POLYTECHNIC OF RIJEKA
OCCUPATIONAL SAFETY DEPARTMENT

PROGRAMME OF STUDY

PROFESSIONAL STUDY OF OCCUPATIONAL SAFETY

- **LIST OF COURSES**

PROFESSIONAL STUDY OF OCCUPATIONAL SAFETY

FIELD OF STUDY: GENERAL OCCUPATIONAL SAFETY

1st year of study – Semester I (winter semester)

Course unit no.	Title of the course unit	Hours weekly				ECTS credits	Exam
		L	S	E	P		
1	Mathematics	4	-	5	-	8	1
2	Physics for Engineers	3	-	2	-	6	1
3	Electrotechnics	2	-	2	-	6	1
4	Chemistry for Engineers	3	-	3	-	7	1
6	Foreign language I	1	-	1	-	3	1
7	Physical education	-	-	(2)	-		
	Totally per semester	**13**	**-**	**13 (15)**	**-**	**30**	**5**

Note: 1) L – lecture, S – seminar, E – exercise, P – practical
2) It is possible to choose a foreign language among English or German.
3) Physical education is not held during regular classes.

1st year of study – Semester II (summer semester)

Course unit no.	Title of the course unit	Hours weekly				ECTS credits	Exam
		L	S	E	P		
5	Fundamentals of safety	2	-	1	-	3	1
9	Computers in safety science	2	-	3	-	5	1
10	Human factors in safety	2	-	1	-	3	1
11	Safety measures in electric power exploitation	2	-	2	-	4	1
12	Theory of combustion and fire-extinguishing	2	-	2	-	5	1
13	Basics of the law and legislation of safety	2	-	2	-	5	1
14	Foreign language II	1	-	1	-	3	1
7	Physical education	-	-	(2)	-	-	-
15	Professional summer work experience	-	-	-	(x)	2	-
	Totally per semester	**13**	**-**	**12 (14)**	(x)	**30**	**7**

2nd year of study – Semester III (winter semester)

Course unit no.	Title of the course unit	Hours weekly				ECTS credits	Exam
		L	S	E	P		
16	Foreign language III	1	-	1	-	3	1
17	Probability and statistics	2	-	2	-	6	1
18	Organization and management	2	2	-	-	6	1
19	Chemical and biological noxiousness	3	-	1	-	5	1
20	Mechanics and mechanical hazards	3	-	3	-	7	1
22	Occupational medicine	2	-	1	-	3	1
	Totally per semester	**13**	**2**	**8**	**-**	**30**	**6**

2nd year of study – Semester IV (summer semester)

Course unit no.	Title of the course unit	Hours weekly				ECTS credits	Exam
		L	S	E	P		
23	Foreign language IV	1	-	1	-	3	1
37	Fundamentals of engineering	2	-	2	-	5	1
31	Occupational safety organization	2	-	1	-	3	1
26	Production processes and systems	3	-	1	-	5	1
27	Personal protective equipment	2	-	1	-	4	1
28	Physical noxiousness	3	-	3	-	6	1
29	Quality assurance	2	-	1	-	4	1
	Totally per semester	**15**	**-**	**10**	**-**	**30**	**7**

3rd year of study – Semester V (winter semester)

Course unit no.	Title of the course unit	Hours weekly				ECTS credits	Exam
		L	S	E	P		
30	Fire protection at construction sites	2	-	1	-	3	1
48	Occupational safety management	1	-	1	-	3	1
32	Safety systems	2	-	1	-	5	1
45	Safety in transportation of goods and people	2	-	2	-	5	1
46	Safety and protection in hotel industry and tourism	2	-	2	-	5	1
47	Safety in health care profession	2	-	2	-	5	1
37	Ergonomics and safety					4	1
	Totally per semester	**13**	**-**	**10**	**-**	**30**	**7**

3rd year of study – Semester VI (summer semester)

Course unit no.	Title of the course unit	Hours weekly				ECTS credits	Exam
		L	S	E	P		
49	Professional semestral work experience	-	-	-	(x)	10	-
50	Bachelor thesis	-	-	(x)	-	20	1
	Totally per semester	**-**	**-**	(x)	**(x)**	**30**	**1**

