organization of research applying various methodological frameworks. Practical application: conducting experimental and alternative research types relevant to the student's study programme, using real-world examples and diverse scientific and professional tools. Engineering foundations and engineering decision-making. <i>Practical teaching</i> A portion of the instruction for this course is conducted within a host company where students undergo professional internships and perform various activities directly related to their study program. During this internship period, students gain practical experience and familiarize themselves with business, production, and technological systems, specifically focusing on design, development, production, research, and testing. Throughout their practical placement, students maintain an internship logbook, recording descriptions of their tasks, conclusions, and observations. Upon completing the practical work, students compile their findings into a final report structured as a seminar paper.			
Literature Ilić, B., Savić, B.: Teorijske i eksperimentalne osnove stručnog rada, Visoka tehnička škola strukovnih studija u Novom Sadu, Novi Sad, 2022 Segedinac, T.: Teorija inženjerskog eksperimenta, Visoka tehnička škola strukovnih studija u Novom sadu, Novi Sad, 2012 Kovačević, S.: Teorijske i eksperimentalne osnove specijalističkog rada, Visoka tehnička škola strukovnih studija u Novom Sadu, Novi Sad, 2012 Adamović, Ž., Vulović, S.: Metodologija naučno-istraživačkog rada, Društvo za tehničku dijagnostiku Srbije, Beograd, 2011 Adamović, Ž., Nadrljanski, Đ.: Metodologija naučno-istraživačkog rada – Statističke metode u istraživanju, Društvo za tehničku dijagnostiku Srbije, Pedagoški fakultet, Sombor, 2011			
Active teaching classes: 150		Theoretical teaching: 90	Practical teaching: 60
Teaching methods: Monologic, dialogic, interactive.			
Assessment (maximum number of points 100)			
Pre-exam obligations	Points	Course exam	Points
Active participation in classes		Written exam	50
Practical work	20	Oral exam	
Interim exam/s	30		
Seminar paper/s			

Study programme: Web design			
Course title: Professional practice			
Teacher: Head of the study programme			
Course status: Compulsory			
Number of ECTS: 4			
Prerequisite course: None			
Course objective Acquiring and applying practical knowledge related to the study programme within the host organization, specifically for the purpose of drafting the final thesis.			
Learning outcomes Practical experience in the application and use of knowledge and skills acquired during undergraduate studies. Understanding of the work processes, operational structures, and management of the host company. Data collection and analysis necessary for drafting both the preliminary thesis and the final thesis.			
Course contents Professional practice is carried out in the sixth semester of basic professional studies. It is conducted within manufacturing, service, or other relevant business organizations, following general and individual programme contents designed for final thesis preparation, as agreed upon by the company co-mentor, the institution's mentor, and the student. Students may also complete their professional practice directly at the Higher Technical School of Professional Studies in Novi Sad (the Institution), according to a pre-determined and approved plan. All relevant forms regarding professional practice are available to students registered for the course. Throughout the internship, students perform both general and specialized tasks. General tasks require students to familiarize themselves with the company's history, organizational structure, production or service portfolio, and overall work processes. Specialized professional tasks are jointly defined by the company co-mentor and the mentor. These tasks represent thematic units that students have already studied during their coursework and are now applying under practical conditions within the selected company. The mentor and co-mentor are responsible for precisely defining work assignments and obligations to familiarize students with the organizational structure, work processes, technology, quality control procedures for products and services, and methodologies for data collection and processing related to the preparation of the final thesis. The company co-mentor cooperates with the student on a daily basis, providing guidance and monitoring progress. During the placement, students maintain an Internship Logbook. Assigned work tasks should enable students to actively apply the knowledge acquired throughout their studies, ensuring effective training for their future profession. Upon completing the internship, students submit a final report that corresponds in content and form to the instructions provided at the beginning of the placement.			
Literature Technical documentation from the company and other relevant literature agreed upon between the student, the company co-mentor and the mentor.			
Active teaching classes: 90			
Teaching methods: Practical, laboratory, individual work.			
Assessment (maximum number of points 100)			
Pre-exam obligations	Points	Course exam	Points
Active participation in classes		Written exam	
Practical work	45	Oral exam	
Interim exam/s		Exam	55
Seminar paper/s			

