

Transilvania University of Braşov, Romania

Study program: Mechanical Engineering (in English)

Faculty: Mechanical Engineering
Study period: 4 years (bachelor)

1st YEAR

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Linear algebra and Analytical and Differential Geometry	ALGAD	5	2	3	-	-

Course description (Syllabus): 1. Linear algebra and free vectors; 2. Analytic geometry in space; 3. Conics and quadrics; 4. Generated surfaces (cylindrical, conical and of rotation); 5. Plane curves and curves in space; 6. Surfaces.

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

Course description (Syllabus): This course introduces fundamental principles in developing graphical solutions to engineering problems. It develops the ability to visualize spatial relationships; develop sequential thinking; set patterns of analysis; and spatial visualization through problem-solving. Topics include: Basic Concepts of 3-Dimensional Descriptive Geometry Points; Projection Planes; Orthographic Projection; Views; Auxiliary View, Lines in 3-Dimensional Geometry, Intersecting lines; Skewed lines; Parallel lines; Perpendicular lines; True Length of a line, Planes in 3-Dimensional Geometry, Representation; Points and lines on a plane; Dip of a plane, Spatial Relations of Lines and Planes, Examples—line parallel to plane; distances between lines, between planes; piercing point of line and plane; line of intersection; dihedral angle; visibility, The methods of the descriptive geometry. Method of replacing projection planes; method of revolution; Solids and Surfaces; Basic techniques for locating points, piercing points, and tangent planes for common solids—prisms, pyramid, cone, cylinder, sphere; Development of surfaces; Planar unfolding of common solids, and solids with warped surfaces; Intersection of geometric surfaces and solids.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Chemistry	CHIM	4	2	-	1	-

Course description (Syllabus): Principles of chemistry and properties of matter explained in terms of modern chemical theory with emphasis on topics of general interest for Traffic and Transport Engineering: Understand the molecular structure and properties of chemical substances in describing and solving real technological problems; Demonstrate quantitative problem solving skills in many aspects of chemistry, including solutions and properties of solutions, metals and corrosion, electrochemistry, polymers.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Materials Science and Technology	STM	6	4	-	2	-

Course description (Syllabus): Structure and properties of metallic materials; Theory of alloys, the main types of equilibrium diagrams; Fe-C alloys - structure, properties, fields of use, symbolizing principles; Steel applied thermophysical and thermochemical treatments; Alloyed steels - symbols, specific heat treatments, fields of use; Heavy, semi-light and light alloys - structure, properties, fields of use, symbolism principles; Extractive metallurgy, ferrous and nonferrous alloys preparation; Execution of parts by casting processes; Elaboration of metals and alloys through plastic deformation; Metal materials welding and unconventional processes related to welding.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Applied Informatics	INFA	4	2	-	2	-

Course description (Syllabus): Introduction: computer system architecture and operating system concepts; Word Processor: Microsoft Word, desktop publishing concepts, basic commands and operations, working with tables, working with long documents; Microsoft Excel, working with cells, normal operations in spreadsheet, formulas and functions, using graphs and diagrams; The Microsoft PowerPoint, creating presentations, formatting text, tables and images, graphs and organizational charts drawing objects.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Foreign Language English 1	LSE1t	3	1	1	-	-

Course description (Syllabus): This course introduces students to the main issues of English grammar. The main aspects are verb tenses, nouns, adjectives, pronouns, articles, adverbs but also the development of the vocabulary. Moreover, this course also deals with articles, reports and all sorts of essays in the field of transport engineering.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Foreign Language English 2	LSE2	3	1	1	-	-

Course description (Syllabus): This course continues the course in the first semester and bases itself on it. The second semester deals with more focused issues, like Working in Industry, A Tour of the Workplace, Tools and Equipment, Suppliers and Sub-contractors, Buildings and Installations and Troubleshooting.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Foreign language French 1	LF01	3	1	1	-	-

Course description (Syllabus): The noun, the article, the adjective, the pronoun, the numeral, the verb, the adverb. At the seminars, students work on French vocabulary and grammar, and on incorporating new items into their speech and writing.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Foreign language French 2	LF02	3	1	1	-	-

