Transilvania University of Braşov, Romania
Study program: Welding Engineering

Faculty: Materials Science and Engineering
Study period: 4 years

1.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Mathematical Analysis	Romanian	4	3	1		

Course description (Syllabus): Field theory. Scalar and vector fields; Differential operation. Formulas whole; Theory of complex variable functions; Cauchy integrals. Taylor and Laurent series; Partial differential equations of first order. Raw integrated; Trigonometric series. Strings orthogonal Fourier series. Bessel functions; Mathematical Equation. Order partial differential equations II. string equations; Vibrant, heat equation, Laplace equation.

2.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Computer and Programming languages	Romanian	5	3		1	

Course description (Syllabus): Description and use of personal computer operating systems; How to use Visual Basic and Visual C programs; Description and use of Microsoft Office package; Numerical methods of approximation; Document compression utilities.

3.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Descriptive geometry	Romanian	4	2		1	

Course description (Syllabus): Representation of the point in double and triple orthogonal projection; Graphical representation of the line; Graphical representation of the plane; Graphical representation of polyhedral; Cylindrical-conical surfaces.

4.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Materials science and engineering I	Romanian	**4**	**2**		**1**	

Course description (Syllabus): Structure and properties of metallic materials; Definitions of metal, alloy, crystal structure, types of networks; Influence on the properties of the network type. Allotropic metallic materials; Defects cross linking. Influences; Crystallization of metallic materials; Homogeneous and inhomogeneous crystallization; Defects. Methods of prevention; Plastic deformation and recrystallization. Plastic deformation of crystals. Plastic deformation of polycrystalline aggregates; Influences on properties; Influence of heating ; Hot plastic deformation.

5.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
General chemistry	Romanian	4	2		1	

Course description (Syllabus): General notions of chemistry (Atom, molecule, mol equivalent gram); The relationship between structure and properties of substances. Chemical bonds; Water. Water hardness. Water softening and demineralization; Metals. Preparation. Properties. Corrosion. Corrosion protection methods and techniques; Getting

thermo chemistry. Fuels. Economic importance and practice materials (lubricants, abrasives, glass); Electrochemical energy conversion. Cells; Macromolecular compounds. Composites; Getting pollution and environmental.

6.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Materials Technology I	Romanian	3	1		2	

Course description (Syllabus): Materials properties; Extractive metallurgy; Casting blanks and parts; Casting properties of metals and alloys, design patterns and core boxes, foundry mixtures, making manual and mechanized forms and core networks, hardware, castings debate, modern methods of temporary molding, molding processes permanent (casting molds, die casting, centrifugal casting).

7.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Mechanics	Romanian	4	2	1		

Course description (Syllabus): Systems of forces; Center of mass; Rigid solid balance; Balance material systems; Mechanical inertia; Kinematics point; Kinematics of rigid; Getting Started dynamics; Fundamental theorems of dynamics; Dynamic stiffness.

8.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Materials Technology II	Romanian	4	2		1	

Course description (Syllabus): Technological basics of plastic deformation; General phenomena occurring in plastic deformation. Processing by plastic deformation: rolling, drawing, extruding, forging, stamping, machining equipment by plastic deformation. sheet metal processing. Manufacture of pipes by plastic deformation; Welding and metal bonding; Theoretical welding of metallic materials. Oxy-fuel welding and flame cutting. Arc welding discovered. Special procedures for arc welding. Pressure welding. Welding allied processes: cutting and metal bonding; Powder metallurgy; Nonmetallic materials used in technics.

9.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Materials science and engineering II	Romanian	4	2		1	

Course description (Syllabus): Alloy systems; Constituents; Binary equilibrium diagrams; Ternary equilibrium diagrams; Fe-C alloys; Fe-C diagram; Steels (classification, symbolization, microstructure properties); Iron (classification, symbolization, microstructures, properties); Alloy steels (classification, microstructure, symbolization, properties, uses).

10.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Linear Algebra, Analytical Geometry, and Differential Geometry	Romanian	4	2	1		

Course description (Syllabus): Linear algebra and free vectors; Conic sections and quadric surfaces; Plane curves and curves in space; Surface generations/methods.

11.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Technical Drawing and Infographics	Romanian	3	1	2		

Course description (Syllabus): Representations used in industrial drawing; Representation of views. Sections; Representation and dimensioning of machine parts; Indicating the precision of part manufacturing.

