SVEUČILIŠTE U ZAGREBU, FAKULTET ŠUMARSTVA I DRVNE TEHNOLOGIJE
UNIVERSITY OF ZAGREB, FACULTY OF FORESTRY AND WOOD TECHNOLOGY

Graduate Study Wood Product Design

Syllabus
from Acad. Year 2022/23

LIST OF COMPULSORY AND ELECTIVE COURSES WITH CLASS HOURS AND ECTS CREDITS

Year of study: I

Semester: Winter

COURSE	COURSE TEACHER	L	E	F	e-learning	ECTS	Compulsory / elective
Construction of wooden products	Assoc. Prof. Ivica Župčić, PhD	30	30	16	2	6	Compulsory
Technological production management	Prof. Denis Jelačić, PhD	30	30	16	1	6	Compulsory
Panel materials	Prof. Vladimir Jambreković, PhD Assist. Prof. Nikola Španić, PhD	30	15	16	2	5	Compulsory
Methodology of furniture design	Danijela Domljan, PhD, Assistant Professor	15	30	16	1	5	Compulsory
Macroscopic properties and texture of wood	prof. Tomislav Sinković PhD assist.prof.TomislavSedlar PhD	30	15		2	4	Elective
Furniture and interior decoration	Danijela Domljan, PhD, Assistant Professor	30	15	16	1	4	Elective
Special products of wood	prof.Tomislav Sinković PhD assist.prof. Tomislav SedlarPhD	30	15	8		4	Elective
Non-wood materials	Associate prof. Jaroslav Kljak, PhD	30	15		1	4	Elective
In total		225	165	88		38	

Year of study: I

Semester: Summer

COURSE	COURSE TEACHER	L	E	F	e-learning	ECTS	Compulsory / elective
Investigation of physical and mechanical properties of wood	prof. Tomislav Sinković PhD assist.prof. Tomislav Sedlar PhD	30	30	8	2	5	Compulsory
Wood Composite Materials	izv. prof. dr. sc. Jaroslav Kljak	30	30		1	5	Compulsory
Quality of finished products	Assoc. Prof. Ivica Župčić, PhD	15	30	8	2	4	Compulsory
Information systems on wood products market	Prof. Darko Motik; assist.prof. Andreja Pirc Barčić	30	15	8	3	4	Compulsory
Professional practice	Prof. dr.sc. Silvana Prekrat			160		4	Compulsory
Computer aided design	Prof. dr.sc. Silvana Prekrat	30	15		2	4	izborni
International market of wood products	Doc. dr. sc. Andreja Pirc Barčić,	30	15		3	4	izborni

Exotic wood and its identification	Assoc. Prof. Bogoslav Šefc, PhD Doc. dr. sc Iva Ištok	30	15		1	4	izborni
In total		195	150	184		34	

Year of study: II							
Semester: Winter							
COURSE	COURSE TEACHER	L	E	F	e-learning	ECTS	Compulsory / elective
Finishing of wood products	Prof. Vlatka Jirouš Rajković, PhD Assist. Prof. Josip Miklečić, PhD	30	30	16	2	6	obvezni
Designing of woden products	Prof. dr. sc. Silvana Prekrat	30	30	8	2	6	obvezni
Furniture and health	Izv.prof.dr.sc. Danijela Domljan Izv. prof. dr. sc. Zoran Vlaović	30	15	8	1	5	obvezni
Applied Statistics	Prof. Anamarija Jazbec, PhD	30	15		3	5	obvezni
Computer aided wood processing	Assoc. Prof. Goran Mihulja, PhD.	30	15	8		4	izborni
Research on adhesive joints	Assist. Prof. Josip Miklečić, PhD Assoc. Prof. Goran Mihulja, PhD. Prof. Hrvoje Turkulin, PhD Tomislav Gržan	30	15	8		4	izborni
Integrated management systems in wood industry	Doc. dr. sc. Kristina Klarić; Doc. dr. sc. Krešimir Greger	30	15	8	2	4	izborni
Project management	Prof. dr. sc. Denis Jelačić	30	15	8		4	izborni
In total		240	150	64		38	

Year of study: II							
Semester: Summer							
COURSE	COURSE TEACHER	L	E	F	e-learning	ECTS	Compulsory / elective
Professional project				120		4	obvezni
Diploma work						14	obvezni
Basics of wood restoration	Assoc. Prof. Marin Hasan, PhD	30	15	16	2	4	izborni
Selected methods in wood anatomy	Doc.dr.sc. Iva Ištok	30	15		1	4	izborni
Business communication in English	Sanda Tomičić, prof.	15	30		2	4	izborni
Entrepreneurship in wood industry	Assist. Prof. Kristina Klarić, PhD	30	15	8	2	4	izborni
Human Resources Management	Prof. dr. sc. Denis Jelačić	30	15	8	1	4	izborni
In total		135	90	152		38	

COURSE DECRIPTION

1. GENERAL INFORMATION			
1.1. Course lecturer(s)	Assoc. Prof. Ivica Župčić, PhD	1.7. Number of ECTS credits	5
1.2. Course title	Construction of wooden products	1.8. Number of hours in semester (L+E+F+e-learning)	30 + 30 + 16
1.3. Course code	235550	1.9. Expected enrolment in the course	10-15
1.4. Study programme	Graduate	1.10. Level of application of e-learning (level 1, 2, 3)	2
1.5. Course type	Compulsory	1.11. Language of instruction	
1.6. Year of the study	1	1.12. Possibility of instruction in English	

2. COURSE DESCRIPTION	
2.1. Course objectives	Acquiring knowledge of designing different types of wood products and equipment used in construction, methods of testing quality, safety and functionality in use. Developing of designing system through planning, modelling, designing and preparing technical documentation (drawings, cross-sections, technical description and components of materials) required for the manufacture of a finished product.
2.2. Enrolment requirements and/or entry competences required for the course	
2.3. Learning outcomes at the level of the programme to which the course contributes	B2 - Resolve interdisciplinary problems which refer not only to product design or construction and their presentation, but also include the selection of all production materials, processing technology and assurance of final product quality, B3 - Apply final wood product, wooden and non-wooden materials design methodology in developing and improving products, quality upgrade, product design and construction; B4 - Develop and plan a complete construction system which consists of planning, designing, constructing, preparing technical documentation and applying technologies for final product manufacturing; C1 - Construct wooden products for building purposes in accordance with the basic safety criteria and usage functionality; C4 - Recommend the finishing process technology for products, evaluate quality of the finishing process and recommend methods for preventing mistakes in the finishing process.
2.4. Expected learning outcomes at the level of the course (3 to 10 learning outcomes)	1. to describe and explain the construction types of objects for civil engineering (doors, windows, stairs, partition walls, floor, wall, ceiling lining, staircases built-in cabinet) based on their modelling features and use; 2. to construct, draw and describe construction of windows, balcony doors, outer and inner doors (room or entrance door with a suitable door frame) based on the principle of functionality, safety and durability of use; 3. to construct, draw and describe construction of interior equipment of a facility (separating walls, floor, wall and ceiling lining, staircases and stairs, built-in cabinet) based on the principle of functionality and safety of use; 4. to calculate the dimensions of steps (height & width) and staircases (walking line inclination and length) for straight, double-flight, multiple-flight and curved staircases; 5. to recommend a cost-effective application of materials and the optimal construction solution, to use CAD programmes as aid when designing and virtualising products and draw up the technical documentation required to make the product; 6. to sketch and describe construction of funeral equipment (coffin, sarcophagus and semi-sarcophagus); 7. to recognise the modelling and construction solutions of the equipment for children's playgrounds; 8. to gather, group and process information about the assigned topic and present it.

<table>
<tr><td>2.5. Course content (syllabus)</td><td colspan="9">Introduction to the construction of wood objects for building equipping. Construction of outer doors of solid wood, outer door classification, door construction (construction and the manner of door leaf assembly, construction and the manner of door frame and threshold assembly, dimensions and other outer doors, opening manners, hardware and seals). Construction of inner doors, inner door classification, (solid wood inner door and wood panel inner door) door construction (construction and the manner of door leaf assembly, construction and the manner of door frame and threshold assembly, dimensions opening manners, hardware and seals). Construction of window frames and balcony doors, classification of windows and balcony doors, the construction of windows and balcony doors (construction and the manner of door leaf assembly, construction and the manner of frame assembly, dimensions and opening manners, hardware and seals) and the construction of windows and balcony doors made of artificial materials and metal). Stairs and staircases (classification and types, constructional forms, dimensions and the calculation of steps and stair rails) and the standards for stairs.
Interior equipment (ceiling lining, floor lining, separating walls). Build-in cabinet, construction types and hardware. Interior equipment for yachts and ships. Construction of the equipment for children's playgrounds. Exterior equipment. Construction of funeral equipment. Construction of special wood-made products.</td></tr>
<tr><td>2.6. Format of instruction</td><td colspan="3">☒ lectures
☐ seminars and workshops
☒ exercises
☐ online in entirety
☒ partial e-learning
☒ field work</td><td colspan="3">☒ independent assignments
☐ multimedia and the internet
☒ laboratory
☐ work with mentor
☐ (other)</td><td colspan="3">2.7. Comments:</td></tr>
<tr><td rowspan="6">2.8. Monitoring student work</td><td>Class attendance</td><td>yes</td><td></td><td>Research</td><td></td><td></td><td>Oral exam</td><td>yes</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>no</td><td>Report</td><td></td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Essay</td><td></td><td>no</td><td>Seminar paper</td><td></td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Preliminary exam</td><td>yes</td><td></td><td>Practical work</td><td></td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Project</td><td></td><td></td><td>Written exam</td><td>yes</td><td></td><td>ECTS credits (total)</td><td>5</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>2.9. Assessment methods and criteria</td><td colspan="9">Assessment is conducted in accordance with Assessment methods and criteria for the current academic year</td></tr>
<tr><td>2.10. Student responsibilities</td><td colspan="9"></td></tr>
<tr><td rowspan="3">2.11. Required literature (available in the library and/or via other media)</td><td colspan="5">Title</td><td colspan="2">Availability in the library</td><td colspan="2">Availability via other media</td></tr>
<tr><td colspan="5">Domljan, D.; Grbac, I.; Jirouš Rajković, V.; Vlaović, Z.; Živković, V.; Župčić, I. 2015: Kvaliteta i tehnički opisi proizvoda od drva, Svezak I opremanje zgrada za odgoj i obrazovanje, sveučilišni udžbenik, Sveučilište u Zagrebu Šumarski fakultet, Zagreb.</td><td colspan="2">Yes</td><td colspan="2"></td></tr>
<tr><td colspan="5">Nutsch, W. (2012.): Handbuch der Konstruktion Innenausbau, Verlags-Anstalt, Deutsche.</td><td colspan="2">No</td><td colspan="2">Professors office</td></tr>
<tr><td></td><td colspan="5"></td><td colspan="2">No</td><td colspan="2">Professors office</td></tr>
</table>

	Ehrmann, W.; Nutsch, W.; Siebert. D. (2008.): Holztechnik, Der Holztreppenbau, Verlang Europa-Lehrmittel, Deutschland. Ehrmann, W.; Nutsch, W.; Spellenberg. B. (2005.): Holztechnik, Konstruktion und Arbeitsplanung, Verlang Europa-Lehrmittel, Deutschland.	No	Professors office
2.12. Optional literature	1, Šimetin, V. 1983: Građevinska fizika, Liber, Zagreb. 2. Au, G.; Baumgarten, R.; Behre, H.; Bissinger, T.; Heidsieck, E.; Herchenhahn, A.; Kitzhofer, F.; Redding, R.; Rolfes, K.; Rompp, O.; Roth, D.; Schmale, W.; Schroder, M.; Urbanek, J.; Wolff, E.-D.; Wolff, S. 2007: Fachwissen Holztechnik, Technologie mit CNC-technik – technische mathematik – konstruktion und arbeitsplanung. Handwerk und technik, Hamburg. 3. Frgić, V. 2004: Drvne konstrukcije. Namještaj 3: prozori, vrata, stubišta, unutarnja oprema. Element, Zagreb, 1-288. 4. Morić, M. 1995: Konstrukcije drvnih proizvoda, Namještaj, proizvodi za građevinarstvo, transportna ambalaža, priručnik za praksu i nastavu, Projektni biro "INTERIJER", Šibenik. 5. Župčić, I.; Grbac, I.; Bogner, A.; Hadžić, D. 2012: Research corner joints in corpus furniture, International Conference, Wood is good – with knowledge and technology to a competitive forestry and wood technology sector. Innovawood, University of Zagreb, Faculty of Forestry, Croatia 12th October, 229-235. 6. Govorčin, S.; Sinković, T.; Župčić, I. 2000: Tvrdoća-pokazatelj upotrebljivosti drva u graditeljstvu, International Conference, Wood in the construction industry, Institute for Research in Wood Industry, Faculty of Forestry, University of Zagreb, Croatia 24th April, 19-25. 7. Kelsey, J. (1987.) Fine woodworking od bending wood. The Taunton press, USA.		

COURSE DECRIPTION

1. GENERAL INFORMATION			
1.1. Course lecturer(s)	Prof. Denis Jelačić, PhD	1.7. Number of ECTS credits	6
1.2. Course title	Technological production management	1.8. Number of hours in semester (L+E+F+e-learning)	30+30+16
1.3. Course code	235551	1.9. Expected enrolment in the course	15
1.4. Study programme	Graduate	1.10. Level of application of e-learning (level 1, 2, 3)	1
1.5. Course type	Compulsory	1.11. Language of instruction	
1.6. Year of the study	1	1.12. Possibility of instruction in English	
2. COURSE DESCRIPTION			
2.1. Course objectives	Student receives the necessary knowledge for the work in praxis on the work places in enterprise management with responsiblities in the area of production management, especially in the area of technological production management, production scheduling, material management, etc.		
2.2. Enrolment requirements and/or entry competences required for the course	D1 – to do the responsible work in enterprise management in the are of production management, technological production management, scheduling, material management and capacity management D4 – to do the responsible work in enterprise management in the are of production management		

<table>
<tr><td>2.3. Learning outcomes at the level of the programme
to which the course contributes</td><td colspan="9">1. To establish the position and activities of production management within the management system
2. To create the work order as a main information carrier in production management
3. To establish the standards and demands for material in the production
4. To establish the standards and demands for working time in the production
5. To establish the standards and demands for capacity in the production
6. To create full technological documentation as a part of management-information system in a company
7. To project the management-information system in the company</td></tr>
<tr><td>2.4. Expected learning outcomes at the level of the course (3 to 10 learning
outcomes)</td><td colspan="9">1. Goals and tasks of production management in wood processing and furniture manufacturing. Technological and operations production management and work allocation. Production management as a part of management subsystem.
2. Modern systems and concepts of production management.
3. Working order as a main information carrier in production management. Planning, launching, execution and control of working orders.
4. Creating of drat components. Types of draft components. Establishing of material standards and demands. Exercise: Establishing of material demands.
5. Establishing of time standards, working time and working order time. Exercise: Establishing of working order time.
6. Establishing of the flow coefficient. Creating time plans.
7. Establishing the working order priorities.
8. Material management. Methods for establishing stock quantities.
9. Methods for establishing capacity demands. Control of the production execution. Exercise: Establishing capacity demands.
10. Work allocation and working order caluculation. Multiplication, completing and launching of production documentation. Working order records and analysis of the plan execution. Exercise: Project of the production management and completing of technological documentation.
11. Production management documentation. Flow chart of production documentation as a part of information subsystem.
12. Creating a project of management-information system in wood processing and furniture manufacturing. Basics of management-information projects. Exercise: Creating a project of management-information system in a company.
13. Presentations of individual student projects.
14. Final class and quality of the classes inquiry.</td></tr>
<tr><td>2.5. Course content (syllabus)</td><td colspan="9"></td></tr>
<tr><td>2.6. Format of instruction</td><td colspan="3">☒ lectures
☐ seminars and workshops
☒ exercises
☐ online in entirety
☐ partial e-learning
☒ field work</td><td colspan="3">☒ independent assignments
☐ multimedia and the internet
☐ laboratory
☒ work with mentor
☐ (other)</td><td colspan="3">2.7. Comments:</td></tr>
<tr><td rowspan="6">2.8. Monitoring student work</td><td>Class attendance</td><td>yes</td><td></td><td>Research</td><td></td><td></td><td>Oral exam</td><td>yes</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td></td><td>Report</td><td></td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Essay</td><td></td><td></td><td>Seminar paper</td><td></td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Preliminary exam</td><td>yes</td><td></td><td>Practical work</td><td></td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Project</td><td>yes</td><td></td><td>Written exam</td><td>yes</td><td></td><td>ECTS credits (total)</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>2.9. Assessment methods and criteria</td><td colspan="9">Assessment is conducted in accordance with Assessment methods and criteria for the current academic year</td></tr>
</table>

2.10. Student responsibilities			
2.11. Required literature (available in the library and/or via other media)	Title	Availability in the library	Availability via other media
	Jelačić, D. 1998.: Priprema proizvodnje I (Production Management I), Neodidacta, Zagreb	Yes	
	Jelačić, D. 1998.: Priprema proizvodnje II (Production Management II), Neodidacta, Zagreb	Yes	
	Grladinović, T. 1999: Upravljanje proizvodnim sustavima u preradi drva i proizvodnji namještaja, Šumarski fakultet, (Production management systems in wood processing and furniture manufacturing, Faculty of Forestry), Zagreb	yes	
2.12. Optional literature	1. Figurić, M., et al., 1992.: Proizvodni sustavi u drvnoj industriji I, Šumarski fakultet (Production systems in wood industry I, Faculty of Forestry), Zagreb		

COURSE DECRIPTION

1. GENERAL INFORMATION			
1.1. Course lecturer(s)	Prof. Vladimir Jambreković, PhD Assist. Prof. Nikola Španić, PhD	1.7. Number of ECTS credits	4
1.2. Course title	Panel materials	1.8. Number of hours in semester (L+E+F+e-learning)	30+15+16
1.3. Course code	235552	1.9. Expected enrolment in the course	10
1.4. Study programme	Graduate	1.10. Level of application of e-learning (level 1, 2, 3)	2
1.5. Course type	Compulsory	1.11. Language of instruction	
1.6. Year of the study	1	1.12. Possibility of instruction in English	
2. COURSE DESCRIPTION			
2.1. Course objectives	Gaining knowledge about physico-mechanical, ecological, technical (fire retardancy, sound and heat insulation, electrical conductivity) and aesthetic characteristics of panel materials, alongside their workability, in order to select the optimal constructional solution adequate for a specific type of material.		
2.2. Enrolment requirements and/or entry competences required for the course			
2.3. Learning outcomes at the level of the programme	B5 - Evaluate board materials according to processing possibilities, technical and ecological characteristics, and choose optimal constructional solutions adequate for the properties and processability of each bord material type		

<table>
<tr><td>to which the course contributes</td><td colspan="9"></td></tr>
<tr><td>2.4. Expected learning outcomes at the level of the course (3 to 10 learning outcomes)</td><td colspan="9">1. to identify, evaluate and compare the physico-mechanical, ecological, technical and aesthetic properties of panel materials
2. explain the requirements for the quality of panel materials regarding the construction requirements and furniture design requirements
3. to analyse and evaluate important factors influencing the properties of panel materials in indoor and outdoor use
4. to determine the applicability of panels from the economic aspect
5. to evaluate panels workabillity regarding the specific of their structure
6. to recommend the appropriate type of panel, regarding the specific place of its use</td></tr>
<tr><td>2.5. Course content (syllabus)</td><td colspan="9">Development of standardization and technical regulations related to the application of board materials. Panel materials quality demands considering the construction and furniture design demands. Specific
demands for panel materials in interior design. Wooden panels as construction materials for buildings. The influence of wooden raw material type on panel properties. The influence of chemical components on panel properties. The economic aspect of panels' applicability. The ecological aspects of panels' applicability for use in interior. The factors influencing on physical properties of panel materials. The influence of used raw material on panel's mechanical properties. The factors influencing the stability of panels in interior use. Panel durability factors in construction. Dependability of technical properties and formaldehyde emission.
Specifics of combustion of unprotected panel materials. The influence of fire retardants on technical properties of panels. The influence of panel structure on heat conductivity and acustic properties. Workability of panels considering the type of raw material and structure. Aesthetic, ecological and technical aspects of panel overlaying with natural and synthetic materials. Specifics of edge coating of panel materials. Novel panel materials.Wood-plastic composites.Comparable properties of panel materials. The direction of panels' properties development. The limitations of toxic chemical components share in panel structure.</td></tr>
<tr><td>2.6. Format of instruction</td><td colspan="3">☒ lectures
☐ seminars and workshops
☒ exercises
☐ online in entirety
☒ partial e-learning
☒ field work</td><td colspan="3">☐ independent assignments
☐ multimedia and the internet
☒ laboratory
☐ work with mentor
☐ (other)</td><td colspan="3">2.7. Comments:</td></tr>
<tr><td rowspan="6">2.8. Monitoring student work</td><td>Class attendance</td><td>yes</td><td></td><td>Research</td><td></td><td></td><td>Oral exam</td><td>yes</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td></td><td>Report</td><td></td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Essay</td><td></td><td></td><td>Seminar paper</td><td>yes</td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Preliminary exam</td><td></td><td></td><td>Practical work</td><td></td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Project</td><td></td><td></td><td>Written exam</td><td>yes</td><td></td><td>ECTS credits (total)</td><td>5</td><td></td></tr>
<tr><td></td><td colspan="9"></td></tr>
<tr><td>2.9. Assessment methods and criteria</td><td colspan="9">Assessment is conducted in accordance with Assessment methods and criteria for the current academic year</td></tr>
<tr><td>2.10. Student responsibilities</td><td colspan="9"></td></tr>
<tr><td>2.11. Required literature (available in the library and/or via other media)</td><td colspan="4">Title</td><td colspan="2">Availability in the library</td><td colspan="3">Availability via other media</td></tr>
</table>

	Sandberg, D., Kitek Kuzman, M., Gaff, M.: Engineered Wood Products. Czech University of Life Sciences, Prague, 2018.	No	Yes
	Moslemi, A. A. Particleboards - Volume 1: Materials. Southern Illinois University Press, 1974.	No	Yes
	Jambreković, V., Španić, N.: Panel Materials, (Internal script), Faculty of Forestry, Zagreb, 2021 (in writing)	No	Yes
2.12. Optional literature	1. Ambrozy, H. G., Giertlová, Z.: Holzwerkstoffe: Technologie - Konstruktion - Anwendung. Springer-Verlag/Wien, 2005 [In German].		

