Transilvania University of Braşov, Romania

Study program: Digital Production Systems

Faculty Technological Engineering and Industrial Management
Study period: 4 years (bachelor)

1st Year

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Mathematical analysis	AM	4	2	2	-	-

Course description (Syllabus): numeric series; derivate and differentials; extreme points; integrals; surface and volume integrals

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Descriptive geometry	GD	5	2	2	-	-

Course description (Syllabus): line and plan drawing; relative position of two planes; intersecting and parallel planes; methods applied in descriptive geometry; polyhedrons and rotation surfaces; bodies intersections.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Chemistry	CHI	3	2	-	1	-

Course description (Syllabus): principles of chemistry science; atom characteristics; physical and chemistry bonding; chemical transformation and aggregation states of substances; water; electrolytes; metals; metals and alloys; corrosion; inorganic polymeric materials (glass and ceramics) and organic (polymers of polyaddition and polycondensation); composites.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Computer programming and programming languages I	PCL1	3	1	-	2	-

Course description (Syllabus): Microsoft Word: working with page layout, page setup, inserting page numbers, headers and footers, date and time, pictures, objects, shapes, equations, symbols, etc.; adding text, editing text, finding and replacing text, formatting text and paragraph; working with tables and columns; Microsoft Excel: working with page layout; entering data, formatting data etc.; working with formulae and functions; sorting and filtering data (auto and advanced filter); working with charts (2D and 3D); Microsoft PowerPoint: creating and formatting slides in a presentation; supplying various effects (custom animation and transition effects) in a presentation.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Technical drawing and info- graphics I	DTI1	5	2	-	3	-

Course description (Syllabus): multiview drawing (view, projection, etc.); views, sections and breaks representation; dimensioning in technical drawing; tolerances and precision; drawing and dimensioning: threads, grooved wedge and grooves, gears; assembly drawing.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Physics	FIZ	5	2	-	2	-

Course description (Syllabus): basic of classical mechanics; oscillatory movement; relativity theory; elastic wave; thermodynamics; electromagnetism; optics; quantic mechanics; atomic physics; solid physics; nuclear physics.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Professional integration and development	IDP	2	1	1	-	-

Course description (Syllabus): Transilvania University of Brașov managing staff; University, Faculty, Department, Study program; Students' regulations; Erasmus+, Students mobility, ECTS; Student associations

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Modern languages 1 (English)	LM1a	3	1	1	-	-

Course description (Syllabus): Verb: mood, tense and aspect; indicative mood – present; indicative mood – past; indicative mood – future; modals; Noun: classification, gender, number, case; Adjective: classification, comparison, special constructions, position.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Modern languages 1 (French)	LM1b	3	1	1	-	-

Course description (Syllabus): Verb: mood, tense and aspect; indicative mood – present; indicative mood – past; indicative mood – future; modals; Noun: classification, gender, number, case; Adjective: classification, comparison, special constructions, position.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Physical training 1	EDF1	1	-	1	-	-

Course description (Syllabus): practical skills training-methodical composition of complex aerobics; analytical exercises for upper limbs and scapular-humeral belt; exercises for trunk and abdominal muscle; individual actions specific basketball game in attack and defence; elementary collective tactical combinations in attack and defence in basketball; bilateral game.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Material science and engineering	SIM	5	3	-	2	-

Course description (Syllabus): structure and properties of metallic materials; alloys theory, man type of equilibrium diagrams; Fe-C alloys; thermophysical and thermochemical treatments for steels; alloyed steels; non-ferrous alloys; extractive metallurgy; moulding, plastic processing; metals welding.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Linear algebra, analytical and differential geometry	ALGA	4	2	2	-	-

Course description (Syllabus): Linear algebra: vector spaces and subspaces; Euclidian spaces; free vector; vector product; linear transformation in vector spaces; eigenvalues and eigenvectors; diagonalization; liner, bilinear and quadratic forms. Analytic geometry: plan and lines in space; angles; cons; canonical form; quadrics. Differential geometry: plane curves; oscillate circle; tangent; normal; Frenet marker elements; surfaces (generalities; conics; cylindrical, etc.)

