

Transilvania University of Braşov, Romania

Study program: Traffic and Transport Engineering

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 |
| 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, expending 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 |
| Descriptive Geometry | GD | 5 | 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 | SM | 3 | 2 | - | 1 | - |

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.

| Course title | Code | No. of credits | Number of hours per week | | | |
|----------------------|------|----------------|--------------------------|---------|------------|---------|
| | | | course | seminar | laboratory | project |
| Materials Technology | SM | 3 | 2 | - | 1 | - |

Course description (Syllabus): 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 | 5 | 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 |
| Linear algebra and Analytical and Differential Geometry | AGAD | 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 |
| Technical Drawing and Infographics I | DT1 | 5 | 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. The course includes topics such as problem formulation and solution methods; two- and three-dimensional vector representation of forces, moments and couples; centre 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 | PCLP | 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.

| Course title | Code | No. of credits | Number of hours per week | | | |
|---|------|----------------|--------------------------|---------|------------|---------|
| | | | course | seminar | laboratory | project |
| (O1) Academic Writing and Communication | COMt | 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 |
| Foreign Language English 1 | LE01 | 2 | 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 | LE02 | 2 | 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 | 2 | 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 | 2 | 1 | 1 | - | - |

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

2nd Year

| Course title | Code | No. of credits | Number of hours per week | | | |
|--------------|------|----------------|--------------------------|---------|------------|---------|
| | | | course | seminar | laboratory | project |
| Economics | ECON | 3 | 1 | 1 | 0 | 0 |

Course description (Syllabus): The Economics course provides an introduction to general economy, highlighting the main economic instruments, market elements (needs, resources, property, types of costs, profit), macroeconomic concepts (economic growth, GDP, unemployment, inflation, crises, foreign trade, online marketing concepts, national and European non-reimbursable funds, savings (interest rates, dividend yields, mutual funds and cryptocurrency), and more, all in one practical approach.

| 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 |
| Informatics and Cybernetics in Transports | ICT | 4 | 2 | - | 1 | - |

Course description (Syllabus): Introduction: computer system architecture and operating system concepts; Software for the development of engineering applications- Matlab : GUI interface, the basic elements of a program, variables, operators, instructions, creating scripts, creating M functions, creating complex programs, diagrams; Word Processor: Microsoft Word, editing concepts, commands and operations, working with tables, working with long documents, review documents, working with references; Microsoft Excel, working with cells, operations in spreadsheet, formulas and functions, using diagrams, development of VBA applications; The Microsoft PowerPoint, creating presentations principles, create presentations templates, formatting text, tables and images, graphs and organizational charts.

| Course Title | Code | No. of credits | Number of hours per week | | | |
|------------------------------|------|----------------|--------------------------|---------|------------|---------|
| | | | course | seminar | laboratory | project |
| Information Theory and Codes | TIC | 3 | 2 | 2 | - | - |

Course description (Syllabus): Like any science the information theory uses a series of concepts. Among the theoretical basis used for computing concepts are found: information, time, code, information system, connection and reverse connection, system and computer system. As a general concept, the information cannot be used unless it is specifically expressed through a medium, and in this sense, the data is seen as a specific form of representation of information. The concept of time can therefore be defined as formal support of information resulted in numbers, letters, symbols, codes, etc. Automatic processing imposed using codes and implicitly the encoded data. By encoding is meant the replacement process of the values that are contained in a lot with another values belonging to another lot. The code is a set of elementary symbols.

| 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): The discipline aims to develop knowledge and skills for the identification, calculation and design of the shape of machine components in order to construct and assemble them. 1. Constructive design of

machine parts. 2. Definition, classification, technology and materials resistance calculation. 3. Welded assemblies. 4. Bolt assemblies. 5. Threaded assemblies. 6. Shaft-hub assemblies. 7. Elastic elements (springs). 8. Mechanical couplings. 9. Elements of tribology (rub, wear, lubrication, lubricants, seals).

| Course title | Code | No. of credits | Number of hours per week | | | |
|--------------|-------|----------------|--------------------------|---------|------------|---------|
| | | | course | seminar | laboratory | project |
| Management | MANAG | 3 | 2 | - | 1 | - |

Course description (Syllabus): Historical background of scientific management; Principles of modern management; Management levels and manager's competency profile; Environment and organizational structure; Communication in management; Human resources- motivation, team management, leadership; Financial management- budgeting, income, costs, rate of return, cash flow; Materials management- inventory, depreciation; Time management and planning techniques; Strategic management.

| Course title | Code | No. of credits | Number of hours per week | | | |
|------------------------------|------|----------------|--------------------------|---------|------------|---------|
| | | | course | seminar | laboratory | project |
| Foreign Language - English 3 | LE03 | 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 | LE04 | 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 3 | LF03 | 2 | 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 4 | LF04 | 2 | 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).

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 Elements 2 | OM 2 | 5 | 2 | - | 2 | - |

Course description (Syllabus): The discipline aims to develop knowledge and skills for the identification, calculation and design of the shape of machine components in order to construct and assemble them. 1. Calculation and construction of gears: fundamentals of geometry; thermal materials and treatments; forms of damage and dismantling, gear forces, calculation of cylindrical gears (straight, inclined), tapered and slashed. 2. Drive gears, speed reducers. 3. Straight shafts: shapes, materials, shapes and causes of inappropriate use or inappropriate behavior calculation models design shapes. 4. Sliding bearings: definition, structures, calculation models, design algorithms, constructive design. 5. Bearings: Definitions, types, forms and causes of inappropriate use or misconduct, computational models, bearing mounts. 6. Belt transmissions: definition, constructive structures, classification, materials and technologies, forms and causes of inappropriate use or misconduct, calculation models. 7. Chain drives: definition, constructive structures, classification, materials and technologies, forms and causes of inappropriate use or misconduct, calculation models. 8. Variable transmissions: definition, constructive structures, classification, materials and technologies, forms and causes of inappropriate use or misconduct, calculation models.

| Course title | Code | No. of credits | Number of hours per week | | | |
|---|------|----------------|--------------------------|---------|------------|---------|
| | | | course | seminar | laboratory | project |
| Machines and Installations for Goods Handling | MIMM | 5 | 2 | - | 1 | - |

Course description (Syllabus): This course introduces students to the field of systems and machinery used for goods handling. In the first part of the course are presented systems for handling palletized and packaged goods: the conditions imposed for the transport of the different categories of goods; arrangements for transportation; operations, methods and arrangements for handling; organizing the handling activities; notions of palletizing, packaging, containerization and storage. In the second part of the course are presented principles of industrial and warehouse organization.

| Course title | Code | No. of credits | Number of hours per week | | | |
|-----------------------------|------|----------------|--------------------------|---------|------------|---------|
| | | | course | seminar | laboratory | project |
| Internal Combustion Engines | MAI | 5 | 3 | - | 2 | 1 |

Course description (Syllabus): Reciprocating Internal Combustion Engines fundamental operating principles and taxonomy; Basic work cycles into Internal Combustion Engines; Thermodynamic processes in Internal Combustion Engines; Construction of stationary parts of the Engines (cylinders, cylinders block, cylinder head, etc.); Construction of the moving parts of the Engines (piston, connecting rod, crankshaft, distribution systems, injection systems, etc.); Biofuels and new fuels for feed Internal Combustion Engines; Ecology and modern Internal Combustion Engines; Transportation and new propulsion systems for vehicles (hybrids, electrical, pneumatic, etc.).

| Course title | Code | No. of credits | Number of hours per week | | | |
|--------------|------|----------------|--------------------------|---------|------------|---------|
| | | | course | seminar | laboratory | project |
| Automotives | AUT | 5 | 2 | - | 2 | 1 |

Course description (Syllabus): 1. Calculus principles and regimes for automobile parts and mechanisms; 2. Clutches; 3. Gear boxes and transfer boxes; 4. Drivelines; 5. Rear axles; 6. Front axles; 7. Steering system; 8. Suspension system; 9. Braking system; 10. Bodyworks.

| Course title | Code | No. of credits | Number of hours per week | | | |
|------------------------------|------|----------------|--------------------------|---------|------------|---------|
| | | | course | seminar | laboratory | project |
| Elements of Vehicle Dynamics | EDA | 5 | 2 | - | 2 | 1 |

Course description (Syllabus): The course has as main objectives the development of cognitive and applicative-practical competences regarding the longitudinal and transversal dynamics of the vehicles. These refer to the forward resistance of the vehicles, the dynamics of the rolling process, the dynamic performances of vehicle, the maneuverability and stability, of the vehicles.

The development of the applicative-practical competences is achieved through the laboratory and project works that aim to determine the dynamic performances of the vehicles, as well as through simulations of their travel regimes, assisted by the computer.

| Course title | Code | No. of credits | Number of hours per week | | | |
|---------------------|------|----------------|--------------------------|---------|------------|---------|
| | | | course | seminar | laboratory | project |
| Road Infrastructure | IRUT | 4 | 2 | - | - | 2 |

Course description (Syllabus): Road Classification; Road network structure; Geometrical and constructive characteristics of road; Road system structure; Road system dimensioning; Bituminous surfacing and base layers; Elements of design and construction of bridges; Road maintenance and rehabilitation.

| Course title | Code | No. of credits | Number of hours per week | | | |
|---|------|----------------|--------------------------|---------|------------|---------|
| | | | course | seminar | laboratory | project |
| Transport Control and Command Installations | ICCC | 4 | 2 | - | 2 | - |

Course description (Syllabus): This course introduces students to the field of traffic flows control systems. The course presents traffic command and control systems for: road, rail, maritime and air transportation. The traffic light systems for road, rail and maritime transport and their signal synchronization systems are presented and analyzed.

| Course title | Code | No. of credits | Number of hours per week | | | |
|--|------|----------------|--------------------------|---------|------------|---------|
| | | | course | seminar | laboratory | project |
| Environment Protection and Engineering | PIM | 4 | 2 | - | 2 | - |

Course description (Syllabus): Road transportation pollution assessment; Emissions testing procedures; Pollutant emissions formation in internal combustion engines; Factors affecting emissions formation in SIE; Factors affecting emissions formation in CIE; Active SIE emissions reducing measures; Active CIE emissions reducing measures; Passive ICE emissions reducing measures – catalytic converters; Passive ICE emissions reducing measures – lead trap.

| Course title | Code | No. of credits | Number of hours per week | | | |
|--|-------|----------------|--------------------------|---------|------------|---------|
| | | | course | seminar | laboratory | project |
| Road Traffic Management and Telematics 1 | MTRT1 | 5 | 3 | - | 2 | - |

Course description (Syllabus): This course introduces students to the field of traffic and transportation engineering. It deals primarily with road transport system, the traffic flows analysis process, mathematical methods used in traffic flows analysis, road users' characteristics, microscopic modelling (vehicle kinematics), traffic flow parameters and fundamental diagram (macroscopic analysis).

| Course title | Code | No. of credits | Number of hours per week | | | |
|---------------------------|------|----------------|--------------------------|---------|------------|---------|
| | | | course | seminar | laboratory | project |
| (O1) Multimodal Transport | TM | 2 | 1 | 1 | - | - |

Course description (Syllabus): Defining the field of multimodal transport; Specific terms of multimodal transport, knowing the specific aspects of the main types of transport; Technical and economic indicators of transport systems; Transport technologies; Allocating demands by means of transportation.

