

Transilvania University of Braşov, Romania

Study program: Wood Processing Engineering – part time

Faculty: Furniture Design and Wood Engineering

Study period: 4 years (bachelor)

2nd Year, 3rd Semester

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Descriptive Geometry 2	GD02-IFR	4	1	-	2	-

Course description (Syllabus): Double and triple orthogonal projection. Isometric axonometry. Representation of different elements parallel to a plane or inclined relative to the plane. Intersections.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Technical Drawing and Infographics in Wood Industry 2	DT02-IFR	4	1	-	2	-

Course description (Syllabus): Use of AutoCAD 2D. Drawing a simple frame ; a profiled frame; an edged panel; a milling cutter; a checking device; a drawer; a table; a stool; a wardrobe.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Strength of Materials	RML-IFR	5	2	-	2	-

Course description (Syllabus) Introduction. Stresses in bars and static determined systems. Static moments and inertia moments of plane sections. Stress and strain in bars subjected to tensile and compression loads. Shearing of thin parts. Wood elasticity. Torsion of straight bars. Stresses in bending of straight wooden bars.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Wood Physics and Mechanics	FML-IFR	6	3	-	2	-

Course description (Syllabus): The *Wood physics and mechanics* course presents the physical (moisture, swelling and shrinkage coefficients, density) and mechanical (bending strength and shock resistance, tensile strength parallel and perpendicular to the grain, shearing strength, torsion, spitting, hardness) properties of solid wood and also notions about thermal, electric and acoustic properties of this material. The course contains both the strength analysis in relation with the influencing factors and the reciprocal relations between different properties and the use of this knowledge to solve some practical and important issues for the specialists in the wood domain.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Wood Preservation	PRL-IFR	5	2	-	2	-

Course description (Syllabus): Introduction- course structure and importance Wood preservation: Biotic degradation of wood - factors and phenomena; Natural durability of wood; Use classes and natural durability – biological hazard correlations; Biocides and wood preservatives; Treating technologies: surface and impregnation treatments, efficiency. Wood fire protection: Wood combustibility; Principles of wood fire protection; Fire retardants; Evaluation of efficiency of fire protection products and technologies. Weathering protection: Degradation of wood under the action of climatic factors; Principles of weathering protection; Coating materials for exterior use.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Drives in Wood Industry	ACT-IFR	4	2	-	2	-

Course description (Syllabus): Metals and alloys. Non-dismountable machine assemblies. Dismountable machine assemblies. Couplings. Bearings. Mechanical transmissions. Gears. Electric drives. Hydraulic drives. Pneumatic drives.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Physical Training 3	EF03-IFR	1	-	1	-	-

Course description (Syllabus): Order exercises and front – terminology, shares and motion, changes of achievements and bands, number in figures. Exercises EFG - the fundamental positions of the body and derivatives, positions and movements segmentation, the methodological rules of training and teaching exercises simple and compound. The foundations of the body movement.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Foreign Language 3 (English)	LE03-IFR	2	1	1	-	-

Course description (Syllabus): The main objectives of the Foreign language course are: developing the students' fluency language skills and techniques by further exposure to the other language context; exposing them to advanced-level and listening samples from real newspapers and magazines, to engage both listening and understanding skills. At the seminars, students work on vocabulary & grammar, and on incorporating new items into their speech and writing.

2nd Year, 4th Semester

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Technical Drawing and Infographics in Wood Industry 3	DT03-IFR	4	2	-	2	-

Course description (Syllabus): Use of AutoCAD 3D. Modelling wood objects

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Wood Structures for Constructions	STR-IFR	4	2	-	2	-

Course description (Syllabus): Wood constructions – short history; Wood materials used in constructions; Common building systems for wood construction.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Wood Structures for Furniture	STM-IFR	4	2	-	2	-

Course description (Syllabus): Materials; classification of fixed joints; joints for frames and legged-frames; edge and end joints; assembling joints; classification of frames and panels; simple frame; glass frame; simple and double faced-frame; frame with panel fixed between mouldings; framed panel; normal and false panel board; panelled frame; curve panels; legged-frame; box structures; dismountable joints; fittings; threaded joints; joints with eccentric housings; dismountable joints for legged-frames; dismountable joints with plastic mounts.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Technological Materials in Wood Industry	MTH-IFR	5	2	-	2	-

Course description (Syllabus): Introduction- course structure and importance; Adhesives: Basics of adhesion: terminology and adhesion theories; Factors affecting wood gluing and performance of glued joints; Vinyl and acrylic adhesives; Hot-melt adhesives; Contact adhesives; Polycondensation adhesives (urea-formaldehyde, phenol-formaldehyde); Polyurethane and epoxy adhesives; Coating materials: Wood finishing- general aspects and materials;

Surface preparation by sanding, bleaching and staining; Composition and classification of coating materials; Coating materials with organic solvents: nitrocellulose, polyurethane, acid catalyzed; Coating materials without volatile organic solvents; Basic ecological aspects of wood coating.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
General Economy	ECG-IFR	1	1	-	-	-

Course description (Syllabus): Principles of economic thinking. The market. Company costs. Macro-economic concepts. Cyclic fluctuations of economy.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Fundamentals of Wood Production and Environmental Protection 2	BP02-IFR	2	1	-	1	-

Course description (Syllabus): Environment protection. Forest-Ecosystem natural land. The causes of forest degradation. Solutions for combat forest degradation. Technologies to reduce emissions of volatile organic compounds (COV) in the wood industry. Legal concept of environmental protection activities.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Study of Wood Properties	SPL-IFR	4	2	-	2	-

Course description (Syllabus): The discipline is complementing the general knowledge about wood physical, mechanical and biological properties with other properties having a practical applicability. One of such properties refers to wood behaviour to thermal flow and its applications as thermal insulator, wood calorific power and its potential of conversion into energy. Wood acoustical properties, including acoustic of resonance wood, acoustic insulation, nondestructive testing using sound, ultrasound, acoustic emission, acoustic-ultrasounds and high-power ultrasounds represent other important chapters. Other properties envisaged are: wood electric properties in AC and DC, wood magnetic behaviour and their applications. Final chapters are studying the behaviour of wood when exposed to electromagnetic radiation of various wavelengths and frequencies and their multiple applications in wood industry, including the nondestructive testing of wood and wood panels (nuclear magnetic resonance, microwave, infrared, visible light, ultraviolet, X-ray, gamma-ray and neutron radiation).

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Internship 1	PR01-IFR	4	-	3 weeks x 30h/week = 90 h		

Course description (Syllabus): Work safety rules – general and specific for wood-processing machines. Presentation of raw materials. Hand tools. Effective work.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Physical Training 4	EF04-IFR	1	-	1	-	-

Course description (Syllabus): Order exercises and front – terminology, shares and motion, changes of achievements and bands, number in figures. Exercises EFG - the fundamental positions of the body and derivatives, positions and movements segmentation, the methodological rules of training and teaching exercises simple and compound. The foundations of the body movement.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Foreign Language 4 (English)	LE04-IFR	2	1	1	-	-

Course description (Syllabus): The main objectives of the Foreign language course are: developing the students' fluency language skills and techniques by further exposure to the other language context; exposing them to advanced-

level and listening samples from real newspapers and magazines, to engage both listening and understanding skills. At the seminars, students work on vocabulary & grammar, and on incorporating new items into their speech and writing.

3rd Year, 5th Semester

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Thermal Treatments of Wood 1	TT01-IFR	5	2	-	2	-

Course description (Syllabus): Theoretical basics of wood drying: wood-moisture-heat relations; The mechanism of water removal from wood during drying and associated stresses and strains; Phases of the drying process; Principles of elaborating rational drying schedules; Drying time estimation. Timber drying in practice: methods, kilns, technological phases, computer-aided kiln control, drying quality.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Basics of Wood Cutting and Cutting Tools 1	SA01-IFR	5	2	-	2	-

Course description (Syllabus): The basis of wood cutting methods. Elements of the cutting process, motions in the cutting process, chip geometry. Tool geometry, fundamental cases of cutting, elementary cutting. The influencing factors of the cutting process. The interaction between tool and wood. The assembly of interaction forces, the quality of cutting. Dynamic parameters of the cutting process. Parameters of the cutting process (chip thickness, cutting angle, dynamic angle etc). Tooth wear, problems occurring in the cutting process with circular saw, cutting with positive and negative rake angles, chips formation in transversal cutting. Wood cutting methods (sawing, milling, drilling, turning, peeling, slicing, sanding).