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Mechanics	MEC	5	2	3	-	-

Course description (Syllabus): Statics: material point; rigid; rigid systems; application in engineering. Kinematics: point; rigid; relative movement; application in engineering. Dynamics: theorems; rigid solids.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Technical drawing and info-graphics II	DTI2	5	1	-	4	-

Course description (Syllabus): AutoCAD introduction; basic drawing elements: coordinates, functional keys, OSNAP mode; drawing commands: line, circle, arc, rectangle, point, ellipse, polygon, ray, Xline, Mline; entities selection, editing and properties; generating and editing text; hatching and dimensioning; polylines and spline curves; assembly.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Computer programming and programming languages II	PCL2	5	2	-	2	-

Course description (Syllabus): introduction in VisualBasic; structure of VB program; objects and properties; code lines; control routines; modular programming; menus, file managing, data base managing, object oriented programming.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
General economics	ECG	3	1	1	-	-

Course description (Syllabus): demand, offer, market, concurrency; labour market, employment, unemployment, wages; monetary market, inflation, loan and interest; capital market; macroeconomics; international economic relations.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Modern languages 2 (English)	LM2a	3	1	1	-	-

Course description (Syllabus): word order (in declarative/ interrogative/ imperative/ exclamatory sentences); sequence of tenses; reported speech; inversion; negation; complex sentences.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Modern languages 2 (French)	LM2b	3	1	1	-	-

Course description (Syllabus): pronoun; adverbs; preposition; communication skills.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Physical training II	EDF2	1	-	1	-	-

Course description (Syllabus): Football: playing without ball; foot hitting; head hitting; strategies. Basketball: techniques; tactical offensive and defensive; contra-offensive; bilateral game.

2nd Year

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Special mathematics	MS	4	2	2	-	-

Course description (Syllabus): first order differential equations; differential equations with constant coefficients; systems of differential equations; symmetrical systems; first order partial differential equations; complex functions; holomorphic functions; integral in complex; Cauchy theorem; power series; Taylor series; Fourier series; Laurent series;

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Strength of materials I	RM1	5	2	1	1	-

Course description (Syllabus): Fundamentals: mechanical properties of materials; external tensions and constrains; equilibrium equations; Sectional stress: general aspects; differential dependents between forces and sectional stresses; sectional stress diagrams; static and inertial momentum; axial stress; shear stress; bending; elasticity theory.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Mechanisms	MECMS	6	3	-	2	-

Course description (Syllabus): general structure of mechanisms: joints; structural modelling of complex mechanisms; structural optimizing of mechanisms; kinematics and dynamics of: involute gears; planetary gear; linkage mechanisms; cam gear: kinematics.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Numerical methods	MNI	4	2	-	2	-

Course description (Syllabus): mathematical software: Matlab, Mathematica, Maple, Mathcad; introduction in Mathcad; Mathcad programming; vectors and matrixes; numeric solution of equations and equations system; optimizations: nonlinear, mono-objective and multi-objective; multi-attribute decision; interpolation; regression; Monte Carlo simulation method.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Fluid mechanics and hydraulic equipment	MFH	3	2	-	1	-

Course description (Syllabus): fluids physical properties; fundamental law of hydrostatics; fluid forces; fluid kinematics; fluid dynamics; hydraulic engines: pumps, actuators.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Electrotechnics and applied electronics	EEA	5	2	-	2	-

Course description (Syllabus): electromagnetism; eletrokinetic; DC linear circuits; electrodynamics; AC linear circuits; electronic devices: diode; transistors; electric plants.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Modern languages 3 (English)	LM3a	3	1	1	-	-