| Course title | Code | No. of credits | Number of hours per week | | | |
|-------------------------------------|------|----------------|--------------------------|---------|------------|---------|
| | | | course | seminar | laboratory | project |
| (O2) Economic Analysis of Transport | AET | 2 | 1 | 1 | - | - |

Course description (Syllabus): This course rounds off students' knowledge with information concerning the analysis of transportation activity. In this regard, a system of indicators has been taken into account, which points at the marketing ability of the commercial network, the movement of goods, the economic efficiency of these activities, as well as the establishment of the cost structures. This course is focused on the following: 1.The importance and classification of transportation services; 2.Technical and economic characteristics of the road transport of goods; 3. Technical and economic characteristics of passenger transport; 4.Technical and economic indicators used in transport services; 5.Transport costs; 6.Establishing the price in transport services; 7.Transport and location.

4th Year

| Course title | Code | No. of credits | Number of hours per week | | | |
|-------------------------------|------|----------------|--------------------------|---------|------------|---------|
| | | | course | seminar | laboratory | project |
| Automotive's Electric Systems | EEA | 5 | 2 | - | 2 | - |

Course description (Syllabus): The course permits to know and to understand the function of automotives' electric and electronic systems, separate and as a whole. As well, the course presents how the electric and electronic systems contribute at the optimization of automotives' systems (engine, transmission, brake system, steering system, lighting system, etc.).

| Course title | Code | No. of credits | Number of hours per week | | | |
|---|-------|----------------|--------------------------|---------|------------|---------|
| | | | course | seminar | laboratory | project |
| Road Traffic Management and Telematics II | MTRT2 | 5 | 3 | - | 2 | - |

Course description (Syllabus): This course continues to initiate students to obtain competences the field of traffic and transportation engineering. It deals primarily with signalized, unsignalized and roundabouts intersections design, arterial coordination, modelling and simulation of traffic flows and measures of efficiency, intelligent transportation systems architecture and telematics applications, systems engineering models.

| Course title | Code | No. of credits | Number of hours per week | | | |
|----------------------------------|------|----------------|--------------------------|---------|------------|---------|
| | | | course | seminar | laboratory | project |
| Machines for Road Infrastructure | UIR | 4 | 2 | - | - | 2 |

Course description (Syllabus): Road infrastructure equipment based on tractors; Calculation of mechanical transmission system of industrial wheeled tractor and crawler; Determining economical and traction performance for road infrastructure equipment (Applications on wheeled equipment and crawler); Construction and calculus of PTO; Construction and calculus of three-point hitch lift. Construction and calculus of Bulldozers, graders, scrapers, scarifiers, excavators, chargers, rollers; Equipment for road maintenance and rehabilitation

| Course title | Code | No. of credits | Number of hours per week | | | |
|---|------|----------------|--------------------------|---------|------------|---------|
| | | | course | seminar | laboratory | project |
| Functional Reliability of Transport Systems | FST | 4 | 2 | - | 2 | - |

Course description (Syllabus): 1.Introduction; 2.System theory basics; 3.Reliability theory basics; 4.Testing the reliability of transportation systems; 5.Maintainability and transportation systems reliability; 6.Evaluation of reliability obtained on tests; 7. Introduction to the theory parts degradation in the operating process.

| Course title | Code | No. of credits | Number of hours per week | | | |
|--|-------|----------------|--------------------------|---------|------------|---------|
| | | | course | seminar | laboratory | project |
| Fuels, Lubricants and Maintenance Materials for Vehicles | CLMIA | 4 | 2 | - | 2 | - |

Course description (Syllabus): Transport in the XXI century; Fuel production, environment; The physic-chemical properties of fuels; Refining techniques; Gasoline; Diesel; Energy consumption and environmental protection; Alternative fuels for automobiles; Special fuels; Lubricants; Fluids for hydraulic and cooling systems.

| Course title | Code | No. of credits | Number of hours per week | | | |
|--------------------------------|------|----------------|--------------------------|---------|------------|---------|
| | | | course | seminar | laboratory | project |
| (O1) Vehicle Fleet Maintenance | MPV1 | 6 | 2 | - | 2 | 1 |

