

Transilvania University of Braşov, Romania

Study program: Manufacturing

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
Mathematics	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 1	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 1	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 Braşov 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 1a (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 1b 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 2	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 2	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 2a (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 2b 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 2	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 1	RM1	5	2	1	1	-

Course description (Syllabus): Fundamentals: mechanical properties of materials; external tensions and constraints; 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; electrostatics; 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 3a (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 3b 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 3	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 1	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 2	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
3D Modelling	M3D	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 heattreating	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 heatengines	TET	3	2	-	1	-

Course description (Syllabus): thermodynamics: first law of thermodynamics; ideal gas; second law of 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				

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 4a (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 4b 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
Data acquisition and distribution systems	SADD	4	2	-	2	-

Course description (Syllabus): general remarks related to data acquisition and distribution. Brief presentation of LabVIEW; virtual instruments; LabVIEW environment; controls and indicators; LabVIEW functions; using NI-USB 6009 device to acquire data from processes; data processing; applications.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Basics of cutting surface on machine-tools	BGSA	5	3	-	2	-

Course description (Syllabus): generating surfaces by cutting. Introductory elements; cutting process; kinematics; parameters; dynamics (forces, machine work and power); physics of chip formation; thermodynamics of cutting; electrical phenomenon in the cutting process; wear and the life of cutting tools; cutting fluids; quality of surfaces obtained by cutting; systemic character of the cutting process; machinability of metals by cutting; diagnosis elements and the prognosis of the cutting process.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Computer aided parametric design	PPAC	4	2	-	2	-

Course description (Syllabus): introduction. DNC, CNC, DsNC systems; Pro/NC Manufacturing. Pro/NC concepts; manufacturing process in Pro/NC (operations, sequences, coordinate systems, tooling, manufacturing parameters etc.); milling NC sequences; turning NC sequences; drilling NC sequences; NC Post-Processing.

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

Course description (Syllabus): gears: calculus, forces; shafts; bearings; seals; belt gearing; motor speed control devices.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Machine elements II Project	OM2P	3	-	-	-	2

Course description (Syllabus): designing a gear reducer; performing the strength calculi of main components; assembly design, shop floor drawing of main components

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Tolerances and dimensional control	TCD	5	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
Manufacturing technologies 1	TCM	4	2	-	2	-

Course description (Syllabus): general problems of manufacturing technology; manufacturing precision; quality of machined surface; design of manufacturing processes; optimization of technological processes; additions processing determination and intermediate technological dimension; determination of cutting regimes; synchronization of operations; about vibration of cutting processes; numerical control of technological processes.

-Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Machine-tools	MU	3	2	-	1	-

Course description (Syllabus): main cutting data formulas and definitions of parameters; cutting tool materials and inserts; turning tools; parting and grooving tools; threading tools; milling tools; drilling tools; boring tools; gear cutting tools; broaches.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Cold-pressing technology I	TPR1	4	3	-	2	-

Course description (Syllabus): fundamentals of the theory of plasticity. the plasticity hypotheses. the basic laws of plastic deformation; the main materials employed in forming parts by cold-pressing; classification of the operations and equipment of cold-forming; cropping by shears; cropping with punching dies; blanking and piercing; blanking and piercing by cold precision shearing; cutting the material; bending parts of metallic materials.

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

Course description (Syllabus): main cutting data formulas and definitions of parameters; cutting tool materials and inserts; turning tools; parting and grooving tools; threading tools; milling tools; drilling tools; boring tools; gear cutting tools; broaches.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Fixture design 1	PD	3	2	-	1	-

Course description (Syllabus): definition of the fixtures, types and functions of jigs and fixtures; supporting and locating principles of the prismatic parts, rotational parts and complex parts; design of the locators; locating accuracy of the jigs and fixtures; principles of clamping; design of the edge, screw, collet, cam-action, diaphragm and others clamps.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Databases	BD	3	2	-	2	-

Course description (Syllabus): fundamentals of databases: history of management information; definitions and classifications of databases; DBMS in industrial engineering; design elements of the structure of a database. DBMS Microsoft Access 2007: overview of Access 2007 system; data types used in Access; create and manage tables; create and manage relationships between tables; design and run of queries; design and use of forms; design and print reports; design and use of macros; design and use of switchboards; database maintenance and administration: data security issues; data integrity issues; aspects of import and export data.

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

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; automatic lathes.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
CAD/CAPP/CAM Systems	CADM	4	2	-	2	-

Course description (Syllabus): Introduction in CAD/CAPP/CAM/CAE/PLM/RP; CAD/CAM systems the core of concurrent engineering; Computer aided design; Techniques of 3D modelling of the products; Computer aided manufacturing; CAD/CAPP/CAM integrated systems; Computer aided process planning; Basic of Reverse engineering technologies.