12.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Numerical methods	Romanian	4	2		2	

Course description (Syllabus): Numerical errors; Numerical solution of algebraic equations; Solving systems of equations; Numerical methods for calculating eigenvectors; Approximation of functions; Numerical derivation; Numerical integration; Numerical solution of first order differential equations.

13.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Physics	Romanian	4	2		1	

Course description (Syllabus): Mechanic and acoustic; Thermodynamics and Statistical Physics; Electromagnetism; Maxwell's equations; Potential field; Transition equations for the electromagnetic field components; Field energy in inductors and capacitors electromagnetic; Electrostatics.

14.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Applied Computer Science (I)	Romanian	4	2		1	

Course description (Syllabus): Microsoft Access; Overview of application. General concepts; Tables and their use; Relationships between entities. Creating relationships between tables; Sorting, filtering and indexing data; Operations with applications, forms, reports and labels; LabVIEW; LabVIEW program overview; LabVIEW virtual instruments; Creating a SubVI; Loops and diagrams; Numbers, matrices and graphs; Establishing of formulas and working conditions; Data acquisition and instrument control; Designing an application.

15.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Academic Writing	Romanian	1	1			

Course description (Syllabus): The writing process from preparation, research, note-taking to actual writing. Analysis of texts correct/incorrect from an academic writing perspective.

16.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
English language	English	2/2	1/1	1/1		

Course description (Syllabus): The Verb. Indicative Mood. Present (simple & continuous, perfect simple & continuous) Practice; The Verb. Indicative Mood. Past (simple & continuous, perfect simple & continuous); Practice; The Verb. Indicative Mood. Future (simple & continuous, perfect simple & continuous). Future-in-the-Past (simple & continuous, perfect simple & continuous). Other ways of expressing the future (Present simple & continuous, be going to, be to, be about to), Practice;The Verb. Subjunctive Mood. Synthetic (Present/Past/Past perfect) & Analytic (modal + inf.),

Practice; The Noun. Classification, gender, number, case, Practice; The Adjective. Classification, comparison, special constructions, position, Practice; The Adverb. Classification, types, comparison, position.

17.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Physic education	Romanian	1/1			1/1	

Course description (Syllabus): Sports, athletics, basketball, football. School walking, running and sports march.

2nd Year

1.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Special mathematics	Romanian	4	2	1		

Course description (Syllabus): Systems of differential equations; Elements of field theory; Complex functions; Fourier series; Partial differential equations of second order; Laplace transform.

2.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Strength of Materials I	Romanian	5	2	1	1	

Course description (Syllabus): Static moments and moments of inertia; Sectional forces in straight beams, curved beams, plane structures, and spatial structures; Shear in small sections; joint calculation; Torsional behavior of straight bars; Bending of straight bars.

3.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Ecology and environmental protection	Romanian	5	2		2	

Course description (Syllabus): Introduction. History on the time evolution of ecology and environment and their classification in the context of sustainable development concepts and overall quality. Basic principles of ecology. Formation of environmental awareness. Branches of ecology: population ecology, ecotoxicology, urban ecology, behavioral ecology, human ecology, applied ecology, information ecology, industrial ecology. Environment. Environment and economic development. Environmental pollution. Categories of pollutants.Pollution events.

4.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Technical devices	Romanian	5	2		2	

Course description (Syllabus): General technological, classification; Blanks in device orientation;; Devices with levers and screw tightening; Clamping devices up.

5.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Dimensional control	Romanian	5	2		3	

Course description (Syllabus): Getting on measurement techniques. Basic principles of measurement. Units. Metrology. Meters; Methods and means for measuring lengths. Interpol used to measure lengths; Mechanical means for measuring length. Plane-parallel way, calipers, micrometers, parameter. Pneumatic tools for measuring length; Pressure measurement. General, units and types of pressure. Non-electric means of measuring pressure; Flow

measurement. Definitions and units; Measuring masses. No electric means to measure mass; Methods and means for measuring the velocity and speed. Non-electrical methods for measuring velocities and speeds. Transducers used. Measurement of linear velocity.

6.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Electrotechnics	Romanian	4	2		1	

Course description (Syllabus): Electrostatic. Primitive and derived sizes. Units. Electrification phenomena. Electric charge, electric charge density. Electric field in the vacuum electrical current, Coulomb's formula, induction electric vacuum voltage vacuum. Laws of electrostatics. Applications. Electro kinetic. Electro kinetic status, power and electric current density. Electric fields printed. Cells and batteries. Classification point of view of electrical conductivity material. Solving linear DC network. Applications.
Electrodynamics.

7.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Probability Theory and Mathematical Statistics	Romanian	3	1		2	

Course description (Syllabus): Events. Probability space. Conditional probabilities. Independent events. Classical probability schemes. Random variables. Distribution function. Probability density function. Numerical characteristics of random variables.Convergence of sequences of random variables. Law of large numbers. Central limit theorem Selection theory. Estimation theory. Confidence intervals.

8.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Quality Management	Romanian	4	2		2	

Course description (Syllabus): Standards, norms, regulations regarding quality. Standardization. ISO 9000 family Quality management system. Implementation of the quality management system. Documents of the quality management system. Conformity certification and accreditation of certification bodies.

9.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Strength of Materials II	Romanian	4	1	1	1	

Course description (Syllabus): Combined loads; Calculation of deformations in bending; Indeterminate static systems; Buckling of straight bars; Thin-walled revolution vessels; Fatigue stress.

10.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Machine Elements	Romanian	3	2		1	

Course description (Syllabus): THREADED ASSEMBLIES. Characterization. Areas of use. Threads. Geometry, classification. Technology. Forces and moments in threaded assemblies. Threaded assemblies with screws assembled with clearance. Threaded assemblies with screws assembled without clearance. Constructive elements.
GEARS. Forms and causes of gear deterioration. Materials and treatments. Technology. Geometric calculation of external cylindrical gears. Forces in gears. Calculation of the contact stress of cylindrical gears. Calculation of the

bending stress of cylindrical gears. Permissible stresses. Bevel gears - characterization. Worm gears - characterization. Constructive elements.
SHAFTS AND BEARINGS

11.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Machine Elements - project	Romanian	2				1

Course description (Syllabus): Designing a mechanical transmission composed of: electric motor; belt drive; cylindrical gearbox in a single stage.

12.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Thermodynamics	Romanian	3	2		1	

Course description (Syllabus): Introduction. General terms of thermotechnics; The first principle of thermodynamics; Perfect gas; The second principle of heat transfer; Heat conduction; Internal combustion engine with reciprocating piston; Compressors; Gas turbine.

13.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Bases of Technical Computer Assisted Design	Romanian	5	3		2	

Course description (Syllabus): Program interface presentation; 2D design; Dimensioning of 2D elements; 3D modeling; Surfaces generating; Cavities generating with 3D model; Assemblies modeling; Utilization of Weld met module.

14.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Field Practice (90 hours)	Romanian	4				

Course description (Syllabus): Will gather technical data on semi-finished products was made in the company, Their production flow in sections: ferrous and nonferrous materials, development of systems and equipment arc melting, induction furnaces, ovens resistive heating, flame. Casting continuous flow systems and equipment (conveyors), in temporary form, chill, pressure forging mold-free and specific equipment, heating furnaces, hammers mold hydraulic presses, eccentric presses. Heat-treatments, thermochemical treatments. Welding and welding equipment, thermal cutting, and metallization. Mechanical cutting, turning, milling, grinding, mortising, cutting. Surface coatings, galvanizing. Destructive and non-destructive testing of tensile, compression, bending, shearing, hardness, impact bending, ultrasonic, magnetic particle, radiation testing.

15.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
English language	Romanian	2/2	1/1	1/1		

Course description (Syllabus): The Verb. Indicative Mood. Present (simple & continuous, perfect simple & continuous) Practice; The Verb. Indicative Mood. Past (simple & continuous, perfect simple & continuous); Practice; The Verb. Indicative Mood. Future (simple & continuous, perfect simple & continuous). Future-in-the-Past (simple & continuous, perfect simple & continuous). Other ways of expressing the future (Present simple & continuous, be going to, be to, be about to), Practice; The Verb. Subjunctive Mood. Synthetic (Present/Past/Past perfect) & Analytic (modal + inf.),

Practice; The Noun. Classification, gender, number, case, Practice; The Adjective. Classification, comparison, special constructions, position, Practice; The Adverb. Classification, types, comparison, position.

16.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Physic education	Romanian	1/1			1/1	

Course description (Syllabus): Sports, athletics, basketball, football; School walking, running and sports march; School-jumping; School-throwing; Passing strengthening the place of displacement; Strengthening the place and throw away; Repeating structures and finishing the game with 2-3 players; Long jump with 1 ½ steps in flight; Throwing small.