Course description (Syllabus): The course approaches diagnostic procedures and materials used in auto service activities. Every section provides to the students (and not only) necessary theoretical and practical knowledge in order to gain skills in vehicle service and maintenance. Main issues: principles, piston - cylinder, cylinder head and valves, camshafts and valve trains, cooling and lubrication systems.

| Course title | Code | No. of credits | Number of hours per week | | | |
|--|------|----------------|--------------------------|---------|------------|---------|
| | | | course | seminar | laboratory | project |
| (O2) Traffic accidents Analysis and Reconstruction | ARAC | 5 | 2 | - | 2 | - |

Course description (Syllabus): 1. Characteristics and principles of expertise accidents; 2. Classification and identification of road accidents; 3. Theories underlying dynamic and kinematics modelling collision; 4. Purpose and road traffic accidents investigation stages; 5. Examination of the accident scene, performing and recording measurements and preparing the scene; 6. Identifying, analyzing and interpreting traces accident; 7. Methods for reconstruction of road accidents; 8. Analyze and identify opportunities for avoidance and accident prevention.

| Course title | Code | No. of credits | Number of hours per week | | | |
|--------------------------------|------|----------------|--------------------------|---------|------------|---------|
| | | | course | seminar | laboratory | project |
| (O3) Automotive Passive Safety | SPA | 5 | 2 | - | 2 | - |

Course description (Syllabus): The aim is to sensitize the auditor on the vehicle passive safety problems, by studying their constructive solutions, the restrain passengers systems, certain notions of resistance elements calculus, analysis of the injury criteria of the passengers and pedestrians. Also, the discipline facilitates the fixing and capitalization of knowledge from most fundamental and specialized disciplines.

| Course title | Code | No. of credits | Number of hours per week | | | |
|----------------------------|------|----------------|--------------------------|---------|------------|---------|
| | | | course | seminar | laboratory | project |
| (O4) Quality of Transports | CALT | 3 | 2 | 2 | - | - |

Course description (Syllabus): Creating a model for quality evaluation and identifying methods, techniques and procedures based upon the new communication and information technologies, which would increase the quality of road transport. This course contains the following chapters: 1. Present stage of the development of transport

systems; 2. Specific aspects of transport quality; 3. Transport services' quality; 4. Advanced systems for passenger information; 5. Model for assisting decision making in urban transport; 6. Techniques and procedures for the improvement of urban transport quality.

| Course title | Code | No. of credits | Number of hours per week | | | |
|--|--------|----------------|--------------------------|---------|------------|---------|
| | | | course | seminar | laboratory | project |
| (O5) Risk Assessment, Insurance and Vehicle Trade Techniques | ERATCA | 3 | 2 | - | 2 | - |

Course description (Syllabus): 1. Types of accidents and their consequences; 2. Classification and identification of the degree of injury in road accidents; 3. The role of safety systems to prevent and mitigate harm; 4. Identification and correlation of damage and injuries; 5. Risks driving and the human factor; 6. Accident reconstruction and identification, assessment vehicles; 7. Video processing and analysis of the scene; 8. Management and marketing techniques in vehicle sales.

| Course title | Code | No. of credits | Number of hours per week | | | |
|------------------------------------|------|----------------|--------------------------|---------|------------|---------|
| | | | course | seminar | laboratory | project |
| Transport Management and Marketing | MKTR | 2 | 2 | 2 | - | - |

Course description (Syllabus): The management of the transportation's systems; The Romanian transportation system; Contract for the International Transportation of Merchandise by Road; Certificate of Approval, Qualification Certificate, Consignee; Legal Forms Consignment Sales Agreement; Consignment Contracts on the Transportation Authorizations; On the Rights and Obligations and on the Responsibility; On the Jurisdiction and Competency.