COURSE DECRIPTION

1. GENERAL INFORMATION			
1.1. Course lecturer(s)	Danijela Domljan, PhD, Assistant Professor	1.7. Number of ECTS credits	5
1.2. Course title	Methodology of furniture design	1.8. Number of hours in semester (L+E+F+e-learning)	30+15+16
1.3. Course code	235553	1.9. Expected enrolment in the course	10
1.4. Study programme	Graduate	1.10. Level of application of e-learning (level 1, 2, 3)	1
1.5. Course type	Compulsory	1.11. Language of instruction	
1.6. Year of the study	1	1.12. Possibility of instruction in English	
2. COURSE DESCRIPTION			
2.1. Course objectives	Mastering and understanding the theoretical, practical and methodological foundations of furniture design as a complex interdisciplinary process. Developing the ability of independent analytical and creative design and action.		
2.2. Enrolment requirements and/or entry competences required for the course	-application of ACAD or similar computer programs for 2D and 3D drawings -knowledge of at least one foreign language (preferably English) -equipped workshop / practicum DTO with lathe, laser cutter and other basic machines for processing wood, wood panels and moldings		
2.3. Learning outcomes at the level of the programme to which the course contributes	A1: Inform potential buyers of final product quality characteristics and of trends in wood products design, A2: Independently gather data, statistically process, present and analyse gathered data, discuss and make conclusions based on analysed data and distinguish possibilities of different interpretation of the same problem analysed in different ways, A3: Give presentations at fairs. B1: Apply current technical regulations in ensuring quality of wood, wooden materials and final products, B2: Resolve interdisciplinary problems which refer not only to product design or construction and their presentation, but also include the selection of all production materials, processing technology and assurance of final product quality B7: Apply theoretical, practical and methodological basics of furniture design as a complex interdisciplinary process, B8: Develop the ability of independent analytic and creative design and acting, B9: Analyse and make conclusions on wood properties and their application in wood product design,		

<table>
<tr><td></td><td colspan="9">B10: Apply knowledge of furniture quality and methods of its examination and develop and plan a complete system of final product quality assurance
C6: Manage projects from the preliminary design to serial production with additional operating of CAD programmes for visualization and automatic construction
E1: Perform tasks of scientific and professional associate in scientific research institutions 7
in the field of wood and wood technology,
E2: Conduct courses in vocational secondary schools and other similar schools</td></tr>
<tr><td>2.4. Expected learning outcomes at the level of the course (3 to 10 learning outcomes)</td><td colspan="9">1. Explain the purpose, goals and reasons for the application of design methods (primary and secondary research; survey, interview, observation, photography, video recording, anthropometric research, literature research, marketing research, cultural analysis, focus groups, etc.), within the methodology of industrial furniture in the wood industry and recognize the effects of their application.
2. Evaluate theoretical, practical and methodological goals and methods of furniture design as part of a complex interdisciplinary design process on a given example.
3. Manage the product design process in all phases of product development phases of product development process management (concept and implementation phases; concept creation and search, previous research and problem definition, project feasibility assessment, concretization of conceptual solutions, concept checking and extension; product development and development concept, sample design, value analysis and verification, implementation, prototyping, trial series, solution evaluation, product launch and monitoring).
4. Apply the stages of product development and explain the importance of applying the methodology through individual stages in the design process.
5. Determine the criteria, goals and requirements for the new product within the phase Design concept (product concept).
6. Analyze the feasibility of the product by applying feasibility criteria and optimize the solution (target group of users, technology in operation, materials used, the possibility of standardization of elements, manufacturing costs, etc.)
7. Make a detailed design elaboration and make a model.</td></tr>
<tr><td>2.5. Course content (syllabus)</td><td colspan="9">Introduction to design methodology. Purpose, goals and reasons for the application of the methodology of industrial furniture design in the wood industry. Tasks and effects of methodology. Methods and systematic procedures of the shaping process. The process of designing furniture. Design methods. Decision making methods. Idea search methods. Valuation methods. The role of methodology and design methods in product development. Cyclic method of creative process. Identifying problems and discovering needs. Environmental analysis. Product concept. Project participants. Research of documentation and analog solutions.
Project asignment. Determining criteria, goals and requirements - design instructions. Development of several conceptual solutions. Feasibility analysis. Solution optimization. Execution solution. Communication solutions. Evaluation of results. Detailed elaboration of design, construction and technological solution. Market testing for a new product. Making, testing and refining a prototype of a new product. Preparation of product documentation for trial and serial production. Product conception and interdisciplinarity. Basic features of common development-production-business-social areas. Methodological procedure of an interdisciplinary concept in relation to the design process.</td></tr>
<tr><td>2.6. Format of instruction</td><td colspan="3">☒ lectures
☒ seminars and workshops
☒ exercises
☐ online in entirety
☒ partial e-learning
☒ field work</td><td colspan="3">☒ independent assignments
☐ multimedia and the internet
☐ laboratory
☐ work with mentor
☒ (other) part of the exercises are performed in a practicum (workshop) DTO</td><td colspan="3">2.7. Comments:</td></tr>
<tr><td>2.8. Monitoring student work</td><td>Class attendance</td><td>yes</td><td></td><td>Research</td><td>yes</td><td></td><td>Oral exam</td><td>yes</td><td></td></tr>
</table>

	Experimental work	yes		Report	yes		(other)		
	Essay			Seminar paper	yes		(other)		
	Preliminary exam			Practical work	yes		(other)		
	Project	yes		Written exam			ECTS credits (total)	4	

2.9. Assessment methods and criteria	Assessment is conducted in accordance with Assessment methods and criteria for the current academic year		
2.10. Student responsibilities			
2.11. Required literature (available in the library and/or via other media)	Title	Availability in the library	Availability via other media
	Lapaine, B. (1993): Metodologija dizajna - skripta, Interfakultetski studij dizajna, Zagreb	Yes	
	Domljan, D. (2015): Metodologija industrijskog oblikovanja namještaja (interna skripta), Sveučilište u Zagrebu Šumarski fakultet	No	Yes, Merlin
	Berman, D.B. (2009): Do Good Design. New Riders & AIGA Design Press, USA	No	web, free pdf available
	Domljan, D; Grbac, I; Jirouš Rajković, V; Vlaović, Z; Živković, V; Župčić, I. (2015): Kvaliteta i tehnički opisi proizvoda od drva. Svezak I. Opremanje zgrada za odgoj i obrazovanje, sveučilišni priručnik, Šumarski fakultet Sveučilišta u Zagrebu, Hrvatska gospodarska komora, Zagreb	yes	
	Baxter, M. (2002): Product design, A practical guide to systematic methods of new product development, Nelson Thornes Ltd., Cheltenham, UK	No	web, free pdf available
	Lewrick, M.; Link, P.; Leifer, L. (2018): The Design Thinking Playbook: Mindful digital transformation of teams, products, services, businesses and ecosystems. Willey, USA	no	web, free pdf available
2.12. Optional literature	Beazley, M. (2003): The Elements of Design, Octopus Publishing Group Ltd, UK Clay, R. (2009): Beautiful Thing. Berg, Oxford Int. Publishers, UK Fuad-Luke, A. (2007): The Eco-design Handbbook, Thames & Hudson, London, UK Grbac, I. (2003): Zdrav život – zdravo stanovanje, Prvi priručnik iz područja namještaja u funkciji zdravlja, Spektar media, Zagreb Laurel, B. (2003): Design research, methods and perspectives, Massachusetts Institute of Technology, The MIT Press, Chambridge, Massachusetts, London, England. Luchs M.G. Swan S.; Griffin, A (2015): Design Thinking: New Product Development Essentials from the PDMA. Willey, New Jersey Keller, G. (1995): Dizajn, Vjesnik , Agencija za marketing, Zagreb, odabrana poglavlja Kolter, P. (1996): Upravljanje marketingom: analiza, planiranje, primjena i kontrola. MATE d.o.o, Zagreb		

	Marchus, G.H. (2002): What is design today, H.N. Abrams Inc., New York Quarante, D. (1991): Osnove industrijskog dizajna, Arhitektonski fakultet Sveučilišta u Zagrebu - Interfakultetski studij dizajna, Zagreb, odabrana poglavlja Papanek, V. (1973): Dizajn za stvarni svijet, M. Marulić, Split Urlich, K.T.; Eppinger, S.D. (2012): Product Design and Development, 5th ed. McGraw-Hill, NY

COURSE DECRIPTION

1. GENERAL INFORMATION			
1.1. Course lecturer(s)	prof. Tomislav Sinković PhD assist.prof. Tomislav Sedlar PhD Branimir Jambreković PhD	1.7. Number of ECTS credits	4
1.2. Course title	Macroscopic properties and texture of wood	1.8. Number of hours in semester (L+E+F+e-learning)	30+15
1.3. Course code	33710	1.9. Expected enrolment in the course	
1.4. Study programme	Graduate	1.10. Level of application of e-learning (level 1, 2, 3)	2
1.5. Course type	Elective	1.11. Language of instruction	
1.6. Year of the study	1	1.12. Possibility of instruction in English	
2. COURSE DESCRIPTION			
2.1. Course objectives	Application of theoretical knowledge on the influence of macroscopic characteristics and texture of wood on properties as well as usability of wood in different wood products. Evaluation of the impact of macroscopic characteristics and texture of wood on the value or uniqueness of products from the aspect of macroscopic characteristics and texture of wood.		
2.2. Enrolment requirements and/or entry competences required for the course			
2.3. Learning outcomes at the level of the programme to which the course contributes	A2,B1, B2-Determination of influence of macroscopic properties of wood on processing and application of wood in wood products A2,B1, B2- Determination of the influence of wood texture on wood processing and application of wood products A2,B1, B2-Evaluation of the impact of macroscopic properties of wood and texture of wood for certain types of wood products A2,B1, B2-Determination of type of woodworking for the purpose of achieving the maximum effect of macroscopic properties of wood and wood texture for certain types of wood products A2,B1, B2- Definition of macroscopic properties of wood and texture of wood for certain types of wood products A2,B1, B2-Practical determination of macroscopic properties of wood and texture of wood for certain wood products		
2.4. Expected learning outcomes at the level of the course (3 to 10 learning outcomes)	Determination of influence of macroscopic properties of wood on processing and application of wood in wood products Determination of the influence of wood texture on wood processing and application of wood products Evaluation of the impact of macroscopic properties of wood and texture of wood for certain types of wood products		

<table>
<tr><td></td><td colspan="9">Determination of type of woodworking for the purpose of achieving the maximum effect of macroscopic properties of wood and wood texture for certain types of wood products
Definition of macroscopic properties of wood and texture of wood for certain types of wood products
Practical determination of macroscopic properties of wood and texture of wood for certain wood products</td></tr>
<tr><td>2.5. Course content (syllabus)</td><td colspan="9">Knowledge about impotrants of macroscopical properties of wood. Complite approach to determination of macroscopic properties of wood. Types and forms of texture. Ring width, percentage of latewood and earlywood and finesse of annual rings. Texture of wood. Texture of basic wood sections. Texture of segments tree, root, root swelling, bole and branches. Wood sections and its influence on texture of wood. Factors important for texture of wood. . Texture of wood from defects and abnormalities of wood. Texture of wood natural defects, reaction wood, compression and tension wood, cross grain, variations in log form and shakes. Macroscopical properties and texture of commercial coniferous wood species. Macroscopical properties and texture of commercial ringporous wood species.</td></tr>
<tr><td>2.6. Format of instruction</td><td colspan="4">☒ lectures
☐ seminars and workshops
☒ exercises
☐ online in entirety
☐ partial e-learning
☒ field work</td><td colspan="4">☐ independent assignments
☐ multimedia and the internet
☒ laboratory
☒ work with mentor
☐ (other)</td><td>2.7. Comments:</td></tr>
<tr><td rowspan="6">2.8. Monitoring student work</td><td>Class attendance</td><td>yes</td><td></td><td>Research</td><td></td><td></td><td>Oral exam</td><td>yes</td><td></td></tr>
<tr><td>Experimental work</td><td>yes</td><td></td><td>Report</td><td></td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Essay</td><td></td><td></td><td>Seminar paper</td><td>yes</td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Preliminary exam</td><td></td><td></td><td>Practical work</td><td></td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Project</td><td></td><td></td><td>Written exam</td><td>yes</td><td></td><td>ECTS credits (total)</td><td></td><td></td></tr>
<tr><td></td><td colspan="9"></td></tr>
<tr><td>2.9. Assessment methods and criteria</td><td colspan="9">Assessment is conducted in accordance with Assessment methods and criteria for the current academic year</td></tr>
<tr><td>2.10. Student responsibilities</td><td colspan="9"></td></tr>
<tr><td>2.11. Required literature (available in the library and/or via other media)</td><td colspan="5">Title</td><td colspan="2">Availability in the library</td><td colspan="2">Availability via other media</td></tr>
<tr><td></td><td colspan="5">Horvat i drugi: Osnove nauke o drvu, Zagreb, 1985

Karahasanović, A.: Nauka o drvetu, Sarajevo, 1988

Ugrenović, A.: Tehnologija drveta, Zagreb, 1950

Govorčin, S.; Sinković, T.: Ispitivanje fizikalnih i mehaničkih svojstava drva, 2004, Zagreb, Interna skripta</td><td colspan="2">Yes

Yes

Yes

yes</td><td colspan="2"></td></tr>
<tr><td>2.12. Optional literature</td><td colspan="9">1.Giordano, G.: Tecnologia del legno, Volume l, Torino, 1971, str. 1-1086.
2.Giordano, G.: Tecnologia del legno, Volume 111, Torino, 1976, str. 1-1351.
3.Lincoln, W., A. Walker, et al. 1989. The Encyclopedia of Wood. Facts on File Books. Quarto Publishing plc, London.</td></tr>
</table>

	4.Tsoumis, G.: Science and Technology of Wood, New York,1991, str. 1-233.

COURSE DECRIPTION

1. GENERAL INFORMATION			
1.1. Course lecturer(s)	Danijela Domljan, PhD, Assistant Professor	1.7. Number of ECTS credits	4
1.2. Course title	Furniture and interior decoration	1.8. Number of hours in semester (L+E+F+e-learning)	30+15+16
1.3. Course code	235689	1.9. Expected enrolment in the course	10
1.4. Study programme	Graduate	1.10. Level of application of e-learning (level 1, 2, 3)	1
1.5. Course type	Elective	1.11. Language of instruction	
1.6. Year of the study	1	1.12. Possibility of instruction in English	

2. COURSE DESCRIPTION	
2.1. Course objectives	Knowledge of perceiving space and measuring, presenting, planning, designing and equipping functional spatial units, as well as mastering the methods of analysis and harmonization of functional groups of furniture in relation to space. Developing skills for comprehensive equipping of space (interior, exterior) with furniture and other equipment.
2.2. Enrolment requirements and/or entry competences required for the course	Adopted knowledge and skills for: - application of ACAD or similar computer programs for 2D and 3D drawing - understanding and application of 3D plane, orthogonal projection and perspective - knowledge of at least one foreign language (preferably English or German)
2.3. Learning outcomes at the level of the programme to which the course contributes	A1: Inform potential buyers of final product quality characteristics and of trends in wood products design, A2: Independently gather data, statistically process, present and analyse gathered data, discuss and make conclusions based on analysed data and distinguish possibilities of different interpretation of the same problem analysed in different ways, A3: Give presentations at fairs B2: Resolve interdisciplinary problems which refer not only to product design or construction and their presentation, but also include the selection of all production materials, processing technology and assurance of final product quality B7: Apply theoretical, practical and methodological basics of furniture design as a complex interdisciplinary process, B8: Develop the ability of independent analytic and creative design and acting B11: Perceive space, conduct measuring, display, plan, design and equip functional special units and apply methods of analysis and coordinating functional furniture groups in relation to the space, B12: Develop skills of complete space equipping C2 (NIJE OPISANO U ECTS ENGLESKOM KATALOGU!) C2 (IZ HR): Lead the equipping of facilities C6: Manage projects from the preliminary design to serial production with additional operating of CAD programmes for visualization and automatic construction E1: Perform tasks of scientific and professional associate in scientific research institutions in the field of wood and wood technology, E2: Conduct courses in vocational secondary schools and other similar schools.
2.4. Expected learning outcomes at the level of the course (3 to 10 learning outcomes)	1. Distinguish the types, typology and tasks of residential and public space. 2. Recognize and apply the components, principles and elements of space design (color, texture, light, materials, orientation, etc.) in certain historical stylistic periods, contemporary architecture and / or given task.

<table>
<tr><td></td><td colspan="9">3. To valorize and apply the features of Croatian heritage in the design of the content of the space and furnishing the interior with appropriate furniture.
4. Apply the theory and criteria of spatial planning and architectural design in the furnishing of space.
5. Apply human measures as a module of space organization.
6. Evaluate and apply the principles of modern design of housing and public space and furniture (aesthetic, functional, social, psychological and social, technical-technological, ecological and ethnological) in relation to the needs and habits of users.
7. Analyze, recommend and design functional groups of furniture in relation to a given spatial unit of residential or public use and user needs
8. Analyze individual spatial units and their functions in residential and public space (common space, private (individual) space; space for work, socializing, communication, rest, etc.)
9. Apply a designer freehand or computer drawing in the presentation of the executive solution of furniture and equipped space.
10. Present the solution of equipped space and designed furniture in front of a group of people (potential clients, teachers, colleagues, etc.)</td></tr>
<tr><td>2.5. Course content (syllabus)</td><td colspan="9">What is space. Introduction to spatial design. Typology and tasks of space. Components of spatial expression (light, color, volume, texture, materials, depth, height, (). Aesthetic and functional components of space. Perception of space. Etiological examination of interior furnishing. Styles and trends. Introduction to architectural design. Organization and design of space. Types of drafts. Symbols in architectural design. Floor plan quotation. Space and furniture design parameters (aesthetic, functional, social, psychological and social, technical-technological, ecological and ethnological). Originality and tradition. The impact of heritage. Kitsch culture. Color and materials in space. Psychology of color. The role of materials. Feng shui. Vastu. Biophilia. Wood in the interior. Residential and public space. The relationship of furniture and functional space. Indoor and outdoor design criteria. Contemporary trends in the design of space and furniture. Characteristics of housing and furnishing of living space. Housing culture. Characteristics of modern housing. Functional units of a modern housing unit. Analysis of individual spatial units and their function. Man as a module of housing organization. Public spaces (administrative, educational, catering-tourist, cultural, sports facilities). Characteristics of the use and equipping of public spaces. Analysis of functional groups of furniture in public spaces. Typology and dimensions of furniture in public spaces. Urban equipment. Ecology and sustainable development in furnishing outdoor spaces.</td></tr>
<tr><td>2.6. Format of instruction</td><td colspan="3">☒ lectures
☒ seminars and workshops
☒ exercises
☐ online in entirety
☒ partial e-learning
☒ field work</td><td colspan="3">☒ independent assignments
☐ multimedia and the internet
☐ laboratory
☐ work with mentor
☐ (other)</td><td colspan="3">2.7. Comments:</td></tr>
<tr><td rowspan="6">2.8. Monitoring student work</td><td>Class attendance</td><td>yes</td><td></td><td>Research</td><td>yes</td><td></td><td>Oral exam</td><td>yes</td><td></td></tr>
<tr><td>Experimental work</td><td>yes</td><td></td><td>Report</td><td>yes</td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Essay</td><td></td><td></td><td>Seminar paper</td><td></td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Preliminary exam</td><td></td><td></td><td>Practical work</td><td>yes</td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Project</td><td>yes</td><td></td><td>Written exam</td><td>yes</td><td></td><td>ECTS credits (total)</td><td>4</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>2.9. Assessment methods and criteria</td><td colspan="9">Assessment is conducted in accordance with Assessment methods and criteria for the current academic year</td></tr>
<tr><td>2.10. Student responsibilities</td><td colspan="9">Regular attendance and active participation in lectures, exercises and fieldwork. During the semester, it is mandatory to submit each phase of the project assignment for review and</td></tr>
</table>

	correction within the given deadline, as well as a short report (paper) from fieldwork. The student does not have the right to sign and take the exam before the submitted project assignments. Written exam. A positive grade from the written exam is a prerequisite for taking the oral exam. Taking the oral exam		
2.11. Required literature (available in the library and/or via other media)	Title	Availability in the library	Availability via other media
	Domljan, D; Grbac, I (2014): Interijer (interna skripta), Sveučilište u Zagrebu Šumarski fakultet	No	Yes, Merlin
	Grey, J. i sur. (2001): Dizajn stanovanja; Znanje, Zagreb, 2001.	Yes	
	Lawrence, M. (1997): Dekoriranje i uređenje doma; Dušević&Kršovnik, Rijeka	Yes	
	Neufert, E. (2000): Elementi arhitektonskog projektiranja, Golden marketing, Zagreb	Yes	
	Panero, J.; Zelnik, M. (1990): Antropološke mere i interijer, Zbirka preporuka za standarde u projektiranju, IRO ''Građevinska knjiga'', Beograd	yes	
2.12. Optional literature	1.Biondić, Lj. (2011): Uvod u projektiranje stambenih zgrada. Golden marketing-Tehnička knjiga, Sveučilište u Zagrebu Arhitektonski fakultet, Zagreb 2.Ching, F.D.K.; Binggeli, C. (1918): Interior design illustrated., 4th edition, Willey, USA 3.Cerver, F. A. (2000): Modernes wohndesign; Könemann, Köln 4.Gremley, C.; Love, M (2018): The Interior Design Reference & Specification Book, Rockport, USA 5.Neidhart, V. (1997): Čovjek u prostoru, Školska knjiga, Zagreb 6.Poore, J (1994): Interior Color by Design. A design tool for architects, interior designers and homeowners. Rockport, USA 7.Stulhofer, A.; Veršić, Z. (1998): Crtanje arhitektonskih nacrta. UPI-2M, Zagreb 8.Vrkljan, Z. (1986): Oprema građevnih nacrta. Udžbenici Sveučilišta u Zagrebu, Građevinski fakultet, Zagreb 9.*** (1999): Living spaces, Ecological Building and Design, Öko test, Könemann, English Edition, (Edit.: Schmitz-Gunther T.), Mladinska knjiga tiskarna d.d., Ljubljana		