4th Year

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Cold-pressing technologies II	TPR2	4	1	-	-	2

Course description (Syllabus): cup-drawing - the process and technological conditions by cup-drawing; retention and clamping of the blank in cup-drawing; cup-drawing coefficient; determination of the shape and dimensions of blanks utilized in cup-drawing; the technology and the dies for the cup-drawing of parts; special cup-drawing procedures; fashioning of sheet-metal components: relief forming, bordering, rimming, widening, necking, smoothing and fashioning in special machines; processing of components by volumetric cold-forming: spreading, upsetting, volumetric cold-forming in dies, calibration, cold extrusion, cold rolling.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Automation of manufacturing processes	APT	4	2	-	2	-

Course description (Syllabus): using of compressed air in automation of manufacturing processes; pneumatic valves; pneumatic drives; grippers; automation of feeding of machine tools; electric drive technology; GRAFCET concept; Sensors; image processing; handling systems.

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

Course description (Syllabus): course objectives, general and basic concepts, definitions; CNC machine-tools; machine-tools programming; general structure of the programs, subprograms and blocks in numerical control; coordinate systems of numerical control; geometrical and technological addresses; G codes; M codes;

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Fixture design II	PD2	3	2	-	1	-

Course description (Syllabus): power workholding; pneumatic, vacuumatic, hydraulic, magnetic workholdings; modular fixtures; drilling jigs; milling fixtures; turning and grinding fixtures; broaching fixtures; indexing devices; fixtures for assembly and joining operations; design economics of the jigs and fixtures.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Fixture design II - Project	PD2P	3	-	-	-	2

Course description (Syllabus): design of a modular fixture; clamping scheme; computing the clamping force; assembly and shop floor drawings.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Manufacturing technologies 2	TCM	4	1	-	1	1

Course description (Syllabus): mprocessing technology of revolution external surfaces; processing technology of revolution internal surfaces ; processing technology of plane surface.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Computer aided design of products – CAD systems	CADM	4	2	-	2	-

Course description (Syllabus): a brief presentation of the most used CAD/CAM software packages; basic techniques for part modelling using CATIA; advanced techniques for complex part modelling using CATIA surface modelling; parts assembling; defining the workpiece and tools for NC milling; roughing strategies; finishing strategies;

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Robotics in manufacturing processes	RPT	4	2	-	2	-

Course description (Syllabus): Definition of industrial robot (IR), classification of robots. Mechanisms of IR: acuator and transmissions for prismatic and revolute joints. Modular IR: structure and construction. Grippers and end-effectors. Perirobotics: conveyors, AGVs, paletts. Elements of robot geometry and kinematics, control system of IR. Robot programming. Applications of IR: machine tending, packaging/palletizing, industrial workpartners, spot&arc welding, spray painting/coating, assembling.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Basics of manufacturing processes optimisation	BOPT	2	2	-	1	-

Course description (Syllabus): about the optimization of technological processes; external optimization of technological processes; optimization of processing additives; optimization of cutting regimes; processes optimize through adaptive management; optimization of processing with circular advances.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Developing computer applications in engineering	DCAI	2	2	-	2	-

Course description (Syllabus): measurement units converting; drilling force determining; costing for product sales; determining the best offer price for a particular product; surface ordering for rotational parts; dimensions chains computing; cutting parameters calculating in turning operation; cutting parameters choosing from speed ranges and

feeds.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Manufacturing Technologies III	TCM3	1	2	-	-	-

Course description (Syllabus): processing technology of profiled surface; processing technology of threads; processing technology of gears; processing technologies keyways and cleaved; processing technologies with high productivity; assembly technology.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Manufacturing Technologies III -Project	TCM3P	2	-	-	-	2

Course description (Syllabus): processing technology of profiled surface; processing technology of threads; processing technology of gears; processing technologies keyways and cleaved; processing technologies with high productivity; assembly technology.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Computer aided manufacturing	FAC	3	1	-	2	-

Course description (Syllabus): introduction. DNC, CNC, DsNC systems; Pro/NC Manufacturing. Pro/NC concepts; manufacturing process in Pro/NC (operations, sequences, coordinate systems, tooling, manufacturing parameters etc.); milling NC sequences; turning NC sequences; drilling NC sequences; NC Post-Processing.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Flexible manufacturing systems	SFF	3	2	-	2	-

Course description (Syllabus): a brief presentation of the most used CAM software packages: Pro/Engineer, Catia, PowerMill, SolidWorks; advanced techniques for complex part modelling using Pro/Engineer – surface modelling; defining the workpiece and tools for NC turning and milling using Pro/E; roughing and finishing strategies for turning and milling using Pro/E; NC program generation using Pro/E; modern manufacturing technologies – High Speed Machining;

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Concurrent engineering	IS08	3	1	-	2	-

Course description (Syllabus): introduction. Product development cycle; concurrent Engineering concept. Factors of influence. Definitions; sequential Engineering vs. Concurrent/Simultaneous Engineering; concurrent Engineering principles; methods and tools used in concurrent engineering (Quality Function Deployment - QFD, Failure Modes and Effect Analysis – FMEA, Design for Manufacture and Assembly – DFMA etc.); software packages for concurrent engineering.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Elaboration diploma project	APIII	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
Elaboration diploma project	APIII	10	-	-	-	-

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.