Course description (Syllabus): quadratic equations; simultaneous equations; indices and logarithms; geometry; trigonometry; functional notations. limits; differentiation; integration; simple harmonic motion; rotation of a rigid body; beyond Newton's law; fields: strength and forces, potential energy.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Modern languages 3 French	LM3b	3	1	1	-	-

Course description (Syllabus): quadratic equations; simultaneous equations; indices and logarithms; geometry; trigonometry; functional notations. limits; differentiation; integration; simple harmonic motion; rotation of a rigid body; beyond Newton's law; fields: strength and forces, potential energy.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Physical training III	EDF3	1	-	1	-	-

Course description (Syllabus): Football: playing without ball; foot hitting; head hitting; strategies. Basketball: techniques; tactical offensive and defensive; contra-offensive; bilateral game.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Machine elements I	OM1	4	2	-	1	1

Course description (Syllabus): screw assemblies; shape assemblies (keys, studs, grooves, bolts, etc.) friction assemblies; elastic assemblies – springs; couplings.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Strength of materials II	RM2	4	2	1	1	-

Course description (Syllabus): bar bending deformations; curved bars; complex stress; energetic methods to determine the displacements of a linear-elastic system; statically undetermined systems; buckling of straight bars; dynamic stress; stress fatigue.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Basic of Computer Aided technology Design	BPTAC	4	2	-	2	-

Course description (Syllabus): general aspects of working in AutoCAD 3D space; modelling in AutoCAD; 3D primitives; special commands for 3D modelling: Revolve, Extrude, Sweep, Loft; editing/modifying solids; 3D Surfaces; working with layouts, shop floor drawing; applications.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Basics of Industrial engineering	BII	4	2	-	2	-

Course description (Syllabus): industrial engineering - definitions and concepts; industrial engineer's competencies; industrial Engineering Pioneers; ethics and responsibility in industrial engineering; introduction to manufacturing processes; overview on cutting tools and manufacturing devices; introduction to numerical control; productivity and performance in industrial engineering; ergonomics and safety.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Materials selection and heat treating	AMTT	3	2	-	1	-

Course description (Syllabus): ferrous and non-ferrous materials; sintered materials; materials resistant to: corrosion, high temperature, low temperature and wear; composites, plastics and adhesives; criteria used in rational choice of materials: a functional, technological and economic criteria; materials and treatments for: axis, bearings, guides, springs and tools.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Thermotechnics and heat engines	TET	3	2	-	1	-

Course description (Syllabus): thermodynamics: first law of thermodynamics; ideal gas; second law o thermodynamics; energy and anergy; thermodynamics and transformations of steam; heat engines: internal combustion engines; compressors; gas turbine plants; heat transfer

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Industrial Management	MIN	2	2	1	-	-

Course description (Syllabus): management functions; company concept; company environment; company attributes; types of companies; resources raised and use by a company; production management

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Internship (90 hours/ year)	PRAD	4				7

Course description (Syllabus): moulding sectors; hot forming sectors; heat treatment; galvanic coating; welding technologies

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Modern languages 4 (English)	LM4a	2	1	1	-	-

Course description (Syllabus): metals; measurement; design and function; energy, heat and work; control devices; pumps; air-conditioning systems; diesel engines; refrigeration systems; data communications; electric power systems; telecommunications; engineering design; engineering and the Earth's resources

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Modern languages 4 (French)	LM4b	2	1	1	-	-

Course description (Syllabus): metals; measurement; design and function; energy, heat and work; control devices; pumps; air-conditioning systems; diesel engines; refrigeration systems; data communications; electric power systems; telecommunications; engineering design; engineering and the Earth's resources

3rd Year

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Machine elements 2	OM2	4	2	-	1	-

Course description (Syllabus): screw assemblies; shape assemblies (keys, studs, grooves, bolts, etc.) friction assemblies; elastic assemblies – springs; couplings

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Machine elements II- project	OMP2	3	-	-	-	2