The complete syllabus of Professional study of Occupational Safety:

Semester of study	Hours per semester					ECTS credits	Exams
	L	S	E	P	Totally		
Semester I	195	-	195	-	390	30	5
Semester II	195	-	180	-	375	30	7
Semester III	195	30	120	-	345	30	6
Semester IV	225	-	150	-	375	30	7
Semester V	195	-	150	-	345	30	7
Semester VI	-	-	-	(x)	-	30	1
Totally during the studies	**1005**	**30**	**795**	**(x)**	**1830**	**180**	**33**

During the course of study the students attend a total sum of 1830 teaching hours, and after successful completion of the work required they will obtain 180 ECTS credits.

COURSE DESCRIPTION OF PROFESSIONAL STUDY OF OCCUPATIONAL SAFETY

MATHEMATICS | **Course unit number: 1**

Hours weekly: 4+0+5+0 / I **ECTS credits: 8**

Syllabus outline

Basic symbols of mathematical logic. Sets, operations with sets. Concept, way of setting functions and some of their features. Concept of function domain. Function composition. Inverse function. Classification of functions. Elementary functions. Graphical representation and characteristics of some elementary functions. Definition of vector Addition and subtraction of vectors. Multiplying of vectors by a scalar. Linear combination of vectors. Dependence and independence. Basis and dimension of vector space. Vectors in rectangular co-ordinate system. Concept of series. Arithmetic and geometric series. Finite and infinite series. Series limiting value. Convergence and divergence. Limiting value and continuity of a function. Concept of derivative. Definition and geometric meaning of derivative. Differential of a function. Rules of derivation. Derivatives of elementary functions. Derivative of a composite function. Higher order derivatives. Equation of tangent.

Developing general and specific competence (knowledge and skills)

Students gain knowledge given in the syllabus outline. The aim is to develop their capability of logical reasoning and analytic thinking when solving problem-oriented tasks and accuracy in calculating mathematical facts.

Types of classes and methods of assessment

The course is carried out weekly, in the form of consultancy.

PHYSICS FOR ENGINEERS | **Course unit number: 2**

Hours weekly: 3+0+2+0 / I | **ECTS credits: 6**

Syllabus outline

Introduction: Physics - principles and importance. *Motion of particles and bodies*: path, speed and acceleration. Forces and laws of motion. Relative motion. Activity and energy. Gravitation. *Mechanics of fluids*: still fluids and fluids in motion. Forces in real liquids. *Temperature and heat*: Change of physical condition. *Thermodynamics*: first and second rule of thermodynamics. Heat engines. *Motion of a solid body*: Solid body. Kinetic energy. Quantity motion moment. Action of a force on solid bodies. Centre of gravity. Harmonic oscillation. Damped and forced oscillation. Speed, reflection. *Electromagnetic radiation*: Electromagnetic oscillation. Origin of electromagnetic waves. Speed of light. *Atoms and quantum*: Creation of an atom model. Classic and quantum physics. *Atomic nucleus*: Structure of an atomic nucleus. Nuclear forces. Radioactivity.

Developing general and specific competence (knowledge and skills)

Familiarization with the fundamentals of physics.

Types of classes and methods of assessment

The course is carried out weekly, in the form of consultancy.

ELECTROTECHNICS | **Course unit number: 3**

Hours weekly: 2+0+2+0 / I | **ECTS credits: 6**

Syllabus outline

Electrostatics: Electric charge, force, field, influence. Potential electric energy. Electric potential. Tension. Electric capacity. Condensers. *Electric energy*: The power of electric energy, density, resistance. Activity and force of electric energy. *Magnetic field*: Magnetic field of electric energy, induction, magnetic flow. Permeability of the inductor through which electric energy flows within the magnetic field. Act of energy on engines. *Electromagnetic induction*: Induced tension. Inter-induction. Magnetic field energy. *Alternating current*: The real value of alternating current. Electrical circuits. Reactive resistance. Power and energy. Three-phase current transformers. *Electric machines*: Electric engines, generators. Safety of an electrical system: grounding of electricity. Tension of the step and tension of the touch. *Fundamentals of electