

Transilvania University of Braşov, Romania

Study program: Industrial Safety Engineering

Faculty:	Materials Science and Engineering
Study period:	4 years
Academic year structure:	2 semesters (14 weeks per semester)
Examination sessions (two):	winter session (January/February) summer session (June/July)

1st Year

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Mathematical Analysis	SMAMA1	4	2	2		

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

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Computer Basics	SMBUC1	5	3		1	

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

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Descriptive Geometry	SMGDE1	4	2		1	

Course description (Syllabus): Importance of standards in technical drawing. Classification of technical drawings. Representations used in industrial design; Sections; Representation and dimensioning of machine elements; Condition scoring areas; Registration linear and angular tolerances size; Registration form and position deviations; Overall design and installation;

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Materials science and engineering I	SMINM1	4	2		1	

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

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
General chemistry	SMCGB1	4	2		1	

Course description (Syllabus): General notions of chemistry (Atom, molecule, mol equivalent gram). The relationship between structure and properties of substances. Chemical bonds. Water. Water hardness. Water softening and demineralization. Metals. Preparation. Properties. Corrosion. Corrosion protection methods and techniques. Getting thermo chemistry. Fuels. Economic importance and practice materials (lubricants, abrasives, glass) Electrochemical energy conversion. Cells. Macromolecular compounds. Composites. Getting pollution and environmental

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Materials Technology I	SMTHM1	3	1		2	

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

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Physics	SMFIZ1	4	2		1	

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

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Materials Technology II	SMTHM2	5	2		1	

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

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Materials science and engineering II	SMINM2	5	2		1	

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

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Linear Algebra, Analytical Geometry and Differential Equation	SMALG1	4	2	1		

Course description (Syllabus): Vector spaces; Euclidean spaces; Space; Plan and right in space; Linear transformations; Values and eigenvectors; Bilinear and quadratic forms; Conic; Sphere; Quadra on reduced equations; Surfaces generated.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Technical Drawing	SMDEST	3	1		2	

Course description (Syllabus): General (presentation software, interfaces, configuration, screen, menus, opening, closing, maneuvers, etc.). Fundamentals for drawing (initiation, ordering, managing screen graphics, design prototype, coordinates and units). Basic 2D drawing techniques. Layer concept. Graphic aids (basic object creation, types of lines, properties). Editing commands and extract information from drawings. Selecting entities (set of selection, editing techniques, attachment points, grips, delete, move, zoom, scale, copy, etc.). Advanced editing techniques (changing object characteristics, bevelling, connections, extensions, and so on). The concept of block. Symbols and attributes. External references.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Numerical methods	SMMEN1	4	2		2	

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

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Mechanics	SMMEC1	3	2	1		

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

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Data Processing and Informatic Systems	SMPDS1	4	2		2	

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

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
English language	SMLE01/ SMLE02	2/2	1/1	1/1		

Course description (Syllabus): The Verb. Indicative Mood. Present (simple & continuous, perfect simple & continuous) Practice. The Verb. Indicative Mood. Past (simple & continuous, perfect simple & continuous) Practice. The Verb. Indicative Mood. Future (simple & continuous, perfect simple & continuous). Future-in-the-Past (simple & continuous, perfect simple & continuous). Other ways of expressing the future (Present simple & continuous, be going to, be to, be about to), Practice. The Verb. Subjunctive Mood. Synthetic (Present/Past/Past perfect) & Analytic (modal + inf.), Practice. The Noun. Classification, gender, number, case, Practice. The Adjective. Classification, comparison, special constructions, position, Practice. The Adverb. Classification, types, comparison, position.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Physic education	SMEDF01 SMEDF02	1/1			1/1	

Course description (Syllabus): Sports, athletics, basketball, football. School walking, running and sports march; School-jumping; School-throwing; Passing strengthening the place of displacement; Strengthening the place and

throw away; Repeating structures and finishing the game with 2-3 players; Long jump with 1 ½ steps in flight; Throwing small.

2nd Year

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Special mathematics	SMMS01	4	2	1		

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

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Strength of Materials I	SMRM01	5	2	1	1	

Course description (Syllabus): Strength of materials problems; And static moments of inertia; Sectional efforts to straight beams, curved, flat and spatial structures; Elements of the Theory of Elasticity; Extent-compression; Shear relatively small sections, calculating joints; Torsion bars straight; Bending of straight beams.

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

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

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Probability theory and statistics	SMTPSM	4	1		3	

Course description (Syllabus): Field-probability events;; Classical probability distributions; Random variable systems; Law of large numbers; Selection and estimation theory; Confidence intervals; Hypothesis testing.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Technical devices	SMDIST	5	2		2	

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

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Dimensional control	SMCODI	5	3		2	

Course description (Syllabus): Getting on measurement techniques. Basic principles of measurement. Units. Metrology. Meters. Methods and means for measuring lengths. Interpol used to measure lengths. Mechanical means for measuring length. Plane-parallel way, calipers, micrometers, parameter. Pneumatic tools for measuring length. Pressure measurement. General, units and types of pressure. Non-electric means of measuring pressure. Flow measurement. Definitions and units. Measuring masses. No electric means to measure mass. Methods and means for measuring the velocity and speed. Non-electrical methods for measuring velocities and speeds. Transducers used. Measurement of linear velocity.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Electrotechnics	SMETH1	4	2		1	

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

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Quality Control and Assurance	SMASCA	5	2		2	

Course description (Syllabus): Consideration about the quality; Control methods and procedures; Evolution of quality; Quality assurance by international standards ISO 9000; Internal quality assurance; External quality assurance; The quality system documentation; Quality records.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Strength of Materials II	SMRM02	4	2	1	1	

Course description (Syllabus): Bending flat curved bars requests composed; Calculating bending deformations; Statically indeterminate systems; Buckling of straight beams; Thin-walled vessels revolution Requests fatigue; Requests shock; Basics of experimental methods for evaluation of stresses and strains.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Machine components	SMOM01	4	2		1	1

Course description (Syllabus): Introduction. Objective and importance of the subject. History. Course contents. Bolted joints and screw-nut transmissions. Assemblies with pins and bolts. Longitudinal assemblies feathers. Grooved assembly. Polygonal wheels on. Tightening assemblies own. Assembly by clamping onto the cone. Assemblies with tapered rings. Couplings. Gears.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Thermodynamics	SMTERM	4	2		1	

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

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

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

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Practical Activity	SMPR21	2			30	

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

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
English language	SMLE03/ SMLE04	4	1/1	1/1		

Course description (Syllabus): The Verb. Indicative Mood. Present (simple & continuous, perfect simple & continuous) Practice. The Verb. Indicative Mood. Past (simple & continuous, perfect simple & continuous). Practice. The Verb. Indicative Mood. Future (simple & continuous, perfect simple & continuous). Future-in-the-Past (simple & continuous, perfect simple & continuous). Other ways of expressing the future (Present simple & continuous, be going to, be to, be about to), Practice. The Verb. Subjunctive Mood. Synthetic (Present/Past/Past perfect) & Analytic (modal + inf.), Practice. The Noun. Classification, gender, number, case, Practice. The Adjective. Classification, comparison, special constructions, position, Practice. The Adverb. Classification, types, comparison, position.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Physic education	SMEDF03 SMEDF04	1/1			1/1	

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

3rd Year

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Elements of Electronics in Industrial Engineering	SMEEI	5	2		2	

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

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Theory of Welding Processes	SMTPS1	6	3		3	

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

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Mechanical Processing	SMPRM1	4	2		2	

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

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Heat treatments	SMTRTE	4	2		2	

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

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Testing of Materials and Equipment for Protection	SMTMMP	4	2		2	

Course description (Syllabus): History of material testing methods and protective equipment; Destructive control methods; NDT methods; Visual inspection; Magnetic control; Penetrating radiation control; Ultrasound control; Tightness controls .

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Ergonomics	SMERGS	5	2		1	1

Course description (Syllabus): Ergonomics and ergonomics laws; Physiology of the human body and work requests; The ergonomic value dimensions; Physical strength, work capacity, energy body; Fatigue and body movements ergonomics principles; Ergonomic workplace organization; Factors ergonomic work environment and organization; Elements of psychology and human adaptation to work; Industrial aesthetic and ergonomic organization jobs; Labor protection organization ergonomic job; Economic efficiency ergonomic studies.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Ventilation and Air Conditioning Equipment	SMEVC1	5	2		1	1

Course description (Syllabus): Definitions and basic knowledge of technical ventilation and air conditioning; Thermal comfort; Natural ventilation; Ventilation and air conditioning; Operation of ventilation and air conditioning; Optimizing ventilation and air conditioning.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Techniques for Purification of Industrial Liquid	SMTPD1	5	2		2	

Course description (Syllabus): Composition of the waste and surface waters ; Conditions for wastewater discharging into rivers; Wastewater parameters determining; Mechanical wastewater treatment equipment; Coagulation of water suspensions; Biological treatment of wastewater; Industrial wastewater treatment.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Waste Processing Technologies	SMTPLI	4	2		2	

Course description (Syllabus): Introduction; Identification and sorting of waste; Physical separation methods; Based on separation technology and equipment dry; Technologies and equipment based on wet separation; Other recycling technologies; Treatment technologies and waste disposal; Medical waste.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Safety Assessment in Industry	SMESI1	4	2		1	

Course description (Syllabus): Risk assessment methods in occupational health; Disease and injury risk factors; Occupational health risk assessment of the work place; Risk assessment methods generated by machines and technological processes ; Minimize the occupational health risks; Methodology to develop own occupational safety instructions; Research of work accidents .

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Radiation Protection in Industry	SMRPI1	4	2		1	

Course description (Syllabus): Radionuclide; The use of radionuclides in useful activity; Radioactivity radionuclides; Methods for measuring ionizing radiation; Unit of measurement of radiation; Apparatus for measuring radiation; Apparatus for producing X-rays; The component parts; Features and operating parameters of the installation; Apparatus for producing radiations" range"; The component parts; Types of radionuclides that produce such radiation.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Reliability	SMFIAB	4	2	2		

Course description (Syllabus): Elements of Mathematical Statistics; Reliability indicators; Reliability testing; Methodology used to determine reliability indicators; Mechanical reliability of the constructor resistance.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Risk Management	SMRIT1	4	2	1	1	

Course description (Syllabus): Technical risk management; Dysfunction, technical accident, failure, failure risk analysis; Management of risk factors; Identification and classification of risk; Intrinsic factors; Factors associated; The human factor Systematic analysis of technical systems and technological malfunctions.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Practical Activity	SMPR22	2			30	

Course description (Syllabus): Assessment of accidents in industry; Labor protection equipment; Industrial safety procedures; Labor security in the industrial processing; Company organization.

4th Year

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Safety in Primary Sectors	SMSSP1	5	2		2	

Course description (Syllabus): Labor security in the primary processing; Organizational aspects for work safety in mining and extraction; Mining work environment: noise, vibration, temperature, ventilation; Organization of production

processes in terms of job security in metals and alloys smelting; Organizing work safety in foundries; Work safety in plastic deformation departments; Work safety in welding departments.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Safety Systems for Mechanical Industry	SMSSPM	5	2		1	1

Course description (Syllabus): Technical risk management; History of systems safety in mechanical processing; Safe operations of turning; Safety milling operations; Security operations planing, shaping and broaching; Grinding and polishing operations safety; Safe operations in cutting; Safe operations in drilling, boring and honing.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Management and Safety for Industrial Transport	SMMSTI	5	2		1	1

Course description (Syllabus): Importance of transport: transport place in the economy, economic aspects of transport, social issues, impact on society, transport safety. Transport systems towards transport safety, ways to increase safety: organizing legal, technical, system control, system control and signaling role. Warning systems, command and control of transport companies: Systems to prohibit, prevent and guidance and role marking system. Economic and technical characteristics of the transport of goods: goods transported structure, competence, operational characteristics. Economic and technical indicators used in transport service: safe operation indicators, use of indicators journey in safety, capacity utilization indicators for safe transport.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Safety of Advanced Production Systems	SMSSAP	4	2		1	

Course description (Syllabus): Rapid Prototyping (Rapid prototyping). Material used in rapid prototyping, Flexible manufacturing cells and systems. The concept of flexibility; Scheduling flexible manufacturing systems. Safety subsystems components of flexible manufacturing systems. Conventional production systems electro erosion. EDM machines, EDM Technology Electrochemical Smoothing Procedures and equipment; Safety electrochemical systems; Smoothing methods and ultrasound equipment; Safety ultrasound systems; Smoothing Smoothing and equipment electromagnetic. Safety electromagnetic systems. Conventional production systems

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Occupational Safety Legislation	SMLSM1	4	2	2		

Course description (Syllabus): Security legislation and health and legal system at European level in the field of our country (legislative pyramid). Presentation safety and health laws, principles, obligations, liability. Submission rules enforcement of health and safety at work. Presenting content to specific regulations (laws, GD's, orders, etc) in health and safety at work. Organization of health and safety at work, control methods.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Industrial Emissions	SMNIND	5	3		2	

Course description (Syllabus): Intrinsic factors; Definition and classification of industrial hazards; Methods and apparatus for determining the concentration of dust; Hazardous substances. Hazardous chemical agents; Nitrogen oxides and sulfur; Noise; Vibration; Emission measurement; Harm reduction solutions in the industry. Case Studies.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Elements of Social Medicine	SMEMM1	2	1	1		

Course description (Syllabus): Risks posed by metals: Zn, Pb, Hg, Cd, Cr, Ni, Mn, As. Risks caused by particles: quartz, asbestos, wood, plastic. Risks caused by corrosive and irritant substances, solvents, organic substances for pest control. Risks posed by carcinogens and mutagens. Risks caused by physical factors: ionizing radiation, noise, UV light, electromagnetic fields, mobile phones, cold and warm microclimate.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Electro-security	SMELS1	3	2		1	1

Course description (Syllabus): Security Systems electrical, electronic and logical. Transducers and sensors for security. Hazard warning systems: acoustical, optical and complex. Registration systems, storage and playback of critical information. Information systems security.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Initiation and Conduct of Business	SMICAF	3	2		2	

Course description (Syllabus): The role of small business in the economy. Defining small businesses. Enrollment status. Effective management of small business. Factors contributing to the failure of small business. Small business management. Entrepreneur: small business promoter. Assessing entrepreneurial capacity and entrepreneurial goal setting Ways to launch the business. Small business planning and accounting issues for small businesses. Identifying and evaluating business ideas opportunity. Initiating marketing business.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Audit and Certification of Safety Engineering in Industry	SMACSI	3	2		2	

Course description (Syllabus): Occupational safety and health concept ; Legal framework of occupational safety and health audit ; Enterprises occupational safety and health audit; Occupational safety and health auto evaluation for small enterprises; Auto evaluation sheet; Audit report; OHSAS 18001 implementation.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Bases of Experimental Research	SMBCEX	3	3		2	

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

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Statistical Control of Processes and Accidents	SMCSPR	3	2		2	

Course description (Syllabus): Getting statistics and probabilities used in Statistical Process Control; Machine capability;

Variability. Control cards, general terms; Control charts with variables (\bar{x} and R , \bar{x} and s , \bar{M} and R , \bar{x} and MR); Process capability; CUSUM sheets. EWMA sheets; By attributes control charts (p , np , c , u); Measurement Systems Analysis .

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
High Level Design	SMMAPR	3	2		2	

Course description (Syllabus): Introducing SolidWorks program; Work with parts in SolidWorks; Creating assemblies of parts; Obtaining drawings; 3D sketches; Obtaining connections between pieces; Making connections; Import and export files; Design dies; SolidWorks Utilities.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Practical Activity	SMPR23	2			30	

Course description (Syllabus): Industrial case studies: effective performance of management system for health and occupational safety; monitoring of industrial pollutants; applicable laws; quality management; economic aspects.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Research for the Diploma Project	SMPPD2	10				26