Course description (Syllabus): Oral presentations of the French mentalities; history and heritage; cross-cultural communication; traveling the world; meetings and discussions; French culture and traditions; listening and writing.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Communication	COM	3	1	1	-	-

Course description (Syllabus): The main problem arising when studying the notion of “communication” is establishing its content and the means of transmitting it. The course aims to develop relationship and communication skills. Main chapters: Documentary research at the university library; Introduction into communication; Communication within the group; Verbal communication; Non-verbal communication (body language); Written communication; Expression skills.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Mathematical Analysis	ANAM	5	3	2	-	-

Course description (Syllabus): Theory of real numbers; Theory of number series and power series; Derivatives and differentials of a functions of several variables (partial derivatives of a function of several variables, the differentiability of a function of several variables); Line integrals (the line integrals of the first kind and the line integrals of second kind); Double and triple integrals (the double integral in rectangular cartesian coordinates, expanding a double integral in polar coordinates, the Green formula, the Stokes formula, The Gauss – Ostrogradsky formula).

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Technical Drawing and Infographics I	DT01	4	2	-	2	-

Course description (Syllabus): General standards used in technical drawing: lines, scales, technical writing, layouts formats used in technical drawing; orthographic projection, orthographic projections and pictorial views, sections and sectional views, dimensioning, screw threads, screw fasteners and locking devices; keys; conventional representation of common features: flats and squares on shafts, gears, machining and surface texture symbols; isometric drawing; representation of assembly drawing of machine parts and components.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Physics	FIZI	4	2	-	1	-

Course description (Syllabus): Principles and fundamental laws of mechanics; Oscillatory motion and elastic waves; Postulates and fundamental principles of thermodynamics; Electromagnetic field, Maxwell-Lorentz equations and electromagnetic waves; Optics. Photometry and wave optical phenomena; Fundamentals of quantum mechanics with application to atomic physics; Lattice and crystalline structures, state of electrons in crystalline structure and physical properties of solids; Structure of nucleus, nuclear radioactivity, nuclear energy and protection against nuclear radiation.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Mechanics I	MEC1	5	3	1	1	-

Course description (Syllabus): Students in this course will study the theory and application of engineering mechanics - statics. Includes topics such as problem formulation and solution methods; two- and three-dimensional vector representation of forces, moments and couples; center of gravity and moment of inertia; static equilibrium of particles, rigid bodies, and engineering structures; problems related to friction.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Computers Programming and Programming Languages	PCL	5	2	-	2	-

Course description (Syllabus): 1.Introduction; 2.Programming languages and GUI; 3.Buttons, Menu, Tools bar (simple controls); 4.Advanced controls; 5.Design and 2D animation; 6.Data bases; 7.Debugging programs; 8.Complex programming; 9.Project management.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Electrical Engineering and Electrical Machines	ELME	4	2	-	1	-

Course description (Syllabus): Introduction; Direct-Current Circuits: Elements, Symbols, Electric Diagram, Ohm's Law, Kirchhoff's Laws, Work, Energy and Power in DC, Series-Parallel Connections; Sinusoidal AC Circuits; Complex Numbers; DC and AC Applications Circuits; Single-Phase Transformers; Three-Phase Transformers; Autotransformer; Asynchronous Machines: Components, Operating mode, Characteristics; Synchronous Machines: Components, Operating mode, Characteristics.

2nd YEAR

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Technical Drawing and Infographics II	DT2	4	2	-	2	-

Course description (Syllabus): AutoCAD fundamentals; Introduction and basic commands; AutoCAD environment; create objects commands; view objects; drawing aids; graphical screen administration; objects selection; edit/modify objects; Cartesian coordinate system; layers, linetype, properties; text writing and editing; blocks and attributes; hatch generation and editing; dimensioning; advanced editing techniques in AutoCAD.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Mechanics II	MEC2	6	3	2	1	-

Course description (Syllabus): This course represents the second part of the traditional engineering mechanics static-dynamics course. The dynamics deals with accelerated motion of a body. Basic theory of engineering mechanics, using calculus, involving the motion of particles, rigid bodies, and systems of particles; Newton's Laws; work and energy relationships; principles of impulse and momentum; application of kinetics and kinematics to the solution of engineering problems.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Strength of Materials I	RM1	6	2	2	2	-

Course description (Syllabus)–Introduction; Fundamental concepts; Internal Forces; Geometrical Properties of Plane Areas; Strength of Materials Basic Assumptions; Displacements, stresses and strains; Axial loading; Conventional Shear Calculus; Fundamental Concepts of the Theory of Elasticity; Torsion; Elastic bending.