Study programme: Web design			
Course title: Preliminary thesis			
Teacher: Head of the study programme/Mentor			
Course status: Compulsory			
Number of ECTS: 2			
Prerequisite course: None			
Course objective Developing the ability to identify and define problems and communicate with the mentor. Familiarization with practical methodologies applicable to the selected field of study. Integrating, upgrading, and practically applying the knowledge acquired throughout the studies. Preparation for the writing of the final thesis.			
Learning outcomes Through independent and mentored research, the student defines and elaborates upon the initial topic of the final thesis, culminating in a written thesis proposal and an oral defense of a detailed research plan. Consequently, the student develops the ability to conduct analysis and identify problems within the given topic, demonstrating full readiness to write the final thesis.			
Course contents The course is taught through independent professional research and mentoring, during which the student defines the initial topic of the final thesis and elaborates it in detail, leading up to a written proposal and an oral defense of a detailed plan for the preparation of the final thesis. Upon receiving the topic and research assignment, and through regular consultations and progress reporting, the student reviews relevant academic literature, past final theses, and other publications in a related field. The student then conducts preliminary analyses to better delineate the assigned research problem. In the second phase, the student studies the nature, structure, and complexity of the problem in more detail. The student actively searches for published knowledge within the broader topic of the assigned work, and plans and conducts preliminary research or conceptual solutions in order to better conceptualize the task and direct it toward implementation and finalization. In this way, the student draws conclusions about possible solutions, chooses a methodology/technology, and plans in detail the organization and execution of the main analyses or applications of the selected technology when writing the final thesis. During this process, the student regularly consults with the mentor, and if necessary, with other faculty members of the School. The goal of the activities is to gain the necessary experience for problem-solving and to identify opportunities for applying previously acquired knowledge in practice. At the end of the research work, the student writes a Preliminary Thesis Paper. The quality of the written proposal is assessed by the mentor/head of the study programme, and it is defended orally (viva).			
Literature Textbooks in the chosen field, papers from professional journals, technical documentation and company records, software tutorials, past final thesis, etc.			
Active teaching classes: 30			
Teaching methods: Practical, research, mentoring.			
Assessment (maximum number of points 100)			
Pre-exam obligations	Points	Course exam	Points
Active participation in classes		Written exam	
Practical work		Oral exam	
Interim exam/s		Preliminary thesis (viva)	50
Preliminary thesis (preparation)	50		

Study programme: Web design			
Course title: Final thesis			
Teacher: Mentor			
Course status: Compulsory			
Number of ECTS: 8			
Prerequisite course: Passed all courses from the study programme			
Course objective Systematization of theoretical and practical knowledge acquired throughout the study programme, enabling students to develop decision-making and practical problem-solving skills. Documentation of the work done in a written format and the public defense (viva) of the results of the work.			
Learning outcomes The capacity to analyze and resolve practical problems. Skills in presenting research results through both written reports and oral presentations.			
Course contents Upon passing all examinations, the student proceeds to draft the final thesis. This is an applied research paper through which the student becomes familiar with practical problem-solving and research methodologies within one of the fields of the study programme. All procedures and forms related to the final thesis are available on the School's website. The mentor is an active participant in all phases of writing the final thesis, and if necessary, includes a co-mentor from the company (from the student's professional practice) and other faculty members of the School. In addition to a comprehensive review of the existing literature and/or legal and technical regulations in the chosen field, the final thesis should include at least one of the following elements: an analytical, computational, design, or experimental/practical aspect. The student completes the final thesis independently, and it is highly desirable that the work is linked to specific knowledge acquired during professional practice. The student drafts the final thesis based on the detailed execution plan previously presented in the Preliminary Thesis. In doing so, the preliminary experiments, analyses, or software solutions obtained during the research for the Preliminary Thesis are finalized to achieve the definitive results or programs. Subsequently, the student prepares the final thesis in the prescribed format, which includes the following chapters: Introduction, Thesis Objective, Elaboration of the Topic, Conclusion, and Literature. After submitting the written version of the thesis, a verification of fulfillment of conditions follows, according to the procedure given by the <i>Regulations on Topic Application, Preparation, and Defense of the Final Thesis on Bachelor, Specialist, and Master Studies at the Higher Education Technical School of Professional Studies</i> . Then the student proceeds to the oral presentation and defense of the final thesis. The viva is public, and the thesis is defended before a committee.			
Literature Textbooks in the chosen field, papers from professional journals, technical documentation and company records, software tutorials, past final thesis, etc.			
Number of classes: 45			
Teaching methods: Mentoring, practical, laboratory, individual work.			
Assessment (maximum number of points 100)			
Pre-exam obligations	Points	Course exam	Points
Active participation in classes		Written exam	
Practical work		Oral exam	
Interim exam/s		Final thesis (viva)	50
Seminar paper/s			
Final thesis (preparation)	50		