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Machine Tools and Units in Wood Industry 1	MU01-IFR	5	2	-	2	-

Course description (Syllabus): The structure and content of this discipline aim at the achievement of basic knowledge related to the creation of wooden surfaces; Definition and analysis of kinematic structures of wood-processing machine-tools; Knowledge related to the control and adjustment of machines; Kinematic chains and their command systems.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
3D Modeling	MOD-IFR	4	1	-	2	-

Course description (Syllabus): The discipline "3D Modeling" allows to obtain some skills necessary in the design of finished wooden products. The students learn how to use AutoCAD 2D for achieving technical documentations for finished wooden products (views, sections, details, etc.), flow sheets and creation of realistic 3D models. This discipline requires knowledge of using computers and general technical drawings and specific technical drawings for wood.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Timber	CHE-IFR	4	2	-	2	-

Course description (Syllabus): This course provides information on softwood and hardwood timber technology, including: General considerations on sawmill industry: Sawmills evolution and structure. Technology in the log yard: Sawmill raw material, species, assortments, supply and preparation of the raw material, logs manipulation. Technology in the processing hall: Sawing of logs, methods of sawing and equipment and timber processing. Technology in the timber yard: Timber grading, stacking and storage. Management and organization issues.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Calculus of Wooden Structures for Constructions	CSL-IFR	4	2	-	2	-

Course description (Syllabus): Strength calculus of structural wood elements. Combined loads. Stresses in plane curved bars. Calculus of displacements in straight beams. Energetic methods for calculus of displacements in bars and bar systems. Stability and buckling of wooden bars. Dynamic loads. Variable loads. Fatigue behavior of wood. Calculus of tubes with thin walls. Calculus of tubes with thick walls. Experimental methods for the stress and strain study of deformable mechanical structures.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Work Protection and Protection Against Fire	PMF-IFR	3	2	-	1	-

Course description (Syllabus): Rules and regulations in work safety and health. Work accidents and occupational diseases. Work tasks. Noxes. Work environment. Lightning and colours. Noise and vibrations. Electromagnetic fields. First aid in case of accidents. Fire prevention.

3rd Year, 6th Semester

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Thermal Treatments of Wood 2	TT02-IFR	2	1	-	1	-

Course description (Syllabus): Timber steaming. Heat treatments performed in bentwood furniture. Heat treatments performed in veneer industry. Heat treatments performed in the manufacturing of wood-based composite materials.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Thermal Treatments of Wood - Project	TTP-IFR	2	-	-	-	2

Course description (Syllabus): Basic design of a timber drying kiln. Kiln dimensioning. Calculus of heating surface. Aerodynamic calculus and dimensioning of the fans. Economic calculus. Critical analysis of a kiln offer.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Basics of Wood Cutting and Cutting Tools 2	SA02-IFR	4	2	2	-	-

Course description (Syllabus): Tool materials. Construction, geometry and peculiarities of different wood tools: frame saw blades, circular saw blades, milling cutters, router bits, cutter heads, drills, knives. Methods to increase tool durability.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Machine Tools and Units in Wood Industry 2	MU02-IFR	5	3	-	2	-

Course description (Syllabus): Working principle, construction, functioning, characteristics and application of the main types of woodworking machines: Frame saws, Band saws, Circular saws, Straightening and thickening machines, Milling machines, Drilling machines, Lathes, Sanding machines.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Machine Tools and Units in Wood Industry - Project	MUP-IFR	2	-	-	-	2

Course description (Syllabus): The main aim of this discipline is to develop the students' competencies regarding the construction, adjustment and design of wood-processing machine-tools through practical activities and design exercises.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Furniture design, manufacture and viability 1	MO01-IFR	5	2	2	-	-

Course description (Syllabus): General quality features related to furniture. Furniture structure, shape and functions. Typization. Ergonomic principles. Storing furniture. Sitting furniture. Processing precision. Calculus of processing allowance.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Numerical Control Technique in Wood Industry	TCN-IFR	3	2	-	1	-

Course description (Syllabus): The structure and content of this discipline aim at the achievement of knowledge related to the numerical control of wood processing machines; Structure and classification of numerical control systems; Kinematic characteristics of machine-tools and centre with numerical control; Knowledge related to the computer programming of machines.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Technological Devices in Wood Industry	DTH-IFR	3	2	-	2	-

Course description (Syllabus): Structure and classification of technological devices; Basic principles in the design and exploitation of technological devices; Positioning regulations of the parts in the device. Bearings for positioning: plane, cylindrical, conical and spherical surfaces; Positioning precision of the parts in the device. How to determine the positioning errors; Fixing the parts in the device; Stretcher mechanisms. The calculation of the stretcher mechanism; Drive systems. Construction of devices for the wood cutting with saw blade and circular saw, for the wood milling, wood sanding, wood veneer cutting, wood turning and wood finishing. Throughout the course methods for dimensioning and optimization of devices are presented.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Internship 2	PRO2-IFR	4	-	3 weeks x 30h/week = 90 h		

Course description (Syllabus): Work safety. Practical experience in a furniture/veneer/composites manufacturing enterprise: product description, technological flow, machines, packaging, quality system.