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

Course description (Syllabus): Differential Equations with constant coefficients. Fields theory. The theory of complex functions. Fourier series. Laplace Transform. Elements of mathematical statistics.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Applied Electronics	ELEA	4	2	-	1	-

Course description (Syllabus): 1.Passive circuit components: R,C,L; 2.Semiconductor devices: Diodes, Transistors, Thyristors; 3. Power supplies, rectifiers, stabilizers; 4.Electronic amplifiers and operational amplifiers; 5.Logic circuits and digital circuits; 6.Microprocessors and microprocessor systems.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Foreign Language - English 3	LSE3	3	1	1	-	-

Course description (Syllabus): This course focuses upon the tenses that are frequently used in English, like Present Simple and Present Continuous, Past Simple and Past Continuous, Past Perfect, Future and also on the sequence of tenses. Also, the seminar deals with issues like vehicle safety, resistance, dealing with clients and statics and dynamics.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Foreign Language - English 4	LSE4	3	1	1	-	-

Course description (Syllabus): This course uses all knowledge previously acquired in order to tackle upon issues like Electrotechnology, Automatic Systems, Gear Systems, Fluid Mechanics, Pneumatics, Hydraulics and Power Generation. Moreover, the course also focuses on Engineering Design, Corrosion, Motor Selection, Computer Aided Design, Technical Plant and Applying for a Job.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Foreign language French III+IV	LF03	3	1	1	-	-

Course description (Syllabus): The course aims to improve the students` ability to understand and reproduce relevant linguistic structures; the ability to express themselves effectively in writing and in speech, the ability to apply creatively the knowledge acquired in college in different professional situations (the use of specialized terminology).

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Foreign language French III+IV	LF04	3	1	1	-	-

Course description (Syllabus): The course aims to improve the students` ability to understand and reproduce relevant linguistic structures; the ability to express themselves effectively in writing and in speech, the ability to apply creatively the knowledge acquired in college in different professional situations (the use of specialized terminology).

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Numerical Methods	MNUM	3	2	-	2	-

Course description (Syllabus): The course aims to introduce numerical methods used for the solution of engineering problems. The course emphasizes algorithm development and programming and application to realistic engineering problems; Roots of nonlinear equations; Solutions of systems of linear algebraic equations; Numerical differentiation and integration. Interpolation; Numerical solution of ordinary and partial differential equations; Introduction to error analysis; Implement these methods in a computer language (MATLAB); Engineering case studies.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Fluid Mechanics and Hydraulic Machines	MFMH	4	2	-	2	-

Course description (Syllabus): 1.Fluid properties; 2.Fundamentals of fluid statics; 3.Hydrostatic forces; 4.Ideal fluid dynamics; 5.Real (viscous) fluids flow; 6.Pipeline hydraulics; 7.Introduction on rotodynamic machinery.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Strength of Materials II	RM2	5	3	1	1	-

Course description (Syllabus) – Failures Theories; Deflections of Beams under Transverse Loading; Stress under Compound Loads; Curved Beams; Energy Methods for Linear-Elastic Displacements Calculus; Indeterminate structures; Stability of Structures; Dynamic Loads.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Mechanisms	MECS	5	3	-	1	1

Course description (Syllabus): Analysis and synthesis of mechanisms; Structure of mechanisms: elements, joint, degrees of freedom; Kinematic analysis of mechanism; Dynamic analysis of mechanisms; Synthesis of linkages; Gear: type, gear mechanisms, tooth parameters; Cam mechanisms.