Course description (Syllabus): crew assemblies; shape assemblies (keys, studs, grooves, bolts, etc.); friction assemblies; elastic assemblies – springs; couplings

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Ecology and environment protection	EPM	4	2	1	-	-

Course description (Syllabus): ecology, environment protection, sustainable development, management; environment management system; environment performance evaluation; environment audit

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Finite Element Method	MEF	3	2	-	2	-

Course description (Syllabus): linear static analysis of solids and structures; stress analysis for trusses, beams, and other simple structures are carried out based on dramatic simplification and idealization

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Tools and accessories for machine-tools	PASA	5	2	-	1	1

Course description (Syllabus): machining by: turning, drilling, milling, grinding, planning, broach; cutting tools structure; tools and devices for turning; tools for drilling; milling; threading; gearing; calculus and construction of broaches

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Electrical control and drives	CAE	3	2	-	1	-

Course description (Syllabus): introduction to actuating and control systems; mechanics of actuating systems: displacement law; calculus of forces and torques; electric fitting, instrumentations; electric actuating with asynchronous three-phasic motors; with DC motors; step-by-step motors

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Quality management	MC	4	2	-	2	-

Course description (Syllabus): quality; quality engineering; presentation and processing experimental data; quality statistic control; capability analysis; production analysis using control cards; product receiving control; quality assurance costs

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Fundamentals of machine-tools design and kinematics	BCM	4	2	-	1	-

Course description (Syllabus): surface generation analysis and synthesis on machine tools: movements; generating guiding lines; auxiliary movements; kinematic chains; kinematic chains of machine-tools; control of kinematic chain of machine-tools: sorting the inputs; theoretical and real outputs; mechanic, hydraulic and/or electric adjusting of outputs; kinematic design of discrete subsets speed control; mechanisms in kinematic chains of machine-tools: typology; kinematic design; construction and design of specific components and subassemblies machine-tools: axes; bearings; speed-change gear, gearing mechanism, etc.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Fundamentals of machine-tools design and kinematics – Project	BCMP	2	-	-	-	2

Course description (Syllabus): surface generation analysis and synthesis on machine tools: movements; generating guiding lines; auxiliary movements; kinematic chains; kinematic chains of machine-tools; control of kinematic chain of machine-tools: sorting the inputs; theoretical and real outputs; mechanic, hydraulic and/or electric adjusting of outputs; kinematic design of discrete subsets speed control; mechanisms in kinematic chains of machine-tools: typology; kinematic design; construction and design of specific components and subassemblies machine-tools: axes; bearings; speed-change gear, gearing mechanism, etc.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Unconventional processing equipment	ETN	5	3	-	2	1

Course description (Syllabus): physicochemical bases and accuracy for electrochemical erosion processing and deburring; dimensioning the electrode tool in electrochemical erosion process; temperature, pressure and forces fields; electrochemical erosion processing; introduction in directed beam processing technologies – radiant emissions; technological equipment; introduction in ultrasounds processing technologies; equipment; applications; introduction in fluid and abrasive suspensions processing technologies; applications.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Tolerances and dimensional control	TCD	4	2	-	2	-

Course description (Syllabus): mechanical instruments for measurement; optical instrument for measurement; limits and fits for cylindrical smooth parts; surface texture measurement; geometric dimensioning and tolerance; tolerances and fits for part threads; tolerances and fits for gear pairs; tolerances and fits for keys and splines;angle measurements; pneumatic gaging.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Design of metal forming machine-tools	MUPD	4	2	-	1	1

Course description (Syllabus): machine-tools for cold forming: general aspects; design, construction and operation; control-brake-coupling system; design and construction of: flywheels, frames; Presses: double-acting mechanical press; knuckle joint press; screw press; automat mechanical press; hydraulic press; rotation press; cutting machines.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Plan practice (90 hours/year)	PrS	4				7

Course description (Syllabus): mechanical processing: cylindrical, conical, spherical, eccentrically turning; face and radius milling; planning and slotting; broaching; drilling, boring; grinding and finishing; teething; threading; CNC machine tools: processing methods; programming; cold forming; technologies for: dies; automat lathes.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Design I	DES1	4	2	-	1	1

Course description (Syllabus): introduction to CATIA sketching: characteristics; dimensioning; instruction for 3D models: extruded and revolute parts; plans, points, curves; holes; chamfers, rounds; rectangular and angular multiplication (arrays).

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Computer Aided technology Design I	PTAC I	4	1	-	2	-

Course description (Syllabus): introduction to NX / Simens - parametric modeling system; generating sketches, objects, entities; 3D model generation, defined from a geometric point of view, material, physical characteristics;generation of component catalogs;

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Design II	DES 2	3	1	-	2	-

Course description (Syllabus): making assemblies, mechanisms and animations using the Catia design program threads; part data base; sections and views; Catia: design parts based on sections, trajectory and thickness; 2D drawing; assembly in Catia.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Computer Aided technology Design II	PTAC II	3	1	-	2	-

Course description (Syllabus): making assemblies, mechanisms and animations using Siemens NX design program; generating: 2D drawings based on a 3D model; assembly; a mechanism type assembly; animation

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Automated and numerical control machines	MUACN	3	2	-	1	1

Course description (Syllabus): automation of machine-tools; organology of an automatic machine tool; design of component subassemblies; composing and designing machines - aggregate tools and CNC machine-tools; numeric structures and commands; numeric control systems; measurement block; programming CNC machine-tools; assisted numeric control; CAM – CNC integrated equipment.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Modeling and simulation of production systems	MSSP	3	2	-	1	1

Course description (Syllabus): fundamentals: production system, automation, flexibility, modeling and simulation; methods and techniques of modeling and simulation: modeling through networks with waiting lines; Petri nets; fuzzy modelling; neural networks; dynamic modeling and simulation of flexible production systems; modeling and simulation of material flows in production systems; software Tecnomatix / Siemens.

4th Year

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Machine-tools and production systems design	PMUSP	6	2	-	1	2

Course description (Syllabus): design of machine-tools: lathes; drilling machine-tools; milling machine-tools; finishing machine-tools; boring machine-tools; design of automatic transfer lines; design of aggregate machine-tools; CNC machine-tools; design of processing centres.concept of synchronous /asynchronous, cyclic / acyclic systems; design of production systems; the mathematical model of production; blockage analysis; methods of sizing and configuring production systems.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Intelligent kinematic axis control	ACI	4	2	-	2	

Course description (Syllabus): the concept of kinematic axis; defining; classification; machine-tool movements; kinematic axes for translational movement; electromechanical axes; engines; execution elements; electric cylinders; handling systems 2, 3 axes; positioning systems; sensors; kinematic axes for rotational motion; electric rotary tables; rototranslation modules; hydraulic servoaxe; pneumatic axles

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Hydraulic and pneumatic control and drives	AHP	6	3	-	2	1

Course description (Syllabus): Hydraulic actuating: hydromechanics principles; fluids; hydraulic generator; hydraulics actuators; main hydrostatic apparatus; secondary hydrostatic apparatus; sensors; hydraulic and electrohydraulic circuits; Pneumatic actuating: structure and components of actuating and control circuits; actuating apparatus; pneumatic power control elements and logic components; synthesis of control and command circuits.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Sensors and data acquisition	SAD	4	2	-	1	1

Course description (Syllabus): mathematical processing of experimental data; sensors, transducers, tensometric marks; overview, classification, use; sensors for robotics and MUCN; constructive principles; analog sensors; fiber optic sensors; the structure of the data acquisition systems; data acquisition and processing. virtual tools; architecture of virtual instruments.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Digital production I	PD1	4	2	-	1	1

Course description (Syllabus): general concepts PLM; two-dimensional modeling; modeling of solids; operations performed on: volume of solids, edges and faces solid bodies; synchronous modeling; modeling of curves and surfaces; modeling of assemblies; Sheet Metal Design; simulations and analysis using the virtual prototype - digital validation

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Digital production I - Project	PDP 1	2	-	-	-	1

Course description (Syllabus): methods of designing and optimizing the constructive form; assisted technologies; product design; integrated design and programming packages; 3D modelling.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Dgital production II	PD2	4	2	-	1	2

Course description (Syllabus): digital manufacturing - general notions; materials, tools, machining by turning, milling; programming CNC machine tools; additive technologies in production; production simulation

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
3D printing equipment	EI3D	3	3	-	1	1

Course description (Syllabus): Additive Manufacturing technology; 3D printing; types of processes; materials; 3D printers; advantages / disadvantages; stages of work

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Logistics of industrial systems	LIN	4	2	-	-	1

Course description (Syllabus): general presentation: design of production systems; product design industrial robots; sensory and actuation systems; logistic system for: local transport, feeding, orienting; warehouse; material handling;

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Internship for diploma project (90 hours/year)	PPD	10	-	-	-	6

Course description (Syllabus): Internship in companies or in laboratories at manufacturing engineering department or at Research institute of Transilvania University; Support activities for diploma project.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Elaboration diploma project	EPD	4	-	-		6

Course description (Syllabus): working on diploma project under direct coordination of the mentor; specific activities according to subject of diploma project; design of assemblies or parts; assembly and shop floor drawing;

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Specific machine-tools	MUS	4	2	-	1	1

Course description (Syllabus): specialised machines-tools; specialised lathes; machine-tools for helicoidally surfaces processing; specialised milling machines; grinding machine-tools; tooth cutting machine; tooth finishing machine-tools; machine-tools for polygonal surfaces processing.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Gearing machines	MD	4	2	-	1	1

Course description (Syllabus): gearing machine tools; general notions; types of directories and types of tooth generators on machine tools; machine tools gear by plastic deformation; machine tools for machining cylindrical / conical gears; machine tools for finishing the gears; non-circular teeth and gears on non-circular contour

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Maintenance and operation machine tools	IEMU	2	2	-	-	1

Course description (Syllabus): basic notions used in the field of maintenance; reliability, maintainability, maintenance, availability; industrial equipment wear; maintenance and repair systems; maintenance activity management; industrial equipment absorption; maintenance and product quality.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Reliability and maintenance	FM	2	2	-	-	1

Course description (Syllabus): reliability concept; elements of probability calculus and mathematical statistics; indicators of technological systems reliability; estimation of theoretical distribution parameters of the working time without malfunctions; systems reliability; measures for increasing systems reliability; maintenance, maintainability, availability.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Flexible manufacturing systems	SFF	3	3	-	1	1

Course description (Syllabus): manufacturing concept; automation and flexibility concepts; organization and structure of Flexible Manufacturing Systems (FMS); synthesis of FMS; qualitative and quantitative analysis of manufacturing systems; automation strategies; determination of type and number of working stations; design layout of FMS; logistic synthesis of manufacturing systems; modeling and optimisation of Flexible Manufacturing Systems; simulation

applications - Tecnomatix software; monitoring and real-time control of production processes by using specialized software SCADA.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Lean Production systems	SLP	3	3	-	1	1

Course description (Syllabus): Advanced production systems – concept; Lean Production: concept, Lean culture, principles, terminology; Lean Management: organization, production lines - features, design and placement, layout analysis, flow chart, line balancing, takt time vs. cycle time (CT), change over C / O; Lean techniques and tools: 5S; Visual management; Standardization and Industrial Engineering, etc. KAIZEN philosophy: continuous improvement, principles; added value vs. waste / the 7 loss categories; Value Stream Mapping (VSM); Total Productive Maintenance (TPM); Overall Equipment Effectiveness (OEE).