3rd Year

1.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Elements of Electronics in Industrial Engineering	Romanian	4	2		1	

Course description (Syllabus): Passive electronic components; Semiconductor electronic components; Rectifiers, converters, inverters; Amplifiers; Electronic devices with discrete components; Analog integrated circuits; Binary logic integrated circuits; Electronic circuits for industrial machinery and equipment.

2.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Fundamentals of Industrial Engineering	Romanian	3	2		1	

3.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Finite Element Method	Romanian	4	2		2	

4.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Mechanical Machining	Romanian	4	2		2	

Course description (Syllabus): Turning metal. Lathe and turning tools, technology operations that can be performed on the lathe, classification of lathes, tools and devices used for lathes; Drilling materials. Technology operations that can be performed on drill; Milling. Basic operations that execute milling, milling machine; Grinding. Grinding machines, tools and devices used in rectification; Reaming, broaching and planning; Boring, stitching machines, planning machines.

5.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Electrical Equipment and Drives for Welding (I)	Romanian	4	2		2	

Course description (Syllabus): Machinery and equipment for welding; Machinery and equipment for welding; Machinery and equipment for welding pressure; Machinery and equipment for fusion welding and pressure; Machinery

and equipment for thermal cutting; Machinery and equipment for metallization and charging; Machinery and equipment for thermal bonding.

6.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Theory of Welding Processes	Romanian	4	2		1	

Course description (Syllabus): Getting on base metal, steel, weld ability; Processes metal in welded joints to stitch formation; Thermal processes in metal welding, heat transfer during welding processes; Physic-chemical phenomena in welding, electric arc; Dissociation specific chemicals and chemical reactions arc space; Formation and solidification of metal bath her fusion welding processes; Welding stresses and strains; Phenomena of base metal welding under; Welding metallurgy alloy steels; Heterogeneous welded joints.

7.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Occupational Health and Safety in Welding Industry	Romanian	4	2		1	

8.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Surface protection	Romanian	3	1		1	

9.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Fusion welding technology (I)	Romanian	5	2		2	

Course description (Syllabus): General technological problems of fusion welding; Welding processes, classification, general aspects; Welding with coated electrodes; Submerged arc welding; MIG – MAG; TIG; Gas welding; Plasma Welding; Electron beam welding; Laser welding.

10.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Pressure welding technology (I)	Romanian	3	2		1	

Course description (Syllabus): Welding technology in points; Welding technology in line; Welding technology in relief; Butt welding technology; Technology welding high frequency.

11.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Electrical Equipment and Drives for Welding (II)	Romanian	4	2	1	1	

Course description (Syllabus): Methods of measurement of the machinery and equipment for welding; Current transformers for welding; Rectifiers and inverters; Generator with separate excitation and series antagonist; Machinery welding flux; Equipment for MIG / MAG; Radiant energy welding equipment; Stored energy welding equipment; Cutting and welding equipment, air plasma; Equipment for gas welding flame; Diffusion welding equipment; Friction welding equipment; Used for welding pressure points; Pressure welding equipment in line; Butt

Welding Machine; Cold welding equipment; Explosion welding machinery; Equipment for coating; Arc welding equipment rotating; Welding equipment for plastics.

12.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Design of welded structures (I)	Romanian	4	2		1	1

Course description (Syllabus): Introduction to the design of machines and machine welded construction; Welded construction materials; Design of welded joints subjected to static; Calculation of welded joints fatigue; Uniform distribution in welded efforts; Corrosion protection.

13.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Specialized Practice (90 hours)	Romanian	4				

Course description (Syllabus): Base and filler materials for welded structures, chemical composition determination, welding compatibility, choice of filler material. Mechanization of thermal cutting processes, automation, robotic, sources like gas flame, air-plasma laser. Equipment for different welding methods. Adjust welding parameters on equipment, optimization. Destructive and non-destructive control of welded joints, tensile, bending, shear, bending with shock strength, dye penetrant inspection, magnetic particle, ultrasonic penetrating radiation. Safety in welding.

14.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Technical Drawing and Infographics (II)	Romanian	3	2		2	

15.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Computerization and optimization of welding processes	Romanian	4	2	2		

Course description (Syllabus): Experimental data processing and programming experience; Central and centrifugal sizes of populations. Confidence interval; Statistical assumptions used in scheduling experiments; Types of relations used in the analysis of welding processes; Linear regression. Checking law coefficients obtained; By nonlinear regression parameter. Checking the correlation coefficient; Using factorial experiments to modeling welding processes; Choice of programs order levels and ranges of parameters; Matrix programming and programs; Order Programs II; General methods of optimizing the relations resulting from the planning process experiences; Gradient optimization algorithms used to optimize welding processes; Newton-Raphson algorithm. Description of the program developed for this algorithm; Numerical methods for optimizing processes.

16.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Operation of Machining Equipment	Romanian	3	2	1		

Course description (Syllabus): Production and distribution of air; Air preparation; Pneumatic; Distributors; Pneumatic applications in welding engineering.

4th Year

1, 2.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Fusion welding technology (II)	Romanian	4	2		1	
Fusion welding technology project	Romanian	2				2

Course description (Syllabus): Welding behavior of materials; Weldability; Carbon steel welding; Welding of low alloy steels; Welding alloy steels; Welding of clad steel; Welding of dissimilar joints between steel; Welding of cast iron; Welding of aluminum; Welding of copper.

3.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Pressure welding technology (II)	Romanian	5	2		1	1

Course description (Syllabus): Turn technology ARC; Cold Welding Technology; Friction welding technology; GAS Welding Technology; Welding Technology Term (aluminothermic); Technology welding stored energy; UV Welding Technology; Explosion welding technology; Plastic Welding Technology.

4.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Mechanization and automation of welding processes	Romanian	5	3		2	

Course description (Syllabus): The technology of welding and Indicators of mechanization mechanization index Mechanization basic operations preparatory; Complex mechanization preparatory operations; Classification of mechanical equipment for the manufacture of welded structures; Fasteners and fastening; Fitting welded construction; seating and clamping elements; Mechanical drive systems for positioning and clamping elements; Staging movable and mechanization equipment produced in the country.

5.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Design of welded structures (II)	Romanian	4	2		2	

Course description (Syllabus): Welded beams; Welded tanks; Welded pipes; Welded studs; Machine welded; Approval and verification of welded steel structures.

6.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Materials and heat treatments for welding	Romanian	5	2		2	

Course description (Syllabus): Alloys for heat treatment; Heat treatment types; Transformation on solid state; Transformation on hardening; Transformation on cooling; Surface heat treatment.

7.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Quality Inspection of Welded Joints	Romanian	5	2		2	

Course description (Syllabus): Quality and quality control; Defects of welded joints; Magnetic control methods welded; Control methods of X-ray and γ; Ultrasonic flaw welds; Mechanical tests and welded construction; Troubleshooting and weld defects reshuffle; Organizing technical check of welds.

8.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Joining Processes of Non-Metallic Materials	Romanian	4	2		2	

9.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Robotic Welding Processes	Romanian	5	2		1	1

Course description (Syllabus): Automation of welding processes; Automation elements; Transducers, principles for analog and complex energy; Frequency transducers, pulse and digital; Sizes transducers mechanical forces deform; Displacement transducers and sizes; Level transducers, speed, vibration and acceleration; Pressure and flow transducers; Temperature gauges, pyrometers and radiation; Transducers for gases; Automatic controllers; Actuators Drives; Automation systems automatic welding plant.

10.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Related Welding Processes	Romanian	4	2		2	

11.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Damage analysis of welded structures	Romanian	3	2		1	

Course description (Syllabus): Metallographic aspects of resistance crystalline structures; Physical mechanisms of breaking; Thermodynamic aspects of deformable environments with cracks; Linear-elastic fracture mechanics of materials; Elastic-plastic fracture mechanics material; Determinants of toughness characteristics; Breaking material under the action of variable requests; Engineering Applications of Fracture Mechanics.

12.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Bases of experimental research	Romanian	3	2		2	

Course description (Syllabus): Mechanical testing of materials; Technological tests; Methods to investigate behavior welding of steels for welded structure; Determination of mechanical metallurgy of welded joints; Behavior characteristics of the base metal welding, metallurgical behavior, technological and constructive; Tested for their reaction to welding technology. Determination of resistance to cold cracking in the heat affected Methodology for determining the resistance of the weld metal hot cracking in welding; Methodology for determining some aspects of technological behavior welding, bending test specimens loaded with longitudinal welding, bending impact test, hardness and material compatibility in seam welding heterogeneous melting.

13.

Course title	Language of instruction	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Welding Certification	Romanian	3	2		1	

Course description (Syllabus): Management and quality assurance; Quality systems in firms producing welded structures; Quality of welded joints; Approval of welding technologies; Checking arc welding procedures; Certification of welding procedures according CR7 - 96; Certification of welding procedures according to EN 288/3; Checking and approval of welding procedures according to EN 287; Checking and approval of welding sources.