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): Developing fundamental knowledge of tribology and strength calculation of machine elements; Calculation of machine elements and specialized assemblies (bolts, wedges, grooves, studs, springs, couplings, shafts, bearings, plain bearings, gears, etc.); Develop knowledge of identification and recognition of machine elements; Using computing package for design; Developing the overall design and execution; Development of written documentation.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Tolerances and Dimensional Control	TCD	3	2	-	1	-

Course description (Syllabus): Mechanical instruments for measurement. 1.1 Direct length measurement with mechanical appliance. 1.2 The principles of comparative length measurement. 1.3 High sensitivity indicators. Optical instruments for measurement. 2.1 Engineering microscopes. 2.2 Goniometric measurements with the microscope. 2.3 Optical projectors. Limits and fits for cylindrical smooth parts. 3.1 International tolerance system for limits and fits (ISO 20286-1:1997). 3.2 General tolerances for dimensions. Surface texture measurements. 4.1 Surface roughness parameters. 4.2 Roughness and waviness. 4.3 Instruments for surface texture measurements. Geometric dimensioning and tolerancing. 5.1 Symbols for tolerances of position and form. 5.2 The concept of roundness. 5.3 Associated parameters. Tolerances and fits for part threads. 6.1 Tolerances and fits for general thread parts. Tolerances and fits for gear pairs. 7.1 Tolerances for gears and gears pairs. 7.2 Deviations and tolerances for gears and gear pairs. Angle measurements. 8.1 Angle measuring system and techniques. 8.2 Measurement of cone shaped technical parts. Pneumatic gaging. 9.1 Principal elements and operations of pneumatic gaging systems. 9.2 Pneumatic instruments for measurement. Measuring machines. 10.1 Definition and general evaluation. 10.2 Industrial measuring technology applications.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Practical work 90 hours	PT1					

Course description (Syllabus): The practical work proposes to familiarize the students with the real problematic from companies and to stimulate the appliance of the knowledge gained in faculty in the practical activity.

3rd YEAR

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Thermodynamics and Thermal Machines	TMT	5	2	1	2	-

Course description (Syllabus): The main objectives of this course are: the study of basic processes regarding thermodynamics, gazodynamics and heat transfer. There are presented thermodynamic laws, principles, equations that describe thermal processes through thermal engines: internal combustion engines, compressors, refrigerating machines, gas and vapour turbines, power plants, boilers. The cognitive technical competences (notions, laws, diagrams, thermal plants): the student will be familiar with thermodynamically field notions and basic laws, working with diagrams for thermal agents, with understanding the functioning principles of thermal plants, their energetic evaluation and basic designing. Applied technical competences (measurements, error evaluation); the skills for measurements techniques will be improved using analogue and digital devices and high precision sensor technology.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Machine Tools and Cutting	MIMM	5	2	-	1	-

Course description (Syllabus): 1. Classification of machinery and equipment for handling goods; 2. Design of the devices for handling goods; 3. Manipulation of goods conveyers; 4. Manipulation of goods by containers; 5. Manipulation of goods by palletized units.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Mechanical Vibrations	VIBR	5	2	1	1	-

Course description (Syllabus): 1. Introduction. 2. Elastic elements and damping elements. 3. System representation (mathematical models). 4. Systems with one degree of freedom. 5. System with two degrees of freedom. 6. System with multiple degrees of freedom. 7. Approximate methods used to study discrete systems. 8. Introduction to finite element method used for vibration study. 9 Continuous systems.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Machine Elements 2	OM2	5	2	-	2	1

Course description (Syllabus): This course introduces fundamental knowledge in design of mechanical transmissions and develops the ability to assembly and details design of mechanical systems The main chapters of course are: Gears (fundamental geometry, materials, loads, faults , cylindrical gears, bevel worm, gears Mdesign analysis); Shifts (structures, materials, faults, calculus models, shafts Mdesign analysis); Journals (structures, materials, faults, calculus models, shafts Mdesign analysis); Rolling bearings (types, calculus, arrangements); Sealing (structures and montages); Belts transmission (calculus, shafts Mdesign analysis); Chain Transmission (geometry, calculus models); Continuous rate transmission (geometry, calculus models, structures).

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Experimental Methods in Mechanical Engineering	MEIM	5	3	-	2	-

Course description (Syllabus): Experimental methods classification. Tensometry. Captors. Photoelasticity. Moiré Methods (classical, shadow and protection). Correlation method. Holographic interferometers. Serigraphy. Infrared thermography.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Finite Element Method I	MEF1	5	2	-	2	1

Course description (Syllabus): Introduction. Displacements method applied to the double-hinged beam (in plane and in space). Energetically description of the FEM. Stiffness matrix calculation based on energetically method. Triangular element – plane stress state. Triangular element – plane strain state.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Fatigue of Mechanical structures	OST	5	2	2	-	-

Course description (Syllabus): Introduction. Fatigue cycles. Fatigue strength. Fatigue diagrams. Breaking point. Factors that have influence on parts breaking. Fatigue coefficient. Operating strength. Probabilistically methods for fatigue strength.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Composites mechanics	MECC	5	3	2	-	-

Course description (Syllabus): Introduction. Technologies of composite materials manufacturing. Micromechanics of composite materials. Level mechanics. Macro mechanics and stiffness of the thin plate of composite material. Breaking of composite materials. Stratified thin composite materials. Bending of stratified composite materials. Testing of composite materials.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Structural optimisation of the mechanical structures	OPTS	4	2	-	2	-

Course description (Syllabus): Introduction in structural optimisation. Model, objective function, restrictions. Optimisation methods. Beam system optimisation. Curved beam optimisation criteria. Uniform strength beam. Uniform strength plate.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Shock (optional 1)	CSMS	3	2	2	-	-

Course description (Syllabus): Introduction. Assumptions and relationships. Centric collision of two spheres. Experimental determination of the recovery coefficient. Oblique impact of two spheres. Impact of a sphere with a wall. Carnot's theorem. Impact isolation. Technical application of impact.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Collapse of the mechanical structures (optional 1)	COLS	3	2	2	-	-

Course description (Syllabus): Continuous medium. Collapse in linear elastic and viscoelastic medium. Basics of nonlinear calculation of mechanical structures. Breakdown of structures (composite, plastics, etc.). Models of calculation. Design considering the standards.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Elements of elasticity (optional 2)	ELAS	4	2	2	-	-

Course description (Syllabus): Introduction. Stresses, strains and displacements. Stress variation around a point. Equilibrium equations. Continuity equations. Structural elasticity. Plane state of stress and strain. Tubes. Plates. Bottles.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Contact mechanics (optional 2)	MECO	4	2	2	-	-

Course description (Syllabus): Elasticity theory. The theory of round parts contact. Contact fatigue, durability and bearing capacity. Experimental methods for contact study.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Technological practice	PT2	4				

Course description (Syllabus): Practical application in project developed by different companies.

4th YEAR

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

Course description (Syllabus): Introduction. Linear elastic break. Griffith's criteria. Energetically coefficient. R-curves. Stress intensity factor. Plastic domain at the end of the crack. Elasto-plastic break. The open at the crack tip. J and intensity factor of the stress. Strength curves at the crack propagation. Transition between ductile and fragile domains. Cracks propagation.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Finite Element Method 2	FEM2	5	2	-	2	1

Course description (Syllabus): Isoparametric elements – shape functions (general aspects). Isoparametric elements – 2D (plane stress, strain). Isoparametric elements – 3D. Convergence evaluation in case of isoparametric elements. Sensitivity analysis. Structural optimisation.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Technical Acoustics	ACT	5	2	-	2	-

Course description (Syllabus): Introduction (terms, acoustical quantities, etc.). Industrial applications of acoustics. Ultrasound horns. Design of ultrasound horns. Equipment used in industrial applications. Manufacturing with ultrasounds (boring, turning, milling, moulding, cupping, etc.). Environmental noise. Methods of measurement. Methods of noise effect diminish.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Advanced Elements of Strength of Materials	EARM	5	2	2	-	1