COURSE DECRIPTION

1. GENERAL INFORMATION			
1.1. Course lecturer(s)	prof.Tomislav Sinković PhD assist. prof. Tomislav Sedlar PhD Branimir Jambreković, PhD	1.7. Number of ECTS credits	
1.2. Course title	Special products of wood	1.8. Number of hours in semester (L+E+F+e-learning)	30+15+8
1.3. Course code	235690	1.9. Expected enrolment in the course	
1.4. Study programme	Graduate	1.10. Level of application of e-learning (level 1, 2, 3)	

1.5. Course type	Elective	1.11. Language of instruction	
1.6. Year of the study	1	1.12. Possibility of instruction in English	
2. COURSE DESCRIPTION			
2.1. Course objectives	Application of theoretical knowledge to the selection of wood species, wood from the part of the trunk, the method of processing wood for the purpose of making a design special wood product.		
2.2. Enrolment requirements and/or entry competences required for the course			
2.3. Learning outcomes at the level of the programme to which the course contributes	A2: Independently gather data, statistically process, present and analyse gathered data, discuss and make conclusions based on analysed data and distinguish possibilities of different interpretation of the same problem analysed in different ways B2: Resolve interdisciplinary problems which refer not only to product design or construction and their presentation, but also include the selection of all production materials, processing technology and assurance of final product quality B9: Analyse and make conclusions on wood properties and their application in wood product design		
2.4. Expected learning outcomes at the level of the course (3 to 10 learning outcomes)	Determining the characteristics of special products of wood in use that affect the choice of wood species for the production of special products of wood Determination of the required parameters of trees and sawmill for making special wood products Determining the most characteristic properties of wood material for the production of special wood products Determination of timber properties relevant for the production of special wood products Defining the basic technological characteristics for the production of special wood products Valuation of technological characteristics for production of special wood products Collection of relevant data to display the basic technological characteristics for the production of special wood products for the purpose of displaying as scientific or professional work		
2.5. Course content (syllabus)	Knowledge about pencils, history of pencils and wood species for pencils. Matches and wood species for its productions. Models and wood species for its productions. Heel and wood species for its productions. Barrels and wood species for its productions. Barrels for strongdrink and softdrink. Light barrels. Barrels manufactured from plywood. . Pacage and wood species for its productions. Parts of wooden pacages. Standards for wooden pacages. Wood densifying by commpresion (lignostone). Manufacturion of beech lignostone. Structure, density, variation of moisture content, swelling and shrinkage, straingth, impact bending strength. Birch lignostone. Use of lignostone. Wooden briquttes, wood species for its productions and productions. Houses made of wood, square timber, sawn timber, particleboard, plywood and sandwich composites. Musical instruments. Acoustical properties of wood. Compering of acoustical properties of wood species witch are used for musical instruments. Toys and wood species for its productions. Fancy wood articles. Clasification over use of fancy wood articles. Wood species for productions of fancy wood articles. Wood in shipbuilding. Forms of forest cultivated for shipbuilding. Wood species for shipbuilding. Ships and boats made of wood. Parts of ships and boats. Request of shipbuilding technique and construction. Properties of wood for shipbuilding. Select the wood species for shipbuilding. Carving and inlaid work. Wood species and its properties inportante for carving and inlaid work. Wood for sport equipments and props.		
2.6. Format of instruction	☒ lectures ☒ seminars and workshops ☐ exercises ☐ *online in entirety* ☐ partial e-learning ☒ field work	☐ independent assignments ☐ multimedia and the internet ☒ laboratory ☒ work with mentor ☐ (other)	2.7. Comments:

2.8. Monitoring student work	Class attendance	yes		Research			Oral exam	yes	
	Experimental work	yes		Report			(other)		
	Essay			Seminar paper			(other)		
	Preliminary exam			Practical work			(other)		
	Project			Written exam	yes		ECTS credits (total)	4	
2.9. Assessment methods and criteria	Assessment is conducted in accordance with Assessment methods and criteria for the current academic year								
2.10. Student responsibilities									

2.11. Required literature (available in the library and/or via other media)	Title	Availability in the library	Availability via other media
2.12. Optional literature			

COURSE DECRIPTION

1. GENERAL INFORMATION			
1.1. Course lecturer(s)	Associate prof. Jaroslav Kljak, PhD	1.7. Number of ECTS credits	4
1.2. Course title	Non-wood materials	1.8. Number of hours in semester (L+E+F+e-learning)	30+15
1.3. Course code	235691	1.9. Expected enrolment in the course	
1.4. Study programme	Graduate	1.10. Level of application of e-learning (level 1, 2, 3)	1
1.5. Course type	Elective	1.11. Language of instruction	
1.6. Year of the study	1	1.12. Possibility of instruction in English	
2. COURSE DESCRIPTION			
2.1. Course objectives	The aim of the course is to introduce students with the basics of materials structure, properties, and production processes of selected types of materials (metals, plastics, composites, ceramics). Students will also be introduced to the typical application of selected materials.		
2.2. Enrolment requirements and/or entry competences required for the course			
2.3. Learning outcomes at the level of the programme to which the course contributes	B3- Apply final wood product, wooden and non-wooden materials design methodology in developing and improving products, quality upgrade, product design and construction,		

<table>
<tr><td>2.4. Expected learning outcomes at the level of the course (3 to 10 learning outcomes)</td><td colspan="9">1. Compare the physical and mechanical properties of selected materials (metals, plastics, composites, ceramics).
2. Compare an individual manufacturring processes often use in production of metals, plastics and composites.
3. Suggest and select a particular type of material based on knowledge of its structure, properties and applications.</td></tr>
<tr><td>2.5. Course content (syllabus)</td><td colspan="9">General knowledge about selected types of non-wood materials: metals, polymers, composites and ceramics. Structure, properties and use of metals. Single crystals and polycrystals. Dislocations in metals and hardening mechanisms. Processing of metal aaloys: casting processes and metal forming by deformation. Structure, properties and uses of polymers: macromolecural structure. Melting temperature and glass transition of polymers. Stress-strain diagram for brittle and plastic polymeric materials. Tensile behavior of elastomers. Processing of polymers: pressing, injection molding, extrusion, hollow body blowing. Structure, properties and use of composite materials. Composite classification: particle reinforced, fiber reinforced and structural composites. Types of matrices and reinforcements. Production processes. Application of composite materials. Ceramic materials.</td></tr>
<tr><td>2.6. Format of instruction</td><td colspan="3">☒ lectures
☐ seminars and workshops
☒ exercises
☐ online in entirety
☐ partial e-learning
☐ field work</td><td colspan="3">☐ independent assignments
☐ multimedia and the internet
☐ laboratory
☐ work with mentor
☐ (other)</td><td colspan="3">2.7. Comments:</td></tr>
<tr><td rowspan="6">2.8. Monitoring student work</td><td>Class attendance</td><td>yes</td><td></td><td>Research</td><td></td><td></td><td>Oral exam</td><td>yes</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td></td><td>Report</td><td></td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Essay</td><td></td><td></td><td>Seminar paper</td><td></td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Preliminary exam</td><td></td><td></td><td>Practical work</td><td></td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Project</td><td></td><td></td><td>Written exam</td><td>yes</td><td></td><td>ECTS credits (total)</td><td>4</td><td></td></tr>
<tr><td></td><td colspan="9"></td></tr>
<tr><td>2.9. Assessment methods and criteria</td><td colspan="9">Assessment is conducted in accordance with Assessment methods and criteria for the current academic year</td></tr>
<tr><td>2.10. Student responsibilities</td><td colspan="9"></td></tr>
<tr><td rowspan="2">2.11. Required literature (available in the library and/or via other media)</td><td colspan="5">Title</td><td colspan="2">Availability in the library</td><td colspan="2">Availability via other media</td></tr>
<tr><td colspan="5">peer reviewed- web material: https://moodle.srce.hr/2020-2021/pluginfile.php/4665876/mod_resource/content/1/Nedrvni%20materijali.pdf

Filetin, T.; Franz, M.; Španiček, Đ.; Ivušić, V.: Svojstva i karakteristike materijala. Katalog opisa. Fakultet strojarstva i borodogradnje, Zagreb, 2012.

Šercer, M.; Križan, B.; Basan, R.: Konstriuranje polimernih proizvoda. Fakultet strojarstva i borodogradnje, Zagreb, 2009.</td><td colspan="2"></td><td colspan="2"></td></tr>
</table>

2.12. Optional literature	Callister, W., D.: Materials science and engineering: an introduction. John Wiley & Sons, 7th edition, 2007. 2. Groover, M., P.,: Principles of modern manufacturing. John Wiley & Sons, 2011. 3. Biffl, M.: Poznavanje materijala II. Šumarski fakultet, Zagreb, 1986.

COURSE DECRIPTION

1. GENERAL INFORMATION			
1.1. Course lecturer(s)	prof.Tomislav Sinković PhD assist. prof. Tomislav Sedlar PhD Branimir Jambreković, PhD	1.7. Number of ECTS credits	5
1.2. Course title	Investigation of physical and mechanical properties of wood	1.8. Number of hours in semester (L+E+F+e-learning)	30+30+8
1.3. Course code	235554	1.9. Expected enrolment in the course	
1.4. Study programme	Graduate	1.10. Level of application of e-learning (level 1, 2, 3)	2
1.5. Course type	Compulsory	1.11. Language of instruction	
1.6. Year of the study	1	1.12. Possibility of instruction in English	
2. COURSE DESCRIPTION			
2.1. Course objectives	Application of theoretical knowledge to the determination and taking of modal trees for research of physical and mechanical properties of wood. Procedures and practical implementation of sampling and preparation of samples for research of physical and mechanical properties of wood.		
2.2. Enrolment requirements and/or entry competences required for the course			
2.3. Learning outcomes at the level of the programme to which the course contributes	A2,B1, B2-Determination of the necessary parameters of trees for the selection of modal trees for the exploration of physical and mechanical properties of wood A2,B1, B2-Selection and felling of trees for the exploration of physical and mechanical properties of wood A2,B1, B2-Preparation of samples for research of physical and mechanical properties of wood A2,B1, B2-Testing of physical and mechanical properties of wood A2,B1, B2-Statistical treatment and evaluation of the results of the research of physical and mechanical properties of wood A2,B1, B2-Collection of relevant data to display the results of research on physical and mechanical properties of wood for the purpose of displaying as scientific or professional work		
2.4. Expected learning outcomes at the level of the course (3 to 10 learning outcomes)	Determination of the necessary parameters of trees for the selection of modal trees for the exploration of physical and mechanical properties of wood Selection and felling of trees for the exploration of physical and mechanical properties of wood Preparation of samples for research of physical and mechanical properties of wood Testing of physical and mechanical properties of wood Statistical treatment and evaluation of the results of the research of physical and mechanical properties of wood Collection of relevant data to display the results of research on physical and mechanical properties of wood for the purpose of displaying as scientific or professional work		

<table>
<tr><td>2.5. Course content (syllabus)</td><td colspan="9">Knowledge about physical and mechanical properties of wood. Preparation for investigation of physical and mechanical properties of wood. Methods for the selective sampling of wood and general requirements for physical and mechanical tests on small clear test pieces. Instruments and devices for determination of physical and mechanical properties of wood. Macroscopic properties of wood. Optical methods, thomographi, ray x, , . Physical properties of wood. Methods for determination of dimensions and mass. Methods for determination of volume (regular dimensions, immersion). Methods for determination of density (according to standards, floatation. immersion, ray x, ,). Methods for determination of moisture content (ove-drying, distillation, titration, electrical moisture meters, ray x, ,). Methods for determination of fiber saturation point (sorption, shrinkage, mechanical properties, electrical properties, and thermal conductivity). Methods for determination of thermal, electrical and acoustical properties of wood. Destructive and nondestructive methods for determination of mechanical properties of wood. Comparing and determination of macroscopic, physical and mechanical properties of domestic and foreign commercial wood species.
Interdiction of macroscopic, physical and mechanical properties of wood, and comparing technological properties of domestic and foreign commercial wood species.</td></tr>
<tr><td>2.6. Format of instruction</td><td colspan="4">☒ lectures
☐ seminars and workshops
☐ exercises
☐ online in entirety
☐ partial e-learning
☒ field work</td><td colspan="3">☒ independent assignments
☐ multimedia and the internet
☒ laboratory
☒ work with mentor
☐ (other)</td><td colspan="2">2.7. Comments:</td></tr>
<tr><td rowspan="6">2.8. Monitoring student work</td><td>Class attendance</td><td>yes</td><td></td><td>Research</td><td></td><td></td><td>Oral exam</td><td>yes</td><td></td></tr>
<tr><td>Experimental work</td><td>yes</td><td></td><td>Report</td><td></td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Essay</td><td></td><td></td><td>Seminar paper</td><td>yes</td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Preliminary exam</td><td></td><td></td><td>Practical work</td><td>yes</td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Project</td><td></td><td></td><td>Written exam</td><td>yes</td><td></td><td>ECTS credits (total)</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>2.9. Assessment methods and criteria</td><td colspan="9">Assessment is conducted in accordance with Assessment methods and criteria for the current academic year</td></tr>
<tr><td>2.10. Student responsibilities</td><td colspan="9"></td></tr>
<tr><td>2.11. Required literature (available in the library and/or via other media)</td><td colspan="4">Title</td><td colspan="2">Availability in the library</td><td colspan="2">Availability via other media</td></tr>
<tr><td colspan="4">Horvat i drugi: Osnove nauke o drvu, Zagreb, 1985

Karahasanović, A.: Nauka o drvetu, Sarajevo, 1988

Ugrenović, A.: Tehnologija drveta, Zagreb, 1950

Govorčin, S.; Sinković, T.: Ispitivanje fizikalnih i mehaničkih svojstava drva, 2004, Zagreb, Interna skripta</td><td colspan="2">Yes

Yes

Yes

yes</td><td colspan="2"></td></tr>
<tr><td>2.12. Optional literature</td><td colspan="9">1.Giordano, G.: Tecnologia del legno, Volume l, Torino, 1971, str. 1-1086.
2.Giordano, G.: Tecnologia del legno, Volume 111, Torino, 1976, str. 1-1351.</td></tr>
</table>

	3.Lincoln, W., A. Walker, et al. 1989. The Encyclopedia of Wood. Facts on File Books. Quarto Publishing plc, London. 4.Tsoumis, G.: Science and Technology of Wood, New York,1991, str. 1-233.

COURSE DECRIPTION

1. GENERAL INFORMATION			
1.1. Course lecturer(s)	Associate Professor Jaroslav Kljak, Ph. D.	1.7. Number of ECTS credits	5
1.2. Course title	Wood Composite Materials	1.8. Number of hours in semester (L+E+F+e-learning)	30+30
1.3. Course code	235555	1.9. Expected enrolment in the course	12
1.4. Study programme	Graduate	1.10. Level of application of e-learning (level 1, 2, 3)	1
1.5. Course type	Compulsory	1.11. Language of instruction	
1.6. Year of the study	1	1.12. Possibility of instruction in English	

2. COURSE DESCRIPTION	
2.1. Course objectives	A course objective is getting knowledge about properties of wood composite materials, application and about regulatory that exist inherent construction system of wood composite. Accepted knowledge enable to students to make a decision about selecting adequate material according to reqierments for specific use. It also enable to students to design the properties of wood comosite material with diferent calculation methods, according to pre-setting load parameters.
2.2. Enrolment requirements and/or entry competences required for the course	
2.3. Learning outcomes at the level of the programme to which the course contributes	B6: Evaluate, select and apply composite materials regarding the patterns existing inside the wood composite construction system and decide on the selection of proper material
2.4. Expected learning outcomes at the level of the course (3 to 10 learning outcomes)	
2.5. Course content (syllabus)	Types of wood composite materials; properties and application. Wood composite with laminate structure, properties and application, wood and non-wood materials for structural elements, synthetic fiber reinforcements, matrix materials, production processes, mechanical and physical properties. Wood composite with sandwich structure. Face materials – plywood panels, particleboards, fibreboards, OSB, metals, synthetic fiber composites - mechanical and physical properties. Core materials – balsa wood, honeycombs, foam and corrugated cores - mechanical and physical properties. Properties and mixture of synthetic resin for sandwich composites: epoxy resins, polyurethanes, phenolic, polyester and vinyl ester resins. Calculation and analysis of mechanical and physical properties. Joints between sandwich panels. Design and analysis of wood composite materials by finite element method. Wood composite with particle reinforced structure. Wood composites with inorganic binders. Production processes, properties and application.

<table>
<tr><td>2.6. Format of instruction</td><td colspan="3">☒ lectures
☐ seminars and workshops
☒ exercises
☐ online in entirety
☐ partial e-learning
☐ field work</td><td colspan="3">☐ independent assignments
☐ multimedia and the internet
☐ laboratory
☐ work with mentor
☐ (other)</td><td colspan="3">2.7. Comments:</td></tr>
<tr><td rowspan="6">2.8. Monitoring student work</td><td>Class attendance</td><td>yes</td><td></td><td>Research</td><td></td><td></td><td>Oral exam</td><td>yes</td><td></td></tr>
<tr><td>Experimental work</td><td>yes</td><td></td><td>Report</td><td></td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Essay</td><td></td><td></td><td>Seminar paper</td><td></td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Preliminary exam</td><td></td><td></td><td>Practical work</td><td></td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Project</td><td></td><td></td><td>Written exam</td><td>yes</td><td></td><td>ECTS credits (total)</td><td></td><td></td></tr>
<tr><td>2.9. Assessment methods and criteria</td><td colspan="9">Assessment is conducted in accordance with Assessment methods and criteria for the current academic year</td></tr>
<tr><td>2.10. Student responsibilities</td><td colspan="9"></td></tr>
<tr><td>2.11. Required literature (available in the library and/or via other media)</td><td colspan="3">Title</td><td colspan="3">Availability in the library</td><td colspan="3">Availability via other media</td></tr>
<tr><td></td><td colspan="3">Kljak, J.; Brezović, M., 2006.:Plywood stress optimisation using the finite element method. Wood Research, 51 (1), 1-10.

Kljak, J.; Brezović, M., 2007.: Influence of plywood structure on sandwich panel properties: Variability of veneer thickness ratio. Wood Research, 52 (2), 77-88.

Kljak, J.; Brezović, M.; Jambreković, V.; et al., 2009.: 3D Analysis of stress distribution in veneer plywood under bending load. Wood Research, 54 (4), 57-65.

Kljak, J.; Brezović, M.; Antonović, A., 2009.: Influence of plywood grain direction on sandwich panel bending properties. Drvna industrija, 60 (2), 83-88.

Kljak, J.; Španić, N,; Jambreković, V., 2018.: Comparation of finite element models for particle board with homogenous and three-layer structure. Drvna industrija, 69 (4), 311-316.</td><td colspan="3"></td><td colspan="3"></td></tr>
<tr><td>2.12. Optional literature</td><td colspan="9">1. Ever J. Barbero, 1998.: Introduction to Composite Material Design. Taylor & Francis.
2. Tom Bitzer, 1997.: Honeycomb Technology. Materials, design, manufacturing, applications and testing. Champman & Hall.</td></tr>
</table>

COURSE DECRIPTION

1. GENERAL INFORMATION			
1.1. Course lecturer(s)	Associate prof. Ivica Župčić, PhD	1.7. Number of ECTS credits	4
1.2. Course title	Quality of finished products	1.8. Number of hours in semester (L+E+F+e-learning)	15+30+8
1.3. Course code	235556	1.9. Expected enrolment in the course	10-15
1.4. Study programme	Graduate	1.10. Level of application of e-learning (level 1, 2, 3)	2
1.5. Course type	Compulsory	1.11. Language of instruction	
1.6. Year of the study	1	1.12. Possibility of instruction in English	

2. COURSE DESCRIPTION	
2.1. Course objectives	Acquiring knowledge of wood products quality and quality testing methods according to valid HRN EN standards. Developing skills required for the development and planning of the complete quality assurance system for final wood products. The acquired knowledge enables the application of current regulations and standard in quality testing end identification of factors that affect the safety, stability and durability of furniture.
2.2. Enrolment requirements and/or entry competences required for the course	
2.3. Learning outcomes at the level of the programme to which the course contributes	B1 - Apply current technical regulations in ensuring quality of wood, wooden materials and final products; B2 - Resolve interdisciplinary problems which refer not only to product design or construction and their presentation, but also include the selection of all production materials, processing technology and assurance of final product quality; B10 - Apply knowledge of furniture quality and methods of its examination and develop and plan a complete system of final product quality assurance.
2.4. Expected learning outcomes at the level of the course (3 to 10 learning outcomes)	1. to recognise, describe and distinguish the quality factors of finished products (constructional, technological, economic, ergonomic etc.) and assess the impact of materials on the quality of the furniture; 2. to apply knowledge of interdisciplinary approach (use of non-wood material, bed-mattress body interaction) when assuring the quality of wood finished products; 3. to evaluate the flammability of upholstered furniture according to valid HRN EN standards; 4. to apply HRN EN standards in testing and production of furniture (testing of school furniture, chairs, tables, cabinets, beds, cots and playgrounds); 5. to analyse and evaluate factors influencing product durability and reliability (the quality of built-in materials, construction, processing, environment influence) and defined the safety and stability of furniture; 6. to gather, group and process information about the given topic and to present it.
2.5. Course content (syllabus)	Facts about the quality assurance of products and services. Innovation and quality. Quality, HRN EN standards and international practice. Errors, technical, measuring and statistical parameters. Quality factors of furniture and wood products. Durability and reliability. Quality planning. Evaluation of construction. Significance of materials and semi-finished products for product quality. Quality tests of products, effect of production technology on

<table>
<tr><td></td><td colspan="9">product quality. Packaging, transportation and services. Methods of testing products according to HRN EN standards and testing problems. Research on comfort and human bed interaction, bed testing methods and respondents. Quality parameters, functional dimensions, quality tests and use values (functionality) sitting furniture, storage furniture, furniture forwork and diningfurniture for lying, windows and doors. Furniture flammability and ecological aspects of its manufacture; materials for improving the properties of upholstered furniture with regard to fire resistance and testing methods. Playgrounds, the most common errors of installation and testing methods according to HRN EN standards, the importance of play in childrens growing up.</td></tr>
<tr><td>2.6. Format of instruction</td><td colspan="3">☒ lectures
☐ seminars and workshops
☒ exercises
☐ online in entirety
☒ partial e-learning
☒ field work</td><td colspan="3">☒ independent assignments
☐ multimedia and the internet
☒ laboratory
☐ work with mentor
☐ (other)</td><td colspan="3">2.7. Comments:</td></tr>
<tr><td rowspan="6">2.8. Monitoring student work</td><td>Class attendance</td><td></td><td></td><td>Research</td><td></td><td></td><td>Oral exam</td><td></td><td></td></tr>
<tr><td>Experimental work</td><td></td><td></td><td>Report</td><td></td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Essay</td><td></td><td></td><td>Seminar paper</td><td></td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Preliminary exam</td><td></td><td></td><td>Practical work</td><td></td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Project</td><td></td><td></td><td>Written exam</td><td></td><td></td><td>ECTS credits (total)</td><td></td><td></td></tr>
<tr><td></td><td colspan="9"></td></tr>
<tr><td>2.9. Assessment methods and criteria</td><td colspan="9">Assessment is conducted in accordance with Assessment methods and criteria for the current academic year</td></tr>
<tr><td>2.10. Student responsibilities</td><td colspan="9">Regular attendance and active participation in lectures, exercises and field work. Preparations of individual tasks from exercises and field work and writing reports. Pass the preliminary exam and exam.</td></tr>
<tr><td>2.11. Required literature (available in the library and/or via other media)</td><td colspan="4">Title</td><td colspan="3">Availability in the library</td><td colspan="2">Availability via other media</td></tr>
<tr><td></td><td colspan="4">Domljan, D.; Grbac, I.; Jirouš Rajković, V.; Vlaović, Z.; Živković, V.; Župčić, I. 2015: Kvaliteta i tehnički opisi proizvoda od drva, Svezak I opremanje zgrada za odgoj i obrazovanje, sveučilišni udžbenik, Sveučilište u Zagrebu Šumarski fakultet, Zagreb.

Grbac, I. 2005: Ojastučeni namještaj, sveučilišni udžbenik, Sveučilište u Zagrebu, Šumarski fakultet, Zagreb.

Grbac, I. 2006: Krevet i zdravlje, sveučilišni udžbenik, Sveučilište u Zagrebu, Šumarski fakultet, Zagreb.

HRN EN standards (TO 136)</td><td colspan="3">Yes

Yes

yes</td><td colspan="2">Laboratory, standards for access</td></tr>
<tr><td>2.12. Optional literature</td><td colspan="9">1. Župčić, I.; Bogner, A.; Grbac, I. 2006: Comfort measurement of the furniture to lie on, International Conference, European Union - challenges and perspectives for the wood-processing industry, Innovawood, University of Zagreb, Faculty of Forestry, Croatia 13th October, 107-116.</td></tr>
</table>

	2. Gavronski, T. 2005. Multiobjective optimisation of a skeletion furniture construction. Roczniki akademii rolniczej w Poznaniu, Poznan. 3. Crosby, P. B. 1989: Kvaliteta je besplatna, Zagreb, str. 1-218. 4. Feigenbaum, A. V. 1983: Total Quality Control, New York, str. 1-471.

COURSE DECRIPTION

1. GENERAL INFORMATION			
1.1. Course lecturer(s)	Prof. Darko Motik; assist.prof. Andreja Pirc Barčić	1.7. Number of ECTS credits	4
1.2. Course title	Information systems on wood products market	1.8. Number of hours in semester (L+E+F+e-learning)	30+45+8
1.3. Course code	125557	1.9. Expected enrolment in the course	
1.4. Study programme	Graduate	1.10. Level of application of e-learning (level 1, 2, 3)	3
1.5. Course type	Compulsory	1.11. Language of instruction	
1.6. Year of the study	1	1.12. Possibility of instruction in English	

2. COURSE DESCRIPTION	
2.1. Course objectives	Student gets knowledge necessary to work in the wood industry companies on work posts with responsibilities regarding information management on wood and wood products markets within company management activities Student gets competencies for business documentation analyses, for creating a basic market reports, identify a competitor's strategy.
2.2. Enrolment requirements and/or entry competences required for the course	
2.3. Learning outcomes at the level of the programme to which the course contributes	A1: Inform potential buyers of final product quality characteristics and of trends in wood products design, A2: Independently gather data, statistically process, present and analyse gathered data, discuss and make conclusions based on analysed data and distinguish possibilities of different interpretation of the same problem analysed in different ways, A3: Give presentations at fairs. B3: Apply final wood product, wooden and non-wooden materials design methodology in developing and improving products, quality upgrade, product design and construction, B4: Develop and plan a complete construction system which consists of planning, designing, constructing, preparing technical documentation and applying technologies for final product manufacturing E1: Perform tasks of scientific and professional associate in scientific research institutions in the field of wood and wood technology, E3: Perform activities and tasks in publicist writing and the media related to the wood profession, E4: Upgrade their professional and scientific competencies through different forms of

<table>
<tr><td></td><td colspan="9">education and postgraduate studies.</td></tr>
<tr><td>2.4. Expected learning outcomes at the level of the course (3 to 10 learning outcomes)</td><td colspan="9">To carry out a process of wood and wood product market research and to evaluate supply and demand data for wood products.

To analyze the needs and trends for wood and wood products in the macro-circle

To analyze information on business to business market and business behavior when purchasing wood and wood products.

To compare a business to business and business to customers markets related to consumption of wooden products.

To select the most important participants in the business buying process regarding wood based product market and businesses.

To assess the strengths and weaknesses of competitors in the wood and wood products market.</td></tr>
<tr><td>2.5. Course content (syllabus)</td><td colspan="9">Market information system. Market Researchers. Market Research of Wood and Wood Products. Characteristics of market research.
Overcoming obstacles in conducting market research of wood and wood products.Analyzing the needs and trends for wood and wood products in the macro-circle. Economic environment. Demographic environment. Technological environment. Political environment. Social and cultural environment.
Information on the market for business spending and business behavior when purchasing wood and wood products. The market for consumer spending in relation to the final consumer market. Participants in the process of buying a business.
Institutional markets for final wood products. Collecting information about industry and competition in wood processing and furniture manufacturing. Identifying competitor strategies.
Assess the strength and weakness of competitors in the wood and wood products market. Evaluation of common competitor’s reactions. Application of information obtained on wood and wood product market status.</td></tr>
<tr><td>2.6. Format of instruction</td><td colspan="4">☒ lectures
☒ seminars and workshops
☒ exercises
☐ online in entirety
☒ partial e-learning
☐ field work</td><td colspan="3">☒ independent assignments
☐ multimedia and the internet
☐ laboratory
☐ work with mentor
☐ (other)</td><td colspan="2">2.7. Comments:</td></tr>
<tr><td rowspan="6">2.8. Monitoring student work</td><td>Class attendance</td><td>yes</td><td></td><td>Research</td><td></td><td></td><td>Oral exam</td><td>yes</td><td></td></tr>
<tr><td>Experimental work</td><td>yes</td><td></td><td>Report</td><td></td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Essay</td><td></td><td></td><td>Seminar paper</td><td></td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Preliminary exam</td><td>yes</td><td></td><td>Practical work</td><td></td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Project</td><td>yes</td><td></td><td>Written exam</td><td>yes</td><td></td><td>ECTS credits (total)</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>2.9. Assessment methods and criteria</td><td colspan="9">Assessment is conducted in accordance with Assessment methods and criteria for the current academic year</td></tr>
<tr><td>2.10. Student responsibilities</td><td colspan="9"></td></tr>
</table>

2.11. Required literature (available in the library and/or via other media)	Title	Availability in the library	Availability via other media
	Motik, D.; Posavec, S.; Pirc Barčić, A., Bičanić, K.; Moro, M.; Perić, I; 2012: Analiza i trendovi potrošnje drva i drvnih proizvoda u Republici Hrvatskoj. Šumarski fakultet Sveučilišta u Zagrebu, str. 1 – 97. 2.Hansen, E., Ranwar, R., Vlosky, R. (2014): The Global Forest Sector. CRC Press. 3. Pirc Barčić, A., Motik, D., Paluš, H., Klarić, K., Liker, K., Oblak, L. (2016): Analysis of furniture selling place in Croatia, Slovenia and Slovakia. Drvna industrija. 67 (3): 257-262. 4.Kaputa, Vladislav; Barčić Pirc, A.; Mat'ova, H, Motik, D.; (2018): Consumer Preferences for Wooden Furniture in Croatia and Slovakia. Bioresources. 13(3): 6280-6299.		
2.12. Optional literature	Kotler, P. 2006: Upravljanje marketingom, MATE d.o.o., Zagreb.		

COURSE DECRIPTION

1. GENERAL INFORMATION			
1.1. Course lecturer(s)	Prof. dr. sc. Silvana Prekrat	1.7. Number of ECTS credits	4
1.2. Course title	Professional practice	1.8. Number of hours in semester (L+E+F+e-learning)	160
1.3. Course code	235679	1.9. Expected enrolment in the course	20
1.4. Study programme	Graduate	1.10. Level of application of e-learning (level 1, 2, 3)	
1.5. Course type	Compulsory	1.11. Language of instruction	Croatian
1.6. Year of the study	1	1.12. Possibility of instruction in English	Yes
2. COURSE DESCRIPTION			
2.1. Course objectives	The aim of the professional practice is to gain experience and insight into the wood technology activity and to connect the acquired theoretical knowledge with examples from practice. During the stay in a specific work situation, the student has the opportunity to understand and realize the importance of developing business responsibility, communication skills and teamwork. Based on recording and observing the features of the wood technology process and business, the student proposes and elaborates their improvements.		
2.2. Enrolment requirements and/or entry competences required for the course			
2.3. Learning outcomes at	A2: Independently gather data, statistically process, present and analyse gathered data, discuss and make conclusions based on analysed data and distinguish possibilities of		

<table>
<tr><td>the level of the programme
to which the course contributes</td><td colspan="9">different interpretation of the same problem analysed in different ways,
A3: Give presentations at fairs
B2: Resolve interdisciplinary problems which refer not only to product design or construction and their presentation, but also include the selection of all production materials, processing technology and assurance of final product quality,
B3: Apply final wood product, wooden and non-wooden materials design methodology in developing and improving products, quality upgrade, product design and construction,
B4: Develop and plan a complete construction system which consists of planning, designing, constructing, preparing technical documentation and applying technologies for final product manufacturing
C2: Conduct furnishing of facilities
C3 - Recommend the finishing process technology for products, evaluate quality of the finishing process and recommend methods for preventing mistakes in the finishing process
C4: Apply systematic work methods on planning with the aim of rational material application and constructional solutions,
C5: Manage projects from the preliminary design to serial production with additional operating of CAD programmes for visualization and automatic construction,
C6: Apply contemporary methods and techniques of healthy furniture design and ensure protection of man and environment through its production and usage,
C7: Choose optimal constructional solution and its versions using discursive methods
D1: Perform responsible tasks in company management in the area of production management, technical production preparation, termination and management of materials,
D2: Manage and ensure quality adapted to specific production problems in wood product design,
D3: Manage and conduct international trade in wood and wood products,
D4: Perform responsible tasks in company management in the area of project management.
E2: Conduct courses in vocational secondary schools and other similar schools,
E3: Perform activities and tasks in publicist writing and the media related to the wood profession</td></tr>
<tr><td>2.4. Expected learning outcomes at the level of the course (3 to 10 learning outcomes)</td><td colspan="9">1. Apply the acquired knowledge and skills acquired during the study in specific situations
2. Apply communication skills in new work environments
3. Record and comment on the features of the wood technology process and business and propose optimization and rationalization in accordance with applicable standards and regulations
4. Design and propose possible improvements in the existing wood production and business
5. Solve technical problems independently or as a team
6. Form a sense of responsibility and motivation to perform assigned tasks
7. Prepare a written report on professional practice</td></tr>
<tr><td>2.5. Course content (syllabus)</td><td colspan="9">According to the contract between the Faculty and the wood processing employer, the student attends a professional practice for 20 working days under the guidance of two mentors, a teacher and an practice employee. According to the company's activities, the student is given a task in accordance with the learning outcomes from professional practice. During the practice, the student keeps a diary or report on professional practice.</td></tr>
<tr><td>2.6. Format of instruction</td><td colspan="3">☐ lectures
☐ seminars and workshops
☐ exercises
☐ online in entirety
☐ partial e-learning
☐ field work</td><td colspan="3">☒ independent assignments
☐ multimedia and the internet
☐ laboratory
☒ work with mentor
☐ (other)</td><td colspan="3">2.7. Comments:</td></tr>
<tr><td rowspan="2">2.8. Monitoring student work</td><td>Class attendance</td><td></td><td></td><td>Research</td><td></td><td></td><td>Oral exam</td><td></td><td></td></tr>
<tr><td>Experimental work</td><td></td><td></td><td>Report</td><td>yes</td><td></td><td>Work with mentor</td><td>yes</td><td></td></tr>
</table>

	Essay			Seminar paper			(other)		
	Preliminary exam			Practical work	yes		(other)		
	Project			Written exam			ECTS credits (total)	4	
2.9. Assessment methods and criteria	Assessment is conducted in accordance with Assessment methods and criteria for the current academic year								
2.10. Student responsibilities									
2.11. Required literature (available in the library and/or via other media)	Title				Availability in the library		Availability via other media		
2.12. Optional literature									

COURSE DECRIPTION

1. GENERAL INFORMATION			
1.1. Course lecturer(s)	professor Silvana Prekrat, PhD	1.7. Number of ECTS credits	4
1.2. Course title	Computer Aided Design	1.8. Number of hours in semester (L+E+F+e-learning)	30+15
1.3. Course code	235692	1.9. Expected enrolment in the course	
1.4. Study programme	Graduate	1.10. Level of application of e-learning (level 1, 2, 3)	2
1.5. Course type	Elective	1.11. Language of instruction	
1.6. Year of the study	1	1.12. Possibility of instruction in English	
2. COURSE DESCRIPTION			
2.1. Course objectives	Creation of more complex elements and assemblies by 3D modeling with a parametric computer program. Familiarization with digitization procedures in the design process Application of specialized CAD programs in the design of furniture and wood products and furnishings. Programming in the construction process with the aim of improving construction productivity, and thus the entire production system		
2.2. Enrolment requirements and/or entry competences required for the course			
2.3. Learning outcomes at the level of the programme to which the course contributes	A1: Inform potential buyers of final product quality characteristics and of trends in wood products design, A2: Independently gather data, statistically process, present and analyse gathered data, discuss and make conclusions based on analysed data and distinguish possibilities of different interpretation of the same problem analysed in different ways, B2: Resolve interdisciplinary problems which refer not only to product design or construction and their presentation, but also include the selection of all production		

<table>
<tr><td></td><td colspan="9">materials, processing technology and assurance of final product quality
B8: Develop the ability of independent analytic and creative design and acting
C4: Apply systematic work methods on planning with the aim of rational material application and constructional solutions,
C5: Manage projects from the preliminary design to serial production with additional operating of CAD programmes for visualization and automatic construction
C8: Apply 3D modelling using AutoCAD and 3D Studio MAX programme packages,
C9: Programme during construction process in order to improve design productivity, and thus the entire production system</td></tr>
<tr><td>2.4. Expected learning outcomes at the level of the course (3 to 10 learning outcomes)</td><td colspan="9">1. Create a virtual model of furniture and wood products by applying parameterization
2. Create a rendered 3D model of the product using the scene
3. Apply Animation in product presentation
4. Define the features, advantages and disadvantages of virtual and physical 3D models
5. Classify, analyze and select computer programs for design, construction and visualization according to given qualitative and quantitative criteria
6. Analyze the photorealistic quality of the rendered 3D model
7. Prepare a 3D virtual model for the further process of CAM production or the creation of a physical model using the additive technique</td></tr>
<tr><td>2.5. Course content (syllabus)</td><td colspan="9">The role of CAD in a complete production system - the possibility of rationalizing production by introducing a CAD system, Creating a 3D virtual model using advanced techniques, Classification of computer programs with the basics of work and application, Rendering - Working with materials, Using textures and colors, selecting and preparing textures for input into standard databases, Setting up the background of the drawing, Animation - the role of animation in the presentation of furniture, interior and exterior furnishing of space, Methods of defining sketch limitations as a prerequisite for quality 3D model creation, Techniques for assembling a 3D model assembly. Criteria for selecting a CAD computer program, Connecting CAD to the CAM system – Preparation of construction documentation for the CAM system. Conditions for continuing the production process. Supervision of execution.
Organization and handling of drawings - management of drawings, setting standards for drawings. The importance of associativity in 3D modeling and the quality of documentation. Import and export of files in other formats, work with raster images, Digitization in the design process. Basics of 3D scanning. 3D scanning in the process of reverse engineering, the role of 3D printing in designing.</td></tr>
<tr><td>2.6. Format of instruction</td><td colspan="3">☒ lectures
☒ seminars and workshops
☒ exercises
☐ online in entirety
☒ partial e-learning
☐ field work</td><td colspan="3">☒ independent assignments
☐ multimedia and the internet
☐ laboratory
☐ work with mentor
☐ (other)</td><td colspan="3">2.7. Comments:</td></tr>
<tr><td rowspan="6">2.8. Monitoring student work</td><td>Class attendance</td><td>yes</td><td></td><td>Research</td><td></td><td></td><td>Oral exam</td><td></td><td></td></tr>
<tr><td>Experimental work</td><td></td><td></td><td>Report</td><td></td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Essay</td><td></td><td></td><td>Seminar paper</td><td>yes</td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Preliminary exam</td><td></td><td></td><td>Practical work</td><td>yes</td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Project</td><td></td><td></td><td>Written exam</td><td>yes</td><td></td><td>ECTS credits (total)</td><td>4</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>2.9. Assessment methods and criteria</td><td colspan="9">Assessment is conducted in accordance with Assessment methods and criteria for the current academic year</td></tr>
<tr><td>2.10. Student responsibilities</td><td colspan="9"></td></tr>
</table>

2.11. Required literature (available in the library and/or via other media)	Title	Availability in the library	Availability via other media
	Prekrat, S., Čavlović, A.O. (2021): Osnove 3D modeliranja dijelova i sklopova namještaja i drvnih proizvoda, Sveučilišni priručnik, str. 1-166, Sveučilište u Zagrebu, Fakultet šumarstva i drvne tehnologije	DA	MERLIN
	Prekrat, S.: (2021.): Zbirka zadataka	NE	MERLIN
2.12. Optional literature	1.Pandžić, I.S., Pejša, T., Matković, K., Benko H., Čereković, A, Matijašević, M. (2011): Interaktivna 3D grafika, Element, Zagreb 2. Sachidananh, J. (2019): Autodesk Inventor Exercises: 200 Practice Drawings For Autodesk Inventor and Other Feature-Based Modeling Software		

COURSE DECRIPTION

1. GENERAL INFORMATION			
1.1. Course lecturer(s)	Assist. Prof. Andreja Pirc Barčić; prof.Darko Motik	1.7. Number of ECTS credits	4
1.2. Course title	International market of wood products	1.8. Number of hours in semester (L+E+F+e-learning)	30+15
1.3. Course code	33721	1.9. Expected enrolment in the course	
1.4. Study programme	Graduate	1.10. Level of application of e-learning (level 1, 2, 3)	3
1.5. Course type	Elective	1.11. Language of instruction	
1.6. Year of the study	1	1.12. Possibility of instruction in English	
2. COURSE DESCRIPTION			
2.1. Course objectives	Student gets knowledge necessary to work in the wood industry companies on work posts with responsibilities regarding international market research, analysis of the company's environment on international markets necessary in upper management of business activities. Student gets competencies for business documentation analyses, for creating a basic market reports, identify a competitor's strategy.		
2.2. Enrolment requirements and/or entry competences required for the course	To attend the lectures and exercises regularly and to actively participate in them, to make exercise and provide them within deadlines. To attend partial exams and final exam.		
2.3. Learning outcomes at the level of the programme to which the course contributes	A1: Inform potential buyers of final product quality characteristics and of trends in wood products design, A2: Independently gather data, statistically process, present and analyse gathered data, discuss and make conclusions based on analysed data and distinguish possibilities of different interpretation of the same problem analysed in different ways, A3: Give presentations at fairs. B3: Apply final wood product, wooden and non-wooden materials design methodology in developing and improving products, quality upgrade, product design and construction, B4: Develop and plan a complete construction system which consists of planning, designing, constructing, preparing technical documentation and applying technologies		

	for final product manufacturing E1: Perform tasks of scientific and professional associate in scientific research institutions in the field of wood and wood technology, E3: Perform activities and tasks in publicist writing and the media related to the wood profession, E4: Upgrade their professional and scientific competencies through different forms of education and postgraduate studies.
2.4. Expected learning outcomes at the level of the course (3 to 10 learning outcomes)	1.To analyze the impact of the macroeconomic policies of individual countries on growth and development of the timber economy. 2.To review the economic success of the wood industry in international wood products market with a view to achieving competitive advantages within the wood sector. 3.To analyze production, export and import of furniture and other wood products on the international market. 4.To calculate the consumption of furniture and other wood products on the international market using apparent consumption method 5.To analyze information on employment trends, salaries, income and investments on the international furniture and wood products market. 6.To analyze criteria for monitoring the share of the wood economy in the entire economy. 7.To analyze the trade statistics regarding wood based European and world markets. 8.To investigate possible activities to increase the share of wood products in the international market.
2.5. Course content (syllabus)	The basic features of wood processing, furniture manufacture and paper manufacture and recycling. The basic facts about international market of wood products. The strategies of development and growth of wood economy on the international market. An aggregate demand and a multiplier model. International market research of furniture and other wood products. Different methods of collecting, systematizing and data processing of European and world wood products market. Measuring economic success of wood economy in international wood products market. The methods of calculating consumption, export, import and production on the international market of furniture and other wood products. Different techniques of presenting the processed data of international market research. The influence of macroeconomic policy of certain countries on the growth and development of wood economy. The criteria for evaluation the wood economy share in the complete economy. The share in industry and gross domestic product. Sales trends monitoring of certain wood products on the world market. The information about the employment record, employees 'structure, payments, the enterprise income and investments on the international market of wood and wood products.

2.6. Format of instruction							2.7. Comments:		
	☒ lectures ☒ seminars and workshops ☒ exercises ☐ *online in entirety* ☒ partial e-learning ☒ field work			☒ independent assignments ☐ multimedia and the internet ☐ laboratory ☐ work with mentor ☐ (other)					
2.8. Monitoring student work	Class attendance	yes		Research			Oral exam	yes	
	Experimental work	yes		Report			(other)		
	Essay			Seminar paper	yes		(other)		
	Preliminary exam	yes		Practical work			(other)		

	Project	yes		Written exam	yes		ECTS credits (total)		
2.9. Assessment methods and criteria	Assessment is conducted in accordance with Assessment methods and criteria for the current academic year								
2.10. Student responsibilities									
2.11. Required literature (available in the library and/or via other media)	Title				Availability in the library		Availability via other media		
	Hansen, E., Ranwar, R., Vlosky, R. (2014): The Global Forest Sector. CRC Press. FAO Yearbook of Forest Products – godišnja izdanja. Sertić Basarac, M., Pirc Barčić, A.; Klarić, K. (2018): Economic Determinants and Analysis of the European Union Wood Industry SMEs Employment. Bioresources. 13 (1): 522-534. Forest Products Annual Market Review, 2019-2020								
2.12. Optional literature	Previšić, Ozretić Došen, Krupka: Osnove međunarodnog marketinga, Školska knjiga, Zagreb, 2012								

COURSE DECRIPTION

1. GENERAL INFORMATION			
1.1. Course lecturer(s)	Assoc. Prof. Bogoslav Šefc, PhD Asst. Prof. Iva Ištok, PhD Prof. Jelena Trajković, PhD	1.7. Number of ECTS credits	4
1.2. Course title	Exotic wood and its identification	1.8. Number of hours in semester (L+E+F+e-learning)	30 + 15
1.3. Course code	235694	1.9. Expected enrolment in the course	10
1.4. Study programme	Graduate Studies of Wood Product Design	1.10. Level of application of e-learning (level 1, 2, 3)	1
1.5. Course type	Elective	1.11. Language of instruction	Croatian
1.6. Year of the study	1	1.12. Possibility of instruction in English	NO
2. COURSE DESCRIPTION			
2.1. Course objectives	Introduction to wood properties of exotic species in general. Acquiring knowledge on the specifics of the macroscopic and microscopic wood structure of commercial exotic wood species. Knowledge and application of methods and procedures in wood identification. Identification of wood species using software (keys) for wood identification.		
2.2. Enrolment requirements and/or entry competences required for the course	-		

2.3. Learning outcomes at the level of the programme to which the course contributes	A2 - Independently gather data, statistically process, present and analyse gathered data, discuss and make conclusions based on analysed data and distinguish possibilities of different interpretation of the same problem analysed in different ways, E1 - Perform tasks of scientific and professional associate in scientific research institutions in the field of wood and wood technology E2 - Conduct courses in vocational secondary schools and other similar school
2.4. Expected learning outcomes at the level of the course (3 to 10 learning outcomes)	Recognize, distinguish and explain specific diagnostic macroscopic and microscopic wood properties of commercial exotic wood species. Know the materials and implement methods and procedures in wood identification. Distinguish commercial exotic wood species using modern identification software (keys).
2.5. Course content (syllabus)	Comparative wood anatomy of commercial exotic wood species. Endangered exotic wood species according to the list of international organizations CITES and IUCN. Acquiring knowledge of various microscopy and preparation techniques for morphological, qualitative and quantitative analyses of wood, wood cells and wood materials. Measuring instruments and methods in optical microscopy. Microtomy and maceration of wood: preparation, staining and fitting of preparations. Identification of wood species using wood identification software (keys). Methods and boundary examples (reliability of identification). Selected wood species in the *Caesalpinioideae*, *Dipterocarpaceae*, *Ebanaceae*, *Fabaceae*, *Meliaceae*, *Moraceae*, *Sapotaceae* family are included.
2.6. Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *online in entirety* ☐ partial e-learning ☐ field work ☐ independent assignments ☐ multimedia and the internet ☒ laboratory ☐ work with mentor ☐ (other)
2.7. Comments:	

2.8. Monitoring student work									
	Class attendance	YES		Research		NO	Oral exam	YES	
	Experimental work		NO	Report		NO	(other)		
	Essay		NO	Seminar paper	YES		(other)		
	Preliminary exam		NO	Practical work	YES	NO	(other)		
	Project		NO	Written exam		NO	ECTS credits (total)		

2.9. Assessment methods and criteria	Assessment is conducted in accordance with Assessment methods and criteria for the current academic year
2.10. Student responsibilities	

2.11. Required literature (available in the library and/or via other media)	Title	Availability in the library	Availability via other media
	Wood anatomy: lectures in course Wood anatomy (script, authors: Jelena Trajković and Bogoslav Šefc, pdf document 3 MB) and Image atlas to use with lectures (illustrations to use with lectures, collected by: Jelena Trajković and Bogoslav Šefc, pdf document 39 MB)	YES	Library of the Institute of Wood Science, Merlin
	Wagenführ, R.; Scheiber, C., 2006: HOLZATLAS, VEB Fachbuchverlag, Leipzig.	YES	Library of the Institute of Wood Science

	Wood species from the covers of the Drvna industrija journal (2019), Faculty of Forestry, University of Zagreb.	YES	Library of the Institute of Wood Science
	H. G. Richter and M. J. Dallwitz 2000: 'Commercial timbers: descriptions, illustrations, identification, and information retrieval.' In English, French, German, and Spanish. Version: 25th June 2009.		YES
2.12. Optional literature	Gérard, J.; Guibal, D.; Paradis, S.. Cerre, J.C., 2017: Tropical Timber Atlas, Technological characteristics and uses, Éditions Quae RD10, 78026 Versalies. https://insidewood.lib.ncsu.edu/search?3; https://www.wood-database.com/wood-articles/restricted-and-endangered-wood-species/ Glossary of Croatian wood technology terminology (2018)		

COURSE DECRIPTION

1. GENERAL INFORMATION			
1.1. Course lecturer(s)	Prof. Vlatka Jirouš Rajković, PhD Assist. Prof. Josip Miklečić, PhD	1.7. Number of ECTS credits	5
1.2. Course title	Finishing of wood products	1.8. Number of hours in semester (L+E+F+e-learning)	30+30+16
1.3. Course code	235680	1.9. Expected enrolment in the course	
1.4. Study programme	Graduate	1.10. Level of application of e-learning (level 1, 2, 3)	2
1.5. Course type	Compulsory	1.11. Language of instruction	
1.6. Year of the study	2	1.12. Possibility of instruction in English	
2. COURSE DESCRIPTION			
2.1. Course objectives	To provide students with theoretical and practical knowledge about methods of testing the quality of surface treatment, properties and composition of coating materials for wood in interior and exterior and the specifity of their application. Introduce students to new environmentally friendly materials for wood finishing and legal regulations in the field of wood finishing and the most common failures in wood finishing. As part of the subject generic skills will also be developed: teamwork, project work, presentation skills and coping with problem situations.		
2.2. Enrolment requirements and/or entry competences required for the course			
2.3. Learning outcomes at the level of the programme to which the course contributes	A2 - Independently gather data, statistically process, present and analyse gathered data, discuss and make conclusions based on analysed data and distinguish possibilities of different interpretation of the same problem analysed in different ways, B1 - Apply current technical regulations in ensuring quality of wood, wooden materials and final products, B2 - Resolve interdisciplinary problems which refer not only to product design or construction and their presentation, but also include the selection of all production materials, processing technology and assurance of final product quality,		

	B10 - Apply knowledge of furniture quality and methods of its examination and develop and plan a complete system of final product quality assurance, C3 - Conduct furnishing of facilities, E3 - Perform activities and tasks in publicist writing and the media related to the wood profession,
2.4. Expected learning outcomes at the level of the course (3 to 10 learning outcomes)	1.To explain the meaning of color and distinguish color measurement systems. 2.To measure the color and gloss of coated wood and interpret the result. 3.To recommend finishing systems for wood products in the interior and exterior and plan wood finishing process in craftmanship and in industrial production. 5.To analyze the causes of internal stresses in wood coatings. 6.To analyze the factors affecting the performance of wood-coating system. 7.To assess the causes of wood staining failure and coating failures. 8.To distinguish the materials and processes for imitation of wood and wood products. 9.To rank qulity of wood finishing based on laboratory testing of aesthetic properties, mechanical properties, resistance to chemical influences and heat, resistance to weathering. 10.Collect information about the professional topic, synthesize and present them.
2.5. Course content (syllabus)	The appearance of a product. Colour and colour measurement. Gloss and gloss measurement. Coatings for wood during history. Wood properties that affect durability of wood-coating system. The binders for wood coatings and their properties. The solvents. The pigments. Other coatings ingredients. The base of forming the film. Wetting and spreading. Adhesion of coating on wood. Interaction of wood and wood finish. Internal stresses. Properties and composition of modern wood dyes and stains Modern methods of applying and curing of wood finishes. Imitation treatment of wood and wood products. Decorative surface materials (foils and laminates). Special technologies of wood finishing. Functional coatings for wood. Finishing of exterior wood: wood natural enemies, classification of wood coatings, properties of coatings, durability of coatings and maintenance. Removing coatings from wood surface and refinishing. Finishing troubles. Compliant wood coatings. Environmental legislation. Abatement. Quality testing of coated wood surfaces.

2.6. Format of instruction			2.7. Comments:
	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *online in entirety* ☒ partial e-learning ☒ field work	☒ independent assignments ☐ multimedia and the internet ☒ laboratory ☒ work with mentor ☐ (other)	

2.8. Monitoring student work									
	Class attendance	yes		Research			Oral exam	yes	
	Experimental work	yes		Report			(other)		
	Essay			Seminar paper			(other)		
	Preliminary exam	yes		Practical work			(other)		
	Project			Written exam	yes		ECTS credits (total)	5	

2.9. Assessment methods and criteria	Assessment is conducted in accordance with Assessment methods and criteria for the current academic year		
2.10. Student responsibilities			
2.11. Required literature (available in the library and/or via other media)	Title	Availability in the library	Availability via other media

	Ljuljka, B., Jirouš-Rajković, V. 2006: Osnove površinske obrade drva. Šumarski fakultet, Sand, 2006.	Yes	
	Jirouš-Rajković, Vlatka; Turkulin, Hrvoje; Sell, Juergen: Postojanost drva na pročeljima 2.dio: Površinska obrada drva na pročeljima Drvna industrija : znanstveno-stručni časopis za pitanja drvne tehnologije, 53 (2002), 3; 141-151		https://www.bib.irb.hr/154465
	Bulian, F.; Graystone J.A.: Industrial wood coatings. Theory and Practice. Elsevier, Oxford, UK 2009.	no	Available in pdf format in the Merlin E-learning platform
2.12. Optional literature	1. Prieto J.; Kiene J.: Wood Coatings: Chemistry and Practice. Hanover: Vincent Network 2018. 2.Antonios N. Papadopoulos,A.N.; Taghiyari, H.R.: Innovative Wood Surface Treatments Based on Nanotechnology. Coatings 2019, 9(12), 866; https://doi.org/10.3390/coatings9120866		

COURSE DECRIPTION

1. GENERAL INFORMATION			
1.1. Course lecturer(s)	Prof. Silvana Prekrat PhD	1.7. Number of ECTS credits	6
1.2. Course title	Designing of woden products	1.8. Number of hours in semester (L+E+F+e-learning)	30+30+8
1.3. Course code	235681	1.9. Expected enrolment in the course	15
1.4. Study programme	Graduate	1.10. Level of application of e-learning (level 1, 2, 3)	2
1.5. Course type	Compulsory	1.11. Language of instruction	
1.6. Year of the study	2	1.12. Possibility of instruction in English	
2. COURSE DESCRIPTION			
2.1. Course objectives	Acquisition of knowledge and skills in the application of systematic methods of work on design with the aim of rational application of materials and structural solutions. Training of experts to manage projects from conceptual solutions to unique and serial production with additional mastery of CAD programs for visualization and automatic construction.		
2.2. Enrolment requirements and/or entry competences required for the course			
2.3. Learning outcomes at the level of the programme to which the course contributes	A1: Inform potential buyers of final product quality characteristics and of trends in wood products design B2: Resolve interdisciplinary problems which refer not only to product design or construction and their presentation, but also include the selection of all production materials, processing technology and assurance of final product quality B3: Apply final wood product, wooden and non-wooden materials design methodology in developing and improving products, quality upgrade, product design and construction B4: Develop and plan a complete construction system which consists of planning, designing, constructing, preparing technical documentation and applying technologies		

	for final product manufacturing C5: Manage projects from the preliminary design to serial production with additional operating of CAD programmes for visualization and automatic construction C9: Programme during construction process in order to improve design productivity, and thus the entire production system D2: Manage and ensure quality adapted to specific production problems in wood product Design E2: Conduct courses in vocational secondary schools and other similar schools								
2.4. Expected learning outcomes at the level of the course (3 to 10 learning outcomes)	1. Prepare the content of the project task based on the client's needs and the prescribed norms 2. Plan design, project and construction activities 3. Design furniture and wood products according to given requirements. 4. Recommend the optimal design solution with versions. 5. Design the product in a 3D model with the application of knowledge from the field of construction. 6. Evaluate different product variants in certain stages of development using a multi-criteria approach 7. Analyze products, assortment, production program 8. Present your own argumentative solution (written and oral).								
2.5. Course content (syllabus)	Introduction to the design of wood products. The impact of industry 4.0 and 5.0. to changes in the design process. Approach to designing according to the product development stage. Content of the project assignment. Idea project for model, sample. The main project for a prototype, an industrial product. Overview and selection of the production program - classification. Analysis of products, assortment, production program. The impact of pricing on the product design approach. Criteria for choosing the optimal design solution and version, functional, safety, mechanical technical, aesthetic, production and economic requirements. Determination of basic and auxiliary material. Determining the degree of standardization (normization). Determination of structural complexity. Identification and classification. Material needs by types. Evaluation criteria. Product structure labeling system. Rapid prototyping and its role in the product development process. Application of CAD programs in conceptual design and creation of production documentation. Application of automatic construction. Basic digitization techniques in design. Preparation of a project for product promotion.								
2.6. Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *online in entirety* ☒ partial e-learning ☒ field work			☒ independent assignments ☒ multimedia and the internet ☐ laboratory ☐ work with mentor ☒ CAD classroom			2.7. Comments:		
2.8. Monitoring student work	Class attendance	yes		Research	yes		Oral exam	yes	
	Experimental work	yesy es		Report	yes		(other)		
	Essay			Seminar paper	yes		(other)		
	Preliminary exam			Practical work	yes		(other)		
	Project	yes		Written exam	yes		ECTS credits (total)	6	
2.9. Assessment methods and criteria	Assessment is conducted in accordance with Assessment methods and criteria for the current academic year								
2.10. Student responsibilities									

2.11. Required literature (available in the library and/or via other media)	Title	Availability in the library	Availability via other media
	Prekrat, S.: Recenzirani materijali na web-u Tkalec, S., Prekrat, S.:(2000): Konstrukcije proizvoda o ddrva – osnove drvnih konstrukcija, Šumarski fakultet i Znanje Zagreb Prekrat, S.: (2018.): e učionica Šumarskog fakulteta , Šumarski fakultet	No Yes yes	Merlin Merlin Merlin
2.12. Optional literature	1. Smardzewsky, J:(2015.): Furniture Design, Springer Verlag 2. Mattson, C.A.; Sorensen, C.D.: () Product development – Principles and Tools for Cewting Desirable and Transferable Designs, Springer Verlag 3. Ulrich, K.T., Eppinger, S.D. (2012):Product design and development, McGraw – Hill Education, New York		

COURSE DECRIPTION

1. GENERAL INFORMATION			
1.1. Course lecturer(s)	Danijela Domljan, PhD, Assistant Professor Assoc. Prof. Zoran Vlaović, PhD	1.7. Number of ECTS credits	5
1.2. Course title	Furniture and health	1.8. Number of hours in semester (L+E+F+e-learning)	30+15+8
1.3. Course code	235682	1.9. Expected enrolment in the course	10
1.4. Study programme	Graduate	1.10. Level of application of e-learning (level 1, 2, 3)	1
1.5. Course type	Compulsory	1.11. Language of instruction	
1.6. Year of the study	2	1.12. Possibility of instruction in English	
2. COURSE DESCRIPTION			
2.1. Course objectives	Mastering and understanding the basic of contemporary methods and techniques in designing healthy furniture and protecting humans and environment through its production and use.		
2.2. Enrolment requirements and/or entry competences required for the course	knowledge of at least one foreign language (preferably English)		
2.3. Learning outcomes at the level of the programme to which the course contributes	A1: Inform potential buyers of final product quality characteristics and of trends in wood products design, A2: Independently gather data, statistically process, present and analyse gathered data, discuss and make conclusions based on analysed data and distinguish possibilities of different interpretation of the same problem analysed in different ways A3: Give presentations at fairs. B1: Apply current technical regulations in ensuring quality of wood, wooden materials and final products, B2: Resolve interdisciplinary problems which refer not only to product design or construction and their presentation, but also include the selection of all production materials, processing technology and assurance of final product quality B5: Evaluate board materials according to processing possibilities, technical and ecological characteristics, and choose optimal constructional solutions adequate for the		

<table>
<tr><td></td><td colspan="9">properties and processability of each board material type,
B6: Evaluate, select and apply composite materials regarding the patterns existing inside the wood composite construction system and decide on the selection of proper material,
B7: Apply theoretical, practical and methodological basics of furniture design as a complex interdisciplinary process,
B8: Develop the ability of independent analytic and creative design and acting,
B9: Analyse and make conclusions on wood properties and their application in wood product design,
B10: Apply knowledge of furniture quality and methods of its examination and develop and plan a complete system of final product quality assurance.
C6: Apply contemporary methods and techniques of healthy furniture design and ensure protection of man and environment through its production and usage
D2: Manage and ensure quality adapted to specific production problems in wood product design.</td></tr>
<tr><td>2.4. Expected learning outcomes at the level of the course (3 to 10 learning outcomes)</td><td colspan="9">1.Relate the relationship between furniture and psychophysical health of a person. i.e. possible effects caused by (poorly constructed, use of harmful materials or eg use of quality, natural materials…) furniture on human health and possible adverse or positive consequences
2. Formulate the effects of the environment (such as the rhythm of life, environmental pollution, technological innovations…) on human health
3. Apply the principles of design and construction of healthy, functional, cost-effective and environmentally friendly furniture
4. Connect the interdisciplinarity of new knowledge in the design of healthy furniture, new technologies and materials, human needs for change and improvement of quality of life
5. Use ergonomics and anthropometry in the design and construction of healthy furniture.
6. Valorize and apply available materials and apply the importance of environmental parameters (use of materials in the service of health, wood and wood materials, artificial materials and their combinations, hazards from the effects of harmful substances)
7. Design and construct furniture for sitting and lying within healthcare for home, professional and public use</td></tr>
<tr><td>2.5. Course content (syllabus)</td><td colspan="9">Rrelationship between furniture and human health. Environmental impacts on human health. Healthy living. Principles of designing healthy furniture. Contemporary trends in shaping a healthy living environment. Interdisciplinarity as a driver of new knowledge. The importance of health parameters in furniture design. Ergonomics and anthropometry as a function of health. Biomechanics of the body. The spine. Importance of ecological parameters. Wood and wood materials, wood-synthetic and synthetic materials in the function of health. Hygienic healthy materials. Materials and technologies in the function of designing healthy furniture. Norms. Seating furniture for health. Office furniture. School furniture. Upholstered furniture intended for sitting, relaxing and resting. Lying furniture for health. Requirements for the design of a healthy bed in hospitals, hotels, homes, etc. The relationship between the bed system and the body of the sleeper. Kitchen furniture in the function of health. Children's furniture. Furniture for the elderly.</td></tr>
<tr><td>2.6. Format of instruction</td><td colspan="4">☒ lectures
☒ seminars and workshops
☒ exercises
☐ online in entirety
☒ partial e-learning
☒ field work</td><td colspan="3">☒ independent assignments
☐ multimedia and the internet
☐ laboratory
☐ work with mentor
☐ (other)</td><td colspan="2">2.7. Comments:</td></tr>
<tr><td rowspan="4">2.8. Monitoring student work</td><td>Class attendance</td><td>yes</td><td></td><td>Research</td><td>yes</td><td></td><td>Oral exam</td><td>yes</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td></td><td>Report</td><td>yes</td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Essay</td><td></td><td></td><td>Seminar paper</td><td>yes</td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Preliminary</td><td></td><td></td><td>Practical</td><td></td><td></td><td>(other)</td><td></td><td></td></tr>
</table>

	exam			work					
	Project	yes		Written exam			ECTS credits (total)		
2.9. Assessment methods and criteria	Assessment is conducted in accordance with Assessment methods and criteria for the current academic year								
2.10. Student responsibilities									

2.11. Required literature (available in the library and/or via other media)	Title	Availability in the library	Availability via other media
	Bridger, R.S. (2018): Introduction to Human Factors and Ergonomics. Fourth Edition. CRC Press, Taylor & Francis Group, USA	No	web, free pdf available
	Domljan, D., Grbac, I., Jirouš Rajković, V., Vlaović, Z., Živković, V., Župčić, I. (2015): Kvaliteta i tehnički opisi proizvoda od drva, Svezak I. Opremanje zgrada za odgoj i obrazovanje, sveučilišni priručnik. Šumarski fakultet Sveučilišta u Zagrebu, Hrvatska gospodarska komora, Zagreb	Yes	
	Domljan, D. (2011): Oblikovanje školskog namještaja kao preduvjet očuvanja zdravlja učenika. Doktorski rad. Sveučilište u Zagrebu Šumarski fakultet, 18. svibnja 2011. Zagreb		
	Grbac, I. (2006): Krevet i zdravlje, Sveučilišni udžbenik, Zagreb	Yes	
	Kroemer, K.H.E. (2017): Fitting the Human. Introduction to Ergonomics / Human Factors Engineering, 7th edition. CRC Press, Taylor & Francis Group, USA	no	web, free pdf available
	Panero, J.; Zelnik, M. (1991): Antropološke mjere i interijer, Zbirka preporuka za standarde u projektiranju, IRO ''Građevinska knjiga'', Beograd		
	Vlaović, Z. (2005): Istraživanje udobnosti uredskih radnih stolica, magistarski rad – odabrana poglavlja, Sveučilište u Zagrebu, Šumarski fakultet, Zagreb		
	Vlaović, Z. (2009): Činitelji udobnosti uredskih stolica, disertacija – odabrana poglavlja, Sveučilište u Zagrebu, Šumarski fakultet, Zagreb		
2.12. Optional literature	1.Hrvatski zavod za norme – odabrane HRN EN 2.Dul, J.; Weerdmeester, B. (2008): Ergonomics for Beginners. A Quick Reference Guide. 3rd Edition, CRC Press,Taylor & Francis Group, FL, USA 3.Fuad-Luke, A. (2002): The Eco – Design Handbook, Thames&Hudson Ltd., London 4.Grbac, I. (2005): Ojastučeni namještaj, Sveučilišni udžbenik, Zagreb		

	5.Konz, S.; Johnson, S. (2016): Work design - Occupational Ergonomics. 7th edition. CRC Press, Taylor & Francis Group, FL, USA. 6.Meštrović, M. (1980): Teorija dizajna i problemi okoline, Biblioteka Naprijed, Zagreb 7.Pheasant, S. (2003): Bodyspace.Anthropometry, Ergonomics and the Design of Work. 2nd edition. CRC Press, Taylor & Francis Group, UK, USA

COURSE DECRIPTION

1. GENERAL INFORMATION			
1.1. Course lecturer(s)	Prof. Anamarija Jazbec, PhD Assist. Prof. Azra Tafro, PhD	1.7. Number of ECTS credits	4
1.2. Course title	Applied Statistics	1.8. Number of hours in semester (L+E+F+e-learning)	30+15
1.3. Course code	235684	1.9. Expected enrolment in the course	
1.4. Study programme	Graduate	1.10. Level of application of e-learning (level 1, 2, 3)	3
1.5. Course type	Compulsory	1.11. Language of instruction	
1.6. Year of the study	2	1.12. Possibility of instruction in English	

2. COURSE DESCRIPTION	
2.1. Course objectives	The objective of the course is to introduce and train students to independently collect, statistically analyse and display the collected data. Also that they can discuss and reach conclusions based on analysed data. Independently analysed and write a report on obtaining the standard for a product.
2.2. Enrolment requirements and/or entry competences required for the course	Passed some basic statistical subject.
2.3. Learning outcomes at the level of the programme to which the course contributes	A2-Independently gather dana, statitically process, present and analyses gathered dana, discuss and make conclusions based on analysed dana and distinguish the possibilities of different, interpretation of the same problem anaylsed in different ways
2.4. Expected learning outcomes at the level of the course (3 to 10 learning outcomes)	1.Identify, implement and perform a statistical test based on sample for testing population mean and proportion 2.Identify, implement and perform a statistical test based on sample for testing population variance. 3.Identify, implement and perform a statistical test for testing difference between two population proportions (test of proportions) 4.Identify, implement and perform a statistical test for testing difference between two population variances (F test) 5.Identify, implement and perform a statistical test for testing difference between two population means (t test, Mann Whitney test) 6.Identify, implement and perform a statistical test for testing equality more than two population means (ANOVA) 7.Identify, implement and perform a statistical test for testing two dependent population means (t paired test) 8.Calculate population correlation and estimate coeficient of the correlation and preforme statistical test (Pearson's and Spearman rank correlations) with computer support.. 9.Analyze and interpret the results of univariate and multivariate linear regression with the help of computer support. 10.Analyze the contingency table implement the chi2 test

2.5. Course content (syllabus)	Statistical decision theory, Hypotheses Testing. Testing for the Population Mean. Testing Population Proportion. Testing Population Variance. Difference between two Population Proportions. Difference between two Population Variances. Difference between two Population Means. T-test. Nonparametric Mann Whitney test. Analysis of Variance. Perason`s and Spearman rank Correlation. Linear Regression. Least Squares Mathod. Estimation of Regression Coefficients.Coefficient of Determination. Model building. Methods of Model building. Univariat and Multivariate Regression Models. Modelling Interactions. Chi square test.								
2.6. Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *online in entirety* ☒ partial e-learning ☐ field work			☐ independent assignments ☐ multimedia and the internet ☐ laboratory ☐ work with mentor ☐ (other)			2.7. Comments:		
2.8. Monitoring student work	Class attendance	yes		Research			Oral exam	yes	
	Experimental work			Report			(other)		
	Essay			Seminar paper			(other)		
	Preliminary exam			Practical work			(other)		
	Project			Written exam	yes		ECTS credits (total)		
2.9. Assessment methods and criteria	Assessment is conducted in accordance with Assessment methods and criteria for the current academic year								
2.10. Student responsibilities									
2.11. Required literature (available in the library and/or via other media)	Title			Availability in the library			Availability via other media		
	Jazbec A. Applied Statistics (in Croatian) Internal script			no			YES. All teaching materials in written and same in video form are on the Merlin platform		
2.12. Optional literature	1. Jazbec A. (2009) Osnove statistike, 2 ed. Šumarski fakultet, Zagreb 2. Bahovec V, Erjavec N ur. (2015) Statistika, Element, Zagreb 2. Montgomery D.C.(2005) Statistical Quality Control, 5ed. Wiley, NewYork								

COURSE DECRIPTION

1. GENERAL INFORMATION			
1.1. Course lecturer(s)	Assoc. Prof. Goran Mihulja, PhD.	1.7. Number of ECTS credits	4
1.2. Course title	Computer aided wood processing	1.8. Number of hours in semester (L+E+F+e-learning)	30+15+8

1.3. Course code	235695	1.9. Expected enrolment in the course	10
1.4. Study programme	Graduate	1.10. Level of application of e-learning (level 1, 2, 3)	2
1.5. Course type	Elective	1.11. Language of instruction	Croatian
1.6. Year of the study	2.	1.12. Possibility of instruction in English	yes
2. COURSE DESCRIPTION			
2.1. Course objectives	The student gains knowledge about computer aided wood processing. Students will be capable to recognize the capabilities and limitations of CNC machines and related software used in wood technology production.		
2.2. Enrolment requirements and/or entry competences required for the course			
2.3. Learning outcomes at the level of the programme to which the course contributes	A2: Independently gather data, statistically process, present and analyse gathered data, discuss and make conclusions based on analysed data and distinguish possibilities of different interpretation of the same problem analysed in different ways, B2: Resolve interdisciplinary problems which refer not only to product design or construction and their presentation, but also include the selection of all production materials, processing technology and assurance of final product quality, B4: Develop and plan a complete construction system which consists of planning, designing, constructing, preparing technical documentation and applying technologies, B8: Develop the ability of independent analytic and creative design and acting, C10: Programme during construction process in order to improve design productivity, and thus the entire production system, D1: Perform responsible tasks in company management in the area of production management, technical production preparation, termination and management of materials, D2: Manage and ensure quality adapted to specific production problems in wood product design		
2.4. Expected learning outcomes at the level of the course (3 to 10 learning outcomes)	1. Investigate and explain the influence of CNC technology factors on the possibilities of application in wood processing 2. Collect and process information related to technology capabilities from machine manufacturers and users in the wood industry 3. Distinguish and categorize NC and CNC machines based on collected data on their capabilities and limitations 4. Propose the application of different CNC machines and methods of production preparation (programming) based on the construction of the product or group of products 5. Know the ways of using different tool constructions in simple machining operations and multi-axis machining 6. Explore the possibilities and plan the optimal way of fixing the workpiece of different (simple and complex) shapes on the CNC machining center 7. Conduct a reverse engineering process using 3D digitization 8. Lead the process of harmonizing the technology and construction of the product to ensure the most economical production process		
2.5. Course content (syllabus)	Lectures 1. The influence of the purpose of the CNC machine and its construction determinants on the choice of processing methods and parameters 2. Influence of available tool control methods, workgroups and machining units of CNC machine on the choice of processing methods and parameters 3. The influence of the type of production technology on the choice of processing methods and parameters 4. Levels of software support in processing preparation 5. Possibilities of application of woodworking tools on CNC machines and machining centers 6. Challenges of choosing the type of tool in the production with CNC technology 7. How to plan the collection of information on machines and related technological capabilities		

<table>
<tr><td></td><td colspan="9">8. Mind maps and categorization of production possibilities
9. How the construction of the machine determines the method of preparation of production
10. Product construction as a basis for production preparation method
11. Possibilities of fixing workpieces on CNC machines
12. Overview of the possibilities of defining processing in CAM software
13. 3D digitization of shapes and products and its replication
14. Limitations of technology and engineering thinking
15. Technological possibilities and their economic result in designing the processing process

Exercises
1. Investigate the influence of the purpose and construction determinants of the CNC machine on the choice of processing method and parameters
2. Investigate the influence of available ways of managing tools, workgroups and machining units of a CNC machine on the choice of processing method and parameters
3. Investigate the influence of a certain type of production technology on the choice of processing methods and parameters
4. Present the collected information on the divisions of cnc machines at defined machine manufacturers
6. Independent work in CAM software - selection of tools and processing parameters for processing plate materials
7. Independent work in CAM software - selection of tools and processing parameters for solid wood processing
8.- 10. Plan the collection of information on the given technology, development of a smart map for the analysis of possibilities, preparation of reports
11. Short presentations of the possibilities of the researched technologies
12. and 13. Design more solutions for the production process of a given product, harmonizing it with the possibilities of available / given CNC processing technology
14. and 15. Analyze the possibilities of designed solutions of the production process and select and explain the most acceptable ones</td></tr>
<tr><td>2.6. Format of instruction</td><td colspan="4">☒ lectures
☐ seminars and workshops
☒ exercises
☐ online in entirety
☒ partial e-learning
☒ field work</td><td colspan="3">☒ independent assignments
☒ multimedia and the internet
☐ laboratory
☐ work with mentor
☐ (other)</td><td colspan="2">2.7. Comments:</td></tr>
<tr><td rowspan="5">2.8. Monitoring student work</td><td>Class attendance</td><td>YES</td><td></td><td>Research</td><td>YES</td><td></td><td>Oral exam</td><td>YES</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>NO</td><td>Report</td><td>YES</td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Essay</td><td></td><td>NO</td><td>Seminar paper</td><td></td><td>NO</td><td>(other)</td><td></td><td></td></tr>
<tr><td>Preliminary exam</td><td>YES</td><td></td><td>Practical work</td><td>YES</td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Project</td><td></td><td>NO</td><td>Written exam</td><td>YES</td><td></td><td>ECTS credits (total)</td><td>4</td><td></td></tr>
<tr><td>2.9. Assessment methods and criteria</td><td colspan="9">Assessment is conducted in accordance with Assessment methods and criteria for the current academic year</td></tr>
<tr><td>2.10. Student responsibilities</td><td colspan="9"></td></tr>
<tr><td>2.11. Required literature (available in the library and/or via other media)</td><td colspan="4">Title</td><td colspan="2">Availability in the library</td><td colspan="3">Availability via other media</td></tr>
</table>

	Irons, I.: Learn CNC Secrets; Quickly Learn the Basic Concepts of CNC, FistFire Publishing Hobart, WA FistFire LLC, 2007, str.1-142.		
	Alain Albert: Understanding CNC Routers, FPInovations - Forintek Division, 2010, str.10-100.		
	Mihulja, G.: Računalom podržana proizvodnja drvom i drvnim materijalima I, Interni studenski priručnik		
2.12. Optional literature	1. Ljuljka, B.: Tehnologija proizvodnje namještaja, Zagreb, 1980, str. 1-257. 2. Tkalec, S., Prekrat, S.: Konstrukcije proizvoda od drva – osnove drvnih konstrukcija, Sveučilišni udžbenik Šumarski fakultet i Znanje, Zagreb, 2000. 3. Goglia, V.: Strojevi i alati za obradu drva I dio, Sveučilište u Zagrebu, Šumarski fakultet, 1994. 4. Grladinović T.: Upravljanje proizvodnim sustavima u preradi drva i proizvodnji namještaja, Šumarski fakultet Sveučilišta u Zagrebu, Zagreb, 1999., str. 1-298. 5. Franjo Nađ dipl.ing.: Priručnik za programiranje, upotrebu i održavanje obradnog centra TECH 80, str.1-25.		

COURSE DECRIPTION

1. GENERAL INFORMATION			
1.1. Course lecturer(s)	Assoc. Prof. Goran Mihulja, PhD. Assist. Prof. Josip Miklečić, PhD Prof. Hrvoje Turkulin, PhD Tomislav Gržan	1.7. Number of ECTS credits	4
1.2. Course title	Research on adhesive joints	1.8. Number of hours in semester (L+E+F+e-learning)	30+15+8
1.3. Course code	33726	1.9. Expected enrolment in the course	
1.4. Study programme	Graduate	1.10. Level of application of e-learning (level 1, 2, 3)	2
1.5. Course type	Elective	1.11. Language of instruction	
1.6. Year of the study	2	1.12. Possibility of instruction in English	
2. COURSE DESCRIPTION			
2.1. Course objectives	To acquaint students with laboratory tests that are base for research on factors affecting response of the glued joint in the use of the product.		
2.2. Enrolment requirements and/or entry competences required for the course			
2.3. Learning outcomes at the level of the programme to which the course contributes	B1: Apply current technical regulations in ensuring quality of wood, wooden materials and final products B2: Resolve interdisciplinary problems which refer not only to product design or construction and their presentation, but also include the selection of all production materials, processing technology and assurance of final product quality B8: Develop the ability of independent analytic and creative design and acting		

	D2: Manage and ensure quality adapted to specific production problems in wood product design
2.4. Expected learning outcomes at the level of the course (3 to 10 learning outcomes)	1. Distinguish and categorize the basic groups of glued joints (width, thickness, length, ...); 2. Know and control the factors of forming the bonded joint (adhesive factors, substrates, environmental conditions, processing, ...); 3. Propose to use the specific construction of the glued joint in the wood products; 4. Formulate the importance of strength and durability of the joint on product quality; 5. Evaluate the quality of adhesive joint by standard ISO and EN test methods; 6. Analyse and evaluate the importance of factors affecting the strength and durability of adhesive joint; 7. Recommend methods for determining the strength of the bonded joints (methods for structural and nonstructural joints); 8. Recommend methods for determining the durability of glued compounds (methods for structural and nonstructural joints);
2.5. Course content (syllabus)	Types of bonded joints. Bonding techniques. Joint strength and durability. Influence of structure and water content of wood on durability and strength of adhesive joints. Inner stresses of adhesive joints. Resistance to high (WATT test) or low temperatures. Conditions of accelerated product exposure as a simulation of conditions of long - term real exploitation. Static and dynamic testing of glued products. Standards for testing glued joints (ISO, EN, HRN and ASTM) and various forms of testing elements. Shear strength testing with compressive or tensile loading. Stress distribution and concentration, deformation and elasticity of glued joints (testing probes). Forms of testing probes and methods of determining the strength by tensile, compressive and bending loads. Determination of peel strength. Resistance to temperature changes and climatic influences. Flammability. Resistance to swelling in solvents. Testing of hot melt adhesive joints, adhesives for foams and other materials. Statistical expression of the glued joint strength and other methods of analysis and presentation of the glued joints state (normative strength).
2.6. Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *online in entirety* ☒ partial e-learning ☒ field work ☐ independent assignments ☐ multimedia and the internet ☒ laboratory ☐ work with mentor ☐ (other)
2.7. Comments:	

2.8. Monitoring student work									
	Class attendance	yes		Research			Oral exam	yes	
	Experimental work			Report			(other)		
	Essay			Seminar paper			(other)		
	Preliminary exam			Practical work			(other)		
	Project			Written exam	yes		ECTS credits (total)	4	

2.9. Assessment methods and criteria	Assessment is conducted in accordance with Assessment methods and criteria for the current academic year		
2.10. Student responsibilities			
2.11. Required literature (available in the library and/or via other media)	Title	Availability in the library	Availability via other media

	Mihulja, G.; Bogner, A.: Čvrstoća i trajnost lijepljenog drva. Dio I: Faktori čvrstoće lijepljenog drva, Drvna industrija, 56 (2005), 2; 69-78. Mihulja, G.; Bogner, A.: Čvrstoća i trajnost slijepljenog drva Dio II: Ispitivanje čvrstoće lijepljenja drva, Drvna industrija, 58 (2007), 2; 89-96. Mihulja, G.; Bogner, A.: Dependence of Strength Values of Adhesive-Wood Bonds on Specimen Geometry, Wood Adhesives 2009., Frihart, R.C.; Hunt, G.C.; Moon, J.R. (ur.), Madison WI 53705-2295: The Printing House, Inc., 2009. str. 377-388. Ljuljka, B. 1978: Lijepljenje u tehnologiji finalnih proizvoda, Zagreb, 1 – 219. Bandel, A. 1995: Gluing wood, CATAS, Udine.	yes	
2.12. Optional literature	1. Bogner, A., Ljuljka.B., Grbac,I. 1984.: Optimizacija procesa lijepljenja ploča iz masivnog drva u proizvodnji namještaja BILTEN ZIDI 12,4,1-50. 2. Bogner, A., Ljuljka, B., Grbac, I. 1996.: Methods for Testing the Resistance of Wood Hotmelt Adhesives to Temperature Changes and Weathering. Drvna industrija 47 (3), 108-113. 3. Bogner, A., Grbac, I., Mihulja, G. 1999.: Residual stresses in the glued structural members of wood. DRVNA INDUSTRIJA, 50 (4), 185-191.		

COURSE DECRIPTION

1. GENERAL INFORMATION			
1.1. Course lecturer(s)	Assistant professor Kristina Klarić, PhD; associate professor Krešimir Greger, PhD	1.7. Number of ECTS credits	4
1.2. Course title	Integrated management systems in wood industry	1.8. Number of hours in semester (L+E+F+e-learning)	30+15+8
1.3. Course code	235696	1.9. Expected enrolment in the course	20
1.4. Study programme	Graduate Studies in Wood Products Design	1.10. Level of application of e-learning (level 1, 2, 3)	2
1.5. Course type	Elective	1.11. Language of instruction	Croatian
1.6. Year of the study	2.	1.12. Possibility of instruction in English	YES
2. COURSE DESCRIPTION			
2.1. Course objectives	The aim of the course is to get acquainted with the basics of quality management, gain general and specific knowledge about the types and application of certified management systems and the integration of management systems adapted to the specifics of wood processing and furniture production.		

<table>
<tr><td>2.2. Enrolment requirements and/or entry competences required for the course</td><td colspan="9"></td></tr>
<tr><td>2.3. Learning outcomes at the level of the programme to which the course contributes</td><td colspan="9">B8 - Develop the ability of independent analytic and creative design and acting,
D1: Perform responsible tasks in company management in the area of production management, technical production preparation, termination and management of materials,
D2: Manage and ensure quality adapted to specific production problems in wood product design,
D4: Perform responsible tasks in company management in the area of project management.</td></tr>
<tr><td>2.4. Expected learning outcomes at the level of the course (3 to 10 learning outcomes)</td><td colspan="9">1. Identify and understand the basic concepts and theories of quality management in the field of quality management.
2. Interpret management system development, standards, and system integration.
3. Understand the certification, accreditation and supervision of integrated systems.
4. Distinguish and define management systems in the wood industry.
5. Design the development of a quality management system and integration with other certification systems for the wood processing and furniture manufacturing company.</td></tr>
<tr><td>2.5. Course content (syllabus)</td><td colspan="9">Introduction. Basic concepts and theories of quality management. Historical development of quality management. Management systems in the wood industry. Development stages of quality. Quality control, quality assurance, quality management. Development of standards, norms, integrated systems and quality management systems. Application of standardization in management systems in the wood industry. Development of management system and related standards. Standardization of quality management systems in the wood industry. Standardization of environmental management systems in the wood industry. Standardization of occupational safety and health management systems. Standardization of wood product traceability systems. Sustainable management in the wood industry. An integrated approach to sustainable management. Other standardized systems in the wood industry. Certification, accreditation and supervision. Application of process approach in development an integrated system. Application of continuous improvement based on PDCA cycle. Application of a systematic management approach through the integration of management system documentation. Defining, harmonizing basic processes, goals and resources. Risk analysis. Organizing integrated management systems in the wood industry.</td></tr>
<tr><td>2.6. Format of instruction</td><td colspan="3">☒ lectures
☒ seminars and workshops
☒ exercises
☐ online in entirety
☒ partial e-learning
☒ field work</td><td colspan="3">☒ independent assignments
☐ multimedia and the internet
☐ laboratory
☐ work with mentor
☒ (other) exercises in computer practicum</td><td colspan="3">2.7. Comments:
If necessary, classes can be conducted entirely online.</td></tr>
<tr><td rowspan="6">2.8. Monitoring student work</td><td>Class attendance</td><td>YES</td><td></td><td>Research</td><td></td><td>NO</td><td>Oral exam</td><td>YES</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>NO</td><td>Report</td><td></td><td>NO</td><td>(other)</td><td></td><td></td></tr>
<tr><td>Essay</td><td></td><td>NO</td><td>Seminar paper</td><td>YES</td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Preliminary exam</td><td>YES</td><td></td><td>Practical work</td><td></td><td>NO</td><td>(other)</td><td></td><td></td></tr>
<tr><td>Project</td><td></td><td>NO</td><td>Written exam</td><td>YES</td><td></td><td>ECTS credits (total)</td><td>4</td><td></td></tr>
<tr><td></td><td colspan="9"></td></tr>
<tr><td>2.9. Assessment methods and criteria</td><td colspan="9">Assessment is conducted in accordance with Assessment methods and criteria for the current academic year</td></tr>
<tr><td>2.10. Student responsibilities</td><td colspan="9">Regular attendance and active participation in lectures and exercises, preparation of exercises, preparation and presentation of seminar work. Taking colloquiums, exams.</td></tr>
</table>

2.11. Required literature (available in the library and/or via other media)	Title	Availability in the library	Availability via other media
	Figurić, M. 2000: Proizvodni i poslovni procesi u preradi drva i proizvodnji namještaja, Sveučilište u Zagrebu, Šumarski fakultet, Zagreb.	YES	
	Baković, T., Dužević, I. (2014), Integrirani sustavi upravljanja, Ekonomski fakultet – Zagreb.	YES	
2.12. Optional literature	1. The Integrated Use of Management System Standards (IUMSS), Second Edition, ISO Handbook, 2018, Ženeva, Švicarska. 2. Štajdohar-Pađen, O., Plivati s ISO-om i ostati živ, Zagreb : Grafički zavod Hrvatske. Zagreb: Kigen, 2009. 3. Lazibat, T.: Upravljanje kvalitetom, Znanstvena knjiga, Zagreb, 2009. 4. Šiško Kuliš, M., Grubišić D.: Upravljanje kvalitetom, Sveučilište u Splitu, Ekonomski fakultet, 2010.		

COURSE DECRIPTION

1. GENERAL INFORMATION			
1.1. Course lecturer(s)	Prof. Denis Jelačić, PhD	1.7. Number of ECTS credits	4
1.2. Course title	Project management	1.8. Number of hours in semester (L+E+F+e-learning)	30+15+8
1.3. Course code	235697	1.9. Expected enrolment in the course	15
1.4. Study programme	Graduate	1.10. Level of application of e-learning (level 1, 2, 3)	1
1.5. Course type	Elective	1.11. Language of instruction	
1.6. Year of the study	2	1.12. Possibility of instruction in English	
2. COURSE DESCRIPTION			
2.1. Course objectives	Student receives the necessary knowledge for the work in praxis on the work places in enterprise management with responsiblities in the area of production management, especially in the area of project management. In the are of investment management student receives the necessary knowledge for starting the investment programs and cycles and basics for business planning in the company.		
2.2. Enrolment requirements and/or entry competences required for the course			
2.3. Learning outcomes at the level of the programme to which the course contributes	D1 – to do the responsible work in enterprise management in the are of production management, technological production management, scheduling, material management and capacity management D4 – to do the responsible work in enterprise management in the are of project management		
2.4. Expected learning outcomes at the level of the course (3 to 10 learning	1. Establish the position and tasks on projects within the management system 2. Establish the time components of the project using Gantt charst and Network diagrams 3. Establish the resources for quality execution of the project 4. Create the project and make the business plan for the project		

<table>
<tr><td>outcomes)</td><td colspan="9">5. Create the technical-technological analysis and location analysis of the project
6. Create the financial preparation of the project with main time milestones
7. Create the management project in the company</td></tr>
<tr><td>2.5. Course content (syllabus)</td><td colspan="9">1. Plan and project. Production project. Investment project.
2. Projects within production systems. Establishing the activities on the project, managing of the project, methods and techniques of project management.
3. Gantt charts forwards and backwards (ASAP, ALAP, SPAN). Exercise: project planning using Gantt chart
4. Network diagrams, types of network diagrams (CPM, PERT, Precedence) and their use. Exercise: project planning using network diagram
5. Business and investment projects. Information on investor
6. Analysis of the supply-demand market with examples from the wood processing branche, technical-technological analysis of the organization in wood processing and furniture manufacturing, location analysis
7. Financial preparation of the project, efficiency and sensibility evaluation
8. Purpose of the business plan, enterpreneuer business plan structure. Exercise: indiviual project with a business plan
9. Enterpreneuer decision making process, important business and time components of the project and business plan
10. Company value. Restrictions in business activities in wood processing and furniture manufacturing
11. Basics of the economy calculation, interest calculation, business with banks, loans, loan payments. Exercise: economy calculation for a business plan
12. Economical evaluation of an investment project. Return period for investment, profit and profit rate
13. Presentations of indivitual student projects
14. Final class, inquiry on quality of the classes and the subject</td></tr>
<tr><td>2.6. Format of instruction</td><td colspan="3">☒ lectures
☐ seminars and workshops
☒ exercises
☐ online in entirety
☐ partial e-learning
☒ field work</td><td colspan="3">☒ independent assignments
☐ multimedia and the internet
☐ laboratory
☒ work with mentor
☐ (other)</td><td colspan="3">2.7. Comments:</td></tr>
<tr><td rowspan="6">2.8. Monitoring student work</td><td>Class attendance</td><td>yes</td><td></td><td>Research</td><td></td><td></td><td>Oral exam</td><td>yes</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td></td><td>Report</td><td></td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Essay</td><td></td><td></td><td>Seminar paper</td><td></td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Preliminary exam</td><td></td><td></td><td>Practical work</td><td></td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Project</td><td></td><td></td><td>Written exam</td><td>yes</td><td></td><td>ECTS credits (total)</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>2.9. Assessment methods and criteria</td><td colspan="9">Assessment is conducted in accordance with Assessment methods and criteria for the current academic year</td></tr>
<tr><td>2.10. Student responsibilities</td><td colspan="9"></td></tr>
<tr><td rowspan="2">2.11. Required literature (available in the library and/or via other media)</td><td colspan="5">Title</td><td colspan="2">Availability in the library</td><td colspan="2">Availability via other media</td></tr>
<tr><td colspan="5">Demeter, D., Stepič, D. 1990: Project management, Otvoreno sveučilište, Zagreb</td><td colspan="2">Yes

yes</td><td colspan="2"></td></tr>
</table>

	Omazić, M.A., Baljkas, A. 2005: Projektni menadžment (Project management), Zagreb: Sinergija nakladništvo d.o.o.		
2.12. Optional literature	1. Meredith, J.R., Mantel, S.J. 2012: Project Management, eighth edition, John Wiley & Sons, Inc. 2. Maylor, H. 2010: Project Managment, fourth edition, Grafos S.A., Arte sobre papel, Spain		

COURSE DECRIPTION

1. GENERAL INFORMATION			
1.1. Course lecturer(s)		1.7. Number of ECTS credits	4
1.2. Course title	Professional project	1.8. Number of hours in semester (L+E+F+e-learning)	120
1.3. Course code	235686	1.9. Expected enrolment in the course	20
1.4. Study programme	Graduate	1.10. Level of application of e-learning (level 1, 2, 3)	2
1.5. Course type	Compulsory	1.11. Language of instruction	Croatian
1.6. Year of the study	2	1.12. Possibility of instruction in English	Yes
2. COURSE DESCRIPTION			
2.1. Course objectives	The goal of a professional project is to apply the acquired knowledge and practical skills in creating a project based on a given product, technology or material, in chronological order as in a real environment, with an innovative approach applied to larger projects		
2.2. Enrolment requirements and/or entry competences required for the course			
2.3. Learning outcomes at the level of the programme to which the course contributes	A2: Independently gather data, statistically process, present and analyse gathered data, discuss and make conclusions based on analysed data and distinguish possibilities of different interpretation of the same problem analysed in different ways, A3: Give presentations at fairs. B2: Resolve interdisciplinary problems which refer not only to product design or construction and their presentation, but also include the selection of all production materials, processing technology and assurance of final product quality, B3: Apply final wood product, wooden and non-wooden materials design methodology in developing and improving products, quality upgrade, product design and construction, B4: Develop and plan a complete construction system which consists of planning, designing, constructing, preparing technical documentation and applying technologies for final product manufacturing C2: Conduct furnishing of facilities, C3: Recommend the finishing process technology for products, evaluate quality of the finishing process and recommend methods for preventing mistakes in the finishing process, C4: Apply systematic work methods on planning with the aim of rational material application and constructional solutions, C5: Manage projects from the preliminary design to serial production with additional operating of CAD programmes for visualization and automatic construction, C6: Apply contemporary methods and techniques of healthy furniture design and ensure protection of man and environment through its production and usage, C7: Choose optimal constructional solution and its versions using discursive methods D1: Perform responsible tasks in company management in the area of production management, technical production preparation, termination and management of		

<table>
<tr><td></td><td colspan="9">materials,
D2: Manage and ensure quality adapted to specific production problems in wood product design,
D3: Manage and conduct international trade in wood and wood products,
D4: Perform responsible tasks in company management in the area of project management.
E1: Perform tasks of scientific and professional associate in scientific research institutions in the field of wood and wood technology,
E2: Conduct courses in vocational secondary schools and other similar schools,
E3: Perform activities and tasks in publicist writing and the media related to the wood profession,</td></tr>
<tr><td>2.4. Expected learning outcomes at the level of the course (3 to 10 learning outcomes)</td><td colspan="9">1. Interdisciplinary solve a given problem in defined conditions
2. Solve design-technical-technological larger problems independently or as a team by applying multicriteria decision-making (choose the optimal shape, wood and non-wood materials, construction, technological process) and propose variants of rationalization-innovation of products or processes
3. Develop self-awareness and self-criticism and motivation in the form of assessing their abilities and weaknesses in the team
4. Test your own abilities for an analytical or holistic approach to work and develop a sense of constructive criticism of colleagues and superiors and a sense of personal and collective responsibility for the execution of assigned tasks in compliance with deadline
5.Prepare and defend the entire documentation for the production and promotion of the product
6. Make a presentation and present the project for the professional public and popularize the profession (virtual, oral, written, material)
7. Improve visualization and presentation CAD presentation skills with the application of digital technology in design</td></tr>
<tr><td>2.5. Course content (syllabus)</td><td colspan="9">Project teaching integrates knowledge and skills from several courses related to the project task. A group of students, mentored by the gathered teachers, proposes a project solution to improve a production process or business. According to the specific needs of the professional project, the project team will perform tasks in the faculty premises, laboratories, computer classroom or workshop, or outside the Faculty, in manufacturing companies, visiting thematic exhibitions and professional fairs.</td></tr>
<tr><td>2.6. Format of instruction</td><td colspan="3">☐ lectures
☐ seminars and workshops
☒ exercises
☐ online in entirety
☐ partial e-learning
☐ field work</td><td colspan="3">☒ independent assignments
☐ multimedia and the internet
☒ laboratory
☒ work with mentor
☐ (other)</td><td colspan="3">2.7. Comments:</td></tr>
<tr><td rowspan="6">2.8. Monitoring student work</td><td>Class attendance</td><td>yes</td><td></td><td>Research</td><td>yes</td><td></td><td>Oral exam</td><td></td><td></td></tr>
<tr><td>Experimental work</td><td>yes</td><td></td><td>Report</td><td></td><td></td><td>Work with mentor</td><td>yes</td><td></td></tr>
<tr><td>Essay</td><td></td><td></td><td>Seminar paper</td><td></td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Preliminary exam</td><td></td><td></td><td>Practical work</td><td>yes</td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Project</td><td>yes</td><td></td><td>Written exam</td><td></td><td></td><td>ECTS credits (total)</td><td>4</td><td></td></tr>
<tr><td></td><td colspan="9"></td></tr>
<tr><td>2.9. Assessment methods and criteria</td><td colspan="9">Assessment is conducted in accordance with Assessment methods and criteria for the current academic year</td></tr>
<tr><td>2.10. Student responsibilities</td><td colspan="9"></td></tr>
</table>

2.11. Required literature (available in the library and/or via other media)	Title	Availability in the library	Availability via other media
2.12. Optional literature			

COURSE DECRIPTION

1. GENERAL INFORMATION			
1.1. Course lecturer(s)		1.7. Number of ECTS credits	14
1.2. Course title	Diploma work	1.8. Number of hours in semester (L+E+F+e-learning)	
1.3. Course code	235688	1.9. Expected enrolment in the course	25
1.4. Study programme	Graduate	1.10. Level of application of e-learning (level 1, 2, 3)	
1.5. Course type	Compulsory	1.11. Language of instruction	
1.6. Year of the study	2	1.12. Possibility of instruction in English	
2. COURSE DESCRIPTION			
2.1. Course objectives	Master thesis is an independent, comprehensive and highly independent task in which the student must demonstrate knowledge of the background of the profession and of the scientific research work, ie, in the definition of hypotheses and research goals, research planning, data collection and processing and writing of scientific work. Includes expansion and deepening of knowledge of the content of the curriculum, individual engagement around the problem topics, gaining experience in writing technical papers, the ability to apply scientific methods and instruments in processing problems and drafting work, the ability of independent service corresponding domestic and foreign literature and the use of knowledge, facts and attitudes published in the mentioned sources.		
2.2. Enrolment requirements and/or entry competences required for the course			
2.3. Learning outcomes at the level of the programme to which the course contributes	The diploma thesis contributes to all the learning outcomes of the study program.		
2.4. Expected learning outcomes at the level of the course (3 to 10 learning outcomes)	1. apply the current knowledge to define a scientific and professional problem in choosing the topic of work 2. create a schedule of work in accordance with the deadlines of making the graduate thesis in stages 3. independently devise a methodology of research work 4. apply the methodology of writing a professional and scientific work 5. present their work in written and oral form, using skills succinct interpretation of the results and conclusion of these guidelines to predict the future development of the topics of work		

2.5. Course content (syllabus)	Master thesis is an individual written work based on students' own research that is written in a scientific form and implies students' engagement in work that is equivalent to 15 ECTS module. Graduation is usually done during IV. semester on graduate study and ends with oral defense (presentation and answering the questions).								
2.6. Format of instruction	☐ lectures ☐ seminars and workshops ☐ exercises ☐ *online in entirety* ☐ partial e-learning ☒ field work			☒ independent assignments ☐ multimedia and the internet ☒ laboratory ☒ work with mentor ☐ (other)			2.7. Comments:		
2.8. Monitoring student work	Class attendance			Research	yes		Oral exam		
	Experimental work	yes		Report			(other)		
	Essay			Seminar paper			(other)		
	Preliminary exam			Practical work			(other)		
	Project			Written exam			ECTS credits (total)	14	
2.9. Assessment methods and criteria	Assessment is conducted in accordance with Assessment methods and criteria for the current academic year								
2.10. Student responsibilities									

2.11. Required literature (available in the library and/or via other media)	Title	Availability in the library	Availability via other media
	Pravilnik o izradi i obrani diplomskog rada na diplomskim sveučilišnim studijima Šumarskog fakulteta Obrazac DS-1 Zamolba za odobrenje teme i mentora diplomskog rada Upute o izgledu i sadržaju diplomskog rad		http://www.sumfak.unizg.hr/StudijPojedinacno.aspx?mhID=2&mvID=43
2.12. Optional literature			

COURSE DECRIPTION

1. GENERAL INFORMATION			
1.1. Course lecturer(s)	Assoc. Prof. Marin Hasan, PhD Assoc. Prof. Danijela Domljan, PhD Assoc. Prof. Bogoslav Šefc, PhD Asst. Prof. Tomislav Sedlar, PhD Prof. Vlatka Jirouš Rajković, PhD Prof. Hrvoje Turkulin, PhD	1.7. Number of ECTS credits	4
1.2. Course title	Basics of wood restoration	1.8. Number of hours in semester (L+E+F+e-learning)	30+15+16

1.3. Course code	235698	1.9. Expected enrolment in the course	10
1.4. Study programme	Graduate Studies of Wood Product Design	1.10. Level of application of e-learning (level 1, 2, 3)	2
1.5. Course type	Elective	1.11. Language of instruction	Croatian
1.6. Year of the study	2	1.12. Possibility of instruction in English	NO
2. COURSE DESCRIPTION			
2.1. Course objectives	Introduction to wood product styles and production dating methods; stages and procedures in the wood products restoration; restoration design and documentation; wood identification and visual, non-destructive or semi-destructive condition assessment methods; identification of abiological and biological factors that caused deterioration of the product; key factors in selecting the optimal decontamination procedure; application of some (available) decontamination procedures; basic principles of wood consolidation, alternative wood species selection and restoration preparation; selection and application of adequate long-term wood protection.		
2.2. Enrolment requirements and/or entry competences required for the course	-		
2.3. Learning outcomes at the level of the programme to which the course contributes	A1 -Inform potential buyers of final product quality characteristics and of trends in wood products design B2 - Resolve interdisciplinary problems which refer not only to product design or construction and their presentation, but also include the selection of all production materials, processing technology and assurance of final product quality, B10 - Apply knowledge of furniture quality and methods of its examination and develop and plan a complete system of final product quality assurance, C7 - Apply contemporary methods and techniques of healthy furniture design and ensure protection of man and environment through its production and usage D2 - Manage and ensure quality adapted to specific production problems in wood product design, E2 - Conduct courses in vocational secondary schools and other similar schools E4 - Upgrade their professional and scientific competencies through different forms of education and postgraduate studies		
2.4. Expected learning outcomes at the level of the course (3 to 10 learning outcomes)	1. Based on the obtained wooden object, independently determine the production style and propose a method of dating the object's age. 2. Independently identify the wood species from which the product is made and, if necessary, determine alternative species. 3. Independently identify biological and abiological damage and the risk of the speed of further decomposition and spread of infection. 4. Independently propose the decontamination procedure. 5. Independently propose the appropriate protective agent and procedure for a given product (in a given hazard class), respecting the ecological principles of wood protection and describing the proposed advantages and disadvantages. 6. For the selected product and the conditions in which the wood product is used, recommend adequate physical, structural (and chemical) protection. 7. Recommend remediation steps (consolidation and restoration), adequate preventive or repressive protection procedure and select acceptable means for consolidation and protection depending on the type of wood, place of use and degree of destruction of the wood product. 8. Individually or in a team, do a project (expert opinion) and present it to a group of people.		
2.5. Course content (syllabus)	Lectures: Procedures for determining the manufacturing style and age dating of the wood products. Handling and storage of antique wood and works of art of inestimable value. Procedures for taking wood samples to determine the wood species, the cause of wood degradation, and other materials and means used to manufacture the product. Procedures for identifying wood species and selecting alternative species.		

<table>
<tr><td></td><td colspan="10">Procedures for assessing the condition and biological health of wooden products.
Identification of the causes and intensity of wood biodegradation.
Determination of wood degradation intensity by abiological factors.
Procedures and means of repressive protection - physical and structural protection.
Modern means of chemical protection of wood - new types of preventive inorganic, organic, and environmentally friendly standards.
Modern wood protection procedures - biological protection, advantages, and disadvantages.
Decontamination and sterilization procedures of wood - from the beginnings to today's modern means and methods.
Application of environmentally friendly means and procedures in decontamination and sterilization of wooden works of art ("Anoxi" methods, fumigation, heat, HF and electromagnetic radiation).
Overview of procedures and means for wood consolidation, advantages, disadvantages, and key factors in choosing the optimal methods of wood consolidation.
Importance of surface treatment in wood restoration.
The importance of protection, consolidation, and renewal of wood for the life of wood products.
Assembling a restoration project and keeping documentation.
Fieldwork:
Review of the condition of wooden objects and/or buildings (buildings, bridges, carpentry) and proposal of procedures and means of restoration/rehabilitation (field exercises Gornji grad, Maksimir, museums, restoration workshops).</td></tr>
<tr><td>2.6. Format of instruction</td><td colspan="4">☒ lectures
☐ seminars and workshops
☒ exercises
☐ online in entirety
☒ partial e-learning
☒ field work</td><td colspan="4">☒ independent assignments
☒ multimedia and the internet
☒ laboratory
☒ work with mentor
☐ (other)</td><td colspan="2">2.7. Comments:</td></tr>
<tr><td rowspan="5">2.8. Monitoring student work</td><td>Class attendance</td><td>YES</td><td></td><td>Research</td><td>YES</td><td></td><td>Oral exam</td><td>YES</td><td></td></tr>
<tr><td>Experimental work</td><td>YES</td><td></td><td>Report</td><td></td><td>NO</td><td>(other)</td><td></td><td></td></tr>
<tr><td>Essay</td><td></td><td>NO</td><td>Seminar paper</td><td>YES</td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Preliminary exam</td><td>YES</td><td></td><td>Practical work</td><td>YES</td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Project</td><td>YES</td><td></td><td>Written exam</td><td>YES</td><td></td><td>ECTS credits (total)</td><td></td><td></td></tr>
<tr><td>2.9. Assessment methods and criteria</td><td colspan="10">Assessment is conducted in accordance with Assessment methods and criteria for the current academic year</td></tr>
<tr><td>2.10. Student responsibilities</td><td colspan="10">Regular attendance and active participation in lectures, exercises and fieldwork, preparation and submission of exercises, papers and seminars within the specified time. Taking exam.</td></tr>
<tr><td>2.11. Required literature (available in the library and/or via other media)</td><td colspan="4">Title</td><td colspan="3">Availability in the library</td><td colspan="2">Availability via other media</td></tr>
<tr><td></td><td colspan="4">Unger, A., Schniewind, A.P., Unger, W. 2001: CONSERVATION OF WOOD ARTIFACTS, Springer, 2001.</td><td colspan="3">Library of the Institute of Wood Science</td><td colspan="2"></td></tr>
<tr><td></td><td colspan="4">Hasan, M., Despot, R. 2018: Wood protection I, Abiological factors, lignocol bacteria and fungi, xylophagous insects and marine pests - a script for students of wood technology in the subject Wood protection I, and Wood</td><td colspan="3"></td><td colspan="2">YES, Merlin</td></tr>
</table>

	pathology. University of Zagreb, Faculty of Forestry, Zagreb, 2018		
	Reinprecht, L. 2000: REKONŠTRUKCIA OBJEKTOV Z DREVA, Monografia, Technicka Univerziteta vo Zvolene, Zvolen, 2000.	Library of the Institute of Wood Science	
	Reinprecht, L. 2001: PROCESY DEGRADACIE DREVA. Tehnicka Univerziteta vo Zvolene, Zvolen, 2001. (odabrana poglavlja).	Library of the Institute of Wood Science	
	Salminen, E., Valo, R., Korhonen, M., Jernlås, R. 2014: Wood preservation with chemicals Best Available Techniques (BAT). TemaNord 2014:550 ISSN 0908-6692. Nordic Council of Ministers 2014. ISBN: 978-92-893-2828-9, ISBN 978-92-893-2829-6 (EPUB).		YES, Merlin
2.12. Optional literature	1. Timar, M.C.;Gurau, L.; Porojan, M.; Beldean, E. (2013): Microscopic identification of wood species. An important step in furniture conservation, European Journal of Science and Theology, August 2013, Vol.9, No.4, 243-252 2. Brian K. Brashaw, Voichita Bucur, Ferenc Divos, Raquel Gonçalves, 2009: Nondestructive Testing and Evaluation of Wood: A Worldwide Research Update, Forest Products Journal 59(3):7-14 3. Richardson, B.A. 1993: WOOD PRESERVATION second edition, E & FN SPON, London, 1993. 4. Eaton, R.A., Hale, M.D.C.1994: WOOD, DECAY, PESTS AND PROTECTION, Chapman & Hall, 1994. United Kingdom. 5. Bravery, A.F., Berry, R.W., Carey, J.K., Cooper, D.E. 1992: RECOGNISING WOOD ROT AND INSECT DAMAGE IN BUILDINGS, BRE Bookshop, Seconfd edition, 1992. Garston, Watford, United Kingdom. 6. Proceedings of international IRG-WP conferences: International Research Group on Wood Protection, IRG-WP Stockholm, Sweeden. (editions from 1990. to 2020.)		

COURSE DECRIPTION

1. GENERAL INFORMATION			
1.1. Course lecturer(s)	Asst. Prof. Iva Ištok, PhD Assoc. Prof. Bogoslav Šefc, PhD Prof. Jelena Trajković, PhD	1.7. Number of ECTS credits	4
1.2. Course title	Selected methods in wood anatomy	1.8. Number of hours in semester (L+E+F+e-learning)	30 + 15
1.3. Course code	235699	1.9. Expected enrolment in the course	10
1.4. Study programme	Graduate Studies of Wood Product Design	1.10. Level of application of e-learning (level 1, 2, 3)	1
1.5. Course type	elective	1.11. Language of instruction	Croatian
1.6. Year of the study	2	1.12. Possibility of instruction in English	YES
2. COURSE DESCRIPTION			
2.1. Course objectives	Acquiring knowledge of various microscopy and preparation techniques for morphological, qualitative and quantitative analyses of wood, wood cells and wood materials. Knowledge and application of methods and procedures in wood identification. Identification of wood species using wood identification software (keys).		

<table>
<tr><td>2.2. Enrolment requirements and/or entry competences required for the course</td><td colspan="9"></td></tr>
<tr><td>2.3. Learning outcomes at the level of the programme to which the course contributes</td><td colspan="9">A2 - Independently gather data, statistically process, present and analyse gathered data, discuss and make conclusions based on analysed data and distinguish possibilities of different interpretation of the same problem analysed in different ways
B9 -Analyse and make conclusions on wood properties and their application in wood product design
E1- Perform tasks of scientific and professional associate in scientific research institutions in the field of wood and wood technology
E2- Conduct courses in vocational secondary schools and other similar schools</td></tr>
<tr><td>2.4. Expected learning outcomes at the level of the course (3 to 10 learning outcomes)</td><td colspan="9">Explain and apply different microscopy techniques in identifying wood, wood cells, and wood materials, as well as evaluating wood quality.
Know, explain and apply techniques of histological wood preparations for microscopy.
Know the diagnostic features in wood identification.
Identify wood types using modern software (keys) for wood identification.</td></tr>
<tr><td>2.5. Course content (syllabus)</td><td colspan="9">1. Knowledge of different microscopy and preparation techniques for morphological, qualitative and quantitative analyses of wood, wood cells and wood materials.
2. Measuring instruments and methods in optical microscopy; microtomy and maceration of wood: preparation, staining and fitting of preparations; microphotography; electron microscopy; ultramicrotomy; wood surface replication methods; preparation methods; application of X-ray technique in wood anatomy.
3. Diagnostic features in wood identification.
4. Identification of wood using modern software (keys) for wood identification. Methods and boundary examples (reliability of identification).</td></tr>
<tr><td>2.6. Format of instruction</td><td colspan="4">☒ lectures
☒ seminars and workshops
☒ exercises
☐ online in entirety
☒ partial e-learning
☐ field work</td><td colspan="4">☒ independent assignments
☐ multimedia and the internet
☒ laboratory
☒ work with mentor
☐ (other)</td><td>2.7. Comments:</td></tr>
<tr><td rowspan="5">2.8. Monitoring student work</td><td>Class attendance</td><td>YES</td><td></td><td>Research</td><td></td><td>NO</td><td>Oral exam</td><td>YES</td><td></td></tr>
<tr><td>Experimental work</td><td>YES</td><td></td><td>Report</td><td></td><td>NO</td><td>(other)</td><td></td><td></td></tr>
<tr><td>Essay</td><td></td><td>NO</td><td>Seminar paper</td><td>YES</td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Preliminary exam</td><td></td><td>NO</td><td>Practical work</td><td>YES</td><td></td><td>(other)</td><td></td><td></td></tr>
<tr><td>Project</td><td></td><td>NO</td><td>Written exam</td><td></td><td>NO</td><td>ECTS credits (total)</td><td>4</td><td></td></tr>
<tr><td>2.9. Assessment methods and criteria</td><td colspan="9">Assessment is conducted in accordance with Assessment methods and criteria for the current academic year</td></tr>
<tr><td>2.10. Student responsibilities</td><td colspan="9">Regular class attendance and seminar preparation.</td></tr>
<tr><td rowspan="2">2.11. Required literature (available in the library and/or via other media)</td><td colspan="4">Title</td><td colspan="2">Availability in the library</td><td colspan="3">Availability via other media</td></tr>
<tr><td colspan="4">Wood anatomy: lectures in course Wood anatomy (script, authors: Jelena Trajković and Bogoslav Šefc, pdf document 3 MB) and Image atlas to use with lectures (illustrations to use with lectures, collected by: Jelena</td><td colspan="2">YES</td><td colspan="3">Library of the Institute of Wood Science</td></tr>
</table>

	Trajković and Bogoslav Šefc, pdf document 39 MB)		
	Wheeler, E,A.; Baas, P, Gasson, P.E. (1989): Iawa list of microscopic features for hardwood identification, IAWA Journal, Vol 10 (3):219-332.	YES	Library of the Institute of Wood Science
	Von Arx, G.; Crivellaro, A.; Čufar, K; Prendin, L.A.(2016): Quantitative Wood Anatomy—Practical Guidelines, Frontiers in Plant Science 7(56):781, doi: 10.3389/fpls.2016.00781	YES	Library of the Institute of Wood Science
	Wheeler, E,A.; Baas, P. (1998): WOOD IDENTIFICATION -A REVIEW; IAWA Journal, Vol 19 (3):241-264,	YES	Library of the Institute of Wood Science
	H. G. Richter and M. J. Dallwitz 2000: 'Commercial timbers: descriptions, illustrations, identification, and information retrieval.' In English, French, German, and Spanish. Version: 25th June 2009. https://www.delta-intkey.com/wood/index.htm		YES
2.12. Optional literature	Tiago Ferreira, Wayne Rasband, 2012.: ImageJ Users Guide, 185 str. https://imagej.nih.gov/ij/docs/guide/user-guide.pd Timar, M.C.;Gurau, L.; Porojan, M.; Beldean, E. (2013): Microscopic identification of wood species. An important step in furniture conservation, European Journal of Science and Theology, August 2013, Vol.9, No.4, 243-252 Brian K. Brashaw, Voichita Bucur, Ferenc Divos, Raquel Gonçalves, 2009: Nondestructive Testing and Evaluation of Wood: A Worldwide Research Update, Forest Products Journal 59(3):7-14 InsideWood. 2004-onwards. Published on the Internet. http://insidewood.lib.ncsu.edu/search [date of accession]. Gasson, P.E. Baas, Wheeler, E,A. (2011): WOOD ANATOMY OF CITES-LISTED TREE SPECIES, IAWA Journal, Vol 32 (2):155-198, Abramowitz Mortimer, 2003: Microscope basics and beyond. Revised edition. For Olympus America http://microscopy. Geoffrey Daniel, 2016: Microscope Techniques for Understanding Wood Cell Structure and Biodegradation, u knjizi: Secondary Xylem Biology; Origins, Functions, and Applications, Chapter: 15, Publisher: Academic Press, Editors: Yoon Soo Kim, Ryo Funada, Adya P. Singh, pp.310-345		

COURSE DECRIPTION

1. GENERAL INFORMATION			
1.1. Course lecturer(s)	Sanda Tomičić, prof	1.7. Number of ECTS credits	4
1.2. Course title	Business communication in English	1.8. Number of hours in semester (L+E+F+e-learning)	15+30
1.3. Course code	235700	1.9. Expected enrolment in the course	10
1.4. Study programme	Graduate Studies of Wood Product Design	1.10. Level of application of e-learning (level 1, 2, 3)	2

1.5. Course type	elective	1.11. Language of instruction	
1.6. Year of the study	2	1.12. Possibility of instruction in English	Yes
2. COURSE DESCRIPTION			
2.1. Course objectives	Independent and accurate use of language in speech and writing in different contexts of the selected study group, including the digital environment. Independent and critical use of different sources of knowledge and application of effective language learning strategies. Accepting responsibility for personal development, own actions and their results. Lifelong learning and work in a globalized society.		
2.2. Enrolment requirements and/or entry competences required for the course			
2.3. Learning outcomes at the level of the programme to which the course contributes	A1: Inform potential buyers of final product quality characteristics and of trends in wood products design, A2: Independently gather data, statistically process, present and analyse gathered data, discuss and make conclusions based on analysed data and distinguish possibilities of different interpretation of the same problem analysed in different ways D3: Manage and conduct international trade in wood and wood products, D4: Perform responsible tasks in company management in the area of project management. E1: Perform tasks of scientific and professional associate in scientific research institutions in the field of wood and wood technology E3: Perform activities and tasks in publicist writing and the media related to the wood profession, E4: Upgrade their professional and scientific competencies through different forms of education and postgraduate studies		
2.4. Expected learning outcomes at the level of the course (3 to 10 learning outcomes)	1. apply basic techniques of reading professional texts in the field of professional English 2. define and adopt basic terms from the field of professional English 3. adopt key terms and specific information 4. interpret and evaluate existing and create new ideas related to personal experiences and familiar topics 5. recognize and explain the impact of cross-cultural experiences on shaping one's own beliefs and attitudes towards others 6. review and evaluate prejudices and stereotypes at all levels and in all forms and apply strategies to avoid and/or overcome misunderstandings, reveal and dismantle stereotypes and prejudices 7. achieve independent oral communication typical for general professional situations 8. prepare and present your way of solving a project/idea related to your professional field 9. use language and grammatical structures correctly		
2.5. Course content (syllabus)	1. Introduction to the course (ppt) 2. Unit 1 – No Place Like Home Reading: An inspirational story 3. Revision Language review: Describing trends Dealing with tenses 4. Cultures Listening: Cultural differences Idioms 5. Reading: Culture shock Language review: Advice, obligation and necessity 6.Vocabulary Climate Change 7. Reading: Amazon Forest 8. Environment Vocabulary Listening: Helping environmental research 9. Unit 5: An Eye to the Future 10. Deforestation (Forestry Journals) Vocabulary-Right or wrong 11. Species, Planst, Animals, Trees 12. Grammar: Narrative tenses National Parks (Exchanging Information) 13. Unit 11: The ends of the Earth Gheographical Expressions 14. Sustainable Forest Management 15. Presentation, Course Review		
2.6. Format of instruction	☒ lectures	☒ independent	2.7. Comments:

	☒ seminars and workshops ☐ exercises ☐ *online in entirety* ☐ partial e-learning ☐ field work			assignments ☐ multimedia and the internet ☐ laboratory ☐ work with mentor ☐ (other)					
2.8. Monitoring student work	Class attendance	yes		Research			Oral exam		
	Experimental work			Report	yes		(other)		
	Essay	yes		Seminar paper			(other)		
	Preliminary exam			Practical work			(other)		
	Project			Written exam			ECTS credits (total)	4	
2.9. Assessment methods and criteria	Assessment is conducted in accordance with Assessment methods and criteria for the current academic year								
2.10. Student responsibilities									

2.11. Required literature (available in the library and/or via other media)	Title	Availability in the library	Availability via other media
	Headway, Upper Intermediate&Advanced		yes
	Forestry and Wood technology Journals_odabrani znastveni članci,		yes
2.12. Optional literature			

COURSE DECRIPTION

1. GENERAL INFORMATION			
1.1. Course lecturer(s)	Assistant professor Kristina Klarić, PhD; associate professor Andreja Pirc Barčić, PhD;	1.7. Number of ECTS credits	4
1.2. Course title	Entrepreneurship in wood industry	1.8. Number of hours in semester (L+E+F+e-learning)	30+15+8
1.3. Course code	235701	1.9. Expected enrolment in the course	10
1.4. Study programme	Graduate Studies in Wood Products Design	1.10. Level of application of e-learning (level 1, 2, 3)	2
1.5. Course type	Elective	1.11. Language of instruction	Croatian
1.6. Year of the study	2.	1.12. Possibility of instruction in English	YES
2. COURSE DESCRIPTION			
2.1. Course objectives	Introduction. Basic features of entrepreneurship and enterprising. Types of organizations and organizational structure. Legal forms of entrepreneurship. The legal environment of entrepreneurs in the wood industry. Business customs, practices and usages. External and		

	internal factors of organization in the wood industry. Key competencies and motives of entrepreneurs. Types of entrepreneurs. Entrepreneurial skills: organizational, management, teamwork skills, communication, intercultural. Entrepreneur communication skills. Business opportunities. Entrepreneurial climate. Entrepreneurial behaviour. Creativity and innovation. Techniques for developing innovative entrepreneurial ideas. Preparation, development and implementation of an entrepreneurial venture. Business communication. Life cycle of an organization. Entrepreneurship in a market economy. Specifics of entrepreneurship in the wood industry. Modern entrepreneurship, socially responsible business.		
2.2. Enrolment requirements and/or entry competences required for the course			
2.3. Learning outcomes at the level of the programme to which the course contributes	D1: Perform responsible tasks in company management in the area of production management, technical production preparation, termination and management of materials, D2: Manage and ensure quality adapted to specific production problems in wood product design, D3: Manage and conduct international trade in wood and wood products,		
2.4. Expected learning outcomes at the level of the course (3 to 10 learning outcomes)	Difference between a basic concepts related to entrepreneurship, entrepreneurs and entrepreneurial spirit. Recognize the legal environment in the wood industry and legal forms of entrepreneurship. Distinguish organizational factors in the wood industry. Define types of entrepreneurs and analyse and select key competencies of entrepreneurs in the wood industry. Identify different aspects of the entrepreneurial climate and entrepreneurial behaviour. Describe and select opportunities for entrepreneurial venture in the wood industry with respect to the environment, strategic and institutional framework. Apply the necessary knowledge and skills from different areas of business communication, such as making presentations, sales communication, negotiation, conducting meetings, interviewing, electronically mediated communication, etc. Distinguish and review the phases of the life cycle of an organization and an entrepreneurial venture.		
2.5. Course content (syllabus)	1. Conceptual definition entrepreneurship, entrepreneurs and entrepreneurial spirit. 2. Internal and external factors of organization in the wood industry. 3. Legal forms of entrepreneurship. 4. Legal environment, business customs, practices and usages in the wood industry. 5. Key competencies and motives of entrepreneurs. Types of entrepreneurs. Entrepreneurial skills. 6. Entrepreneurial climate. Entrepreneurial behaviour. 7. Innovation in entrepreneurship. Techniques for developing innovative entrepreneurial ideas. 8. Preparation, development and implementation of an entrepreneurial venture. 9. Communication skills of entrepreneurs. 10. Business communication - making presentations, communication in sales, negotiation, conducting meetings, interviewing, electronically mediated communication. 11. Life cycle of organization and entrepreneurial venture. 12. Strategic framework. Entrepreneurship support programs: institutional support, business centres, business incubators and business zones. 13. Entrepreneurship in a market economy. Specifics of entrepreneurship in the wood industry. 14. Measuring the success of entrepreneurship. 15. Modern entrepreneurship, socially responsible business.		
2.6. Format of instruction	☒ lectures ☒ seminars and workshops ☒ exercises ☐ *online in entirety*	☒ independent assignments ☐ multimedia and the internet	2.7. Comments: If necessary, classes can be conducted entirely online.

	☒ partial e-learning ☒ field work			☐ laboratory ☐ work with mentor ☐ (other)					
2.8. Monitoring student work	Class attendance	YES		Research	YES		Oral exam	YES	
	Experimental work		NO	Report		NO	(other)		
	Essay		NO	Seminar paper	YES		(other)		
	Preliminary exam	YES		Practical work	YES		(other)		
	Project	YES		Written exam	YES		ECTS credits (total)	4	
2.9. Assessment methods and criteria	Assessment is conducted in accordance with Assessment methods and criteria for the current academic year								
2.10. Student responsibilities									

2.11. Required literature (available in the library and/or via other media)	Title	Availability in the library	Availability via other media
	Hisrich, R. D., Peters, M. P., Shepherd, D. A. 2008. Poduzetništvo. Mate. Zagreb.		YES
	Bovée, C. L., Thill, J. V., „Suvremena poslovna komunikacija“, Mate d.o.o., Zagreb, 2012		YES
	Weissman, J. 2010. Najbolji prezenter. Mate. Zagreb.		YES
	Weissman, J. 2006. Prezentacijom do uspjeha: Umijeće predstavljanja. Mate. Zagreb.		YES
	Alfirević, N. i dr. 2014. Društveno odgovorno poslovanje. Školska knjiga. Zagreb.		YES
2.12. Optional literature	Ekonomski leksikon. 1995. Masmedia i Leksikografski zavod Miroslav Krleža. Zagreb Project Management Institute. 2008. Vodič kroz znanje o upravljanju projektima. Mate. Zagreb. Kotler, P.; Lee, N. 2009. DOP - Društveno odgovorno poslovanje. M.E.P. CONSULT d.o.o. Zagreb		

COURSE DECRIPTION

1. GENERAL INFORMATION			
1.1. Course lecturer(s)	Prof. Denis Jelačić, PhD.	1.7. Number of ECTS credits	4
1.2. Course title	Human Resources Management	1.8. Number of hours in semester (L+E+F+e-learning)	30+15+8
1.3. Course code	235702	1.9. Expected enrolment in the course	10
1.4. Study programme	University Graduate Study Design of Wood Products	1.10. Level of application of e-learning (level 1, 2, 3)	1
1.5. Course type	Elective	1.11. Language of instruction	Croatian

1.6. Year of the study	2nd	1.12. Possibility of instruction in English	Yes

2. COURSE DESCRIPTION

2.1. Course objectives	Student receives the necessary knowledge for the work in praxis on the responsible working places in company management in the area of human resources management.
2.2. Enrolment requirements and/or entry competences required for the course	
2.3. Learning outcomes at the level of the programme to which the course contributes	D1 – To implement the knowledge and skills using resources managing the processes which contain planning, organizing, managing and controlling D4 – To manage responsible activities in company management system regarding human resources management
2.4. Expected learning outcomes at the level of the course (3 to 10 learning outcomes)	• Creating the plan of needs for human resources and create goals for human resources needs • Analyzing problems in human relations • Analyzihng factors of motivation and stimulation • Categorizing working places and create the systematization of working places • Analyzing human potentials doing interviews and tests • Creating salary system and awards system • Proposing the system of recruiting new employees • Establishing and comparing models of human resource management
2.5. Course content (syllabus)	1. Place and role of human resources management in a company 2. Human resource management within business and production management system 3. Strategic human resources management, establishing needs and plan for human resources within the company 4. Selection, allocation and education of human potential within company, employees development 5. Working place systematization within company, establishing needs and structure of working places 6. Work evaluation, structure of the evaluation, legislative determinants for the work evaluation 7. Awarding system, motivation and stimulation system in a company, success management 8. Human relationships among employees, conflicts in a company, resolving conflicts 9. Exercise: creating model for human resources management with examples from wood processing and furniture manufacturing

2.6. Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *online in entirety* ☐ partial e-learning ☐ field work	☒ independent assignments ☐ multimedia and the internet ☐ laboratory ☒ work with mentor ☐ (other)	2.7. Comments:

2.8. Monitoring student work									
	Class attendance	Yes		Research	Yes		Oral exam	Yes	
	Experimental work		No	Report		No	(other)		
	Essay		No	Seminar paper		No	(other)		
	Preliminary exam		No	Practical work		No	(other)		
	Project	Yes		Written exam	Yes		ECTS credits (total)	4	

2.9. Assessment methods and criteria	Assessment is conducted in accordance with Assessment methods and criteria for the current academic year		
2.10. Student responsibilities			
2.11. Required literature (available in the library and/or via other media)	Title	Availability in the library	Availability via other media
	Noe, R.A., Hollenbeck, J.R., Gerhart, B., Wright, P.M. (2006): Menadžment ljudskih potencijala (Human Resources Management), Mate, Zagreb, III edition.	Yes	Yes
	Bahtijarević Šiber, F. (1999): Management ljudskih potencijala (Human Resources Management), Golden marketing, Zagreb	Yes	Yes
2.12. Optional literature	•McCourt, W., Eldridge, D. (2003): Global Human Resources Management, UK: Edward Elgar, Cheltenham •Možina S. (2002): Management kadrovskih virov (Human Resources Management). Kranj, Fakulteta za organizacijske vede (Faculty of Organisation Sciences)		