Course description (Syllabus): Stresses in plane curved beams. Special problems of buckling. Dynamic loads. Vessels. Tubs and rotating discs.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Thermodynamics (optional 3)	TERM	4	2	1	-	-

Course description (Syllabus): Introduction. General equations of thermoelasticity. Thermal stresses in beams. Rotating disc with heat load – stresses. Plain plates heat loads – stresses. Finite element method used in thermodynamics. Heat engine parts.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Aeroelasticity (optional 3)	AERO	4	2	1	-	-

Course description (Syllabus): Introduction. Aerodynamics elements. Bearing capacity and aer strength. Aerodynamic structures modelling. Deformation of aerodynamic structures. Static and dynamic phenomenon. Design of aerodynamic structures.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Structural stability (optional 4)	STAB	3	1	1	-	-

Course description (Syllabus): Introduction. Compressible beams loaded with transversal forces. The initial deformation effect. Torque buckling. Plates buckling. Angular buckling.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Machine tool foundations design (optional 4)	PFMD	3	1	1	-	-

Course description (Syllabus): Vibration isolation concept. Soil dynamics. Mechanical characteristics of the soils (stiffness, damping, etc.). Machine tool vibrations. Design of the machine tool foundations.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Plasticity (optional 5)	PLAS	3	2	2	-	-

Course description (Syllabus): Introduction. Basics of plasticity. Conditions. Plastic deformation. Plastic flow. Symmetrically axial stress states. Elasto-plastic calculus of the mechanical structures.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Visco-elasticity (optional 5)	VASC	3	2	2	-	-

Course description (Syllabus): Introduction. Visco-elastic materials testing. Linear visco-elasticity. Simple loads of visco-elastic materials. Creep behaviour of visco-elastic materials. Nonlinear analysis of stress curves. Lost energy at loads. Stability of visco-elastic materials.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Machine diagnosis	DIAG	3	2	-	2	-

Course description (Syllabus): Introduction. Vibration sources. Concept of vibro-diagnosis applied to machine and equipment. Used equipment. Measurement technique. Parts vibro-diagnosis. Equipment vibro-diagnosis.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Dynamics of structures	DINM	4	2	-	2	1

Course description (Syllabus): Introduction. One degree of freedom systems (undamped and damped systems, free and forced). Multiple degree of freedom systems (undamped and damped systems, free and forced). bending vibrations of composite beams. Bending vibrations of composite plates.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Plates and envelopes	PLIN	3	2	2	-	-

Course description (Syllabus): Introduction. Aproximative equation of the deformed fiber. FEM applied to the plates. Mathematical model based on Kirchoff assumption. Mathematical model based on Midlin Reissner assumption. Modeling plates with isoparametric finite elements. Finite element method used for composite plates.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Reliability of mechanical structures	FIAM	3	2	2	-	-

Course description (Syllabus): Introduction. Reliability, mentenabilitate, disponibility. Fault, wear. Statistically calculation. Reliability markers. Reliability testing. Reliability evaluation for mechanical structures.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Rheology (optional 6)	REOL	3	2	2	-	-

Course description (Syllabus): Introduction. Basics about isotropic and anisotropic materials. Plasticity of metallic materials. Time dependent behaviour of different materials. Rheological models (Euclid, Hooke, Saint-Venant, etc.). Rheological models of elastoplastic and viscoelastic parts. Nonmetallic materials rheology.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Industrial project management (optional 6)	MANi	3	2	2	-	-

Course description (Syllabus): Introduction. Industrial management. The plant. Industrial plant. Industrial plant planning. The role of the manager in management system. Human recourses management.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Quality management in industry (optional 7)	MANA	4	2	2	-	-

Course description (Syllabus): Introduction. Quality concept. Standards family SR EN ISO 9000. Quality management system. Quality management system documentation. Audit and quality certification.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Systems identification (optional 7)	IDEN	4	2	2	-	-

Course description (Syllabus): Introduction. Basics of vibrations. Transfer function. Transfer matrix. Poles and zeros. Modal analysis of MDOF. State space representation. Methods of identification in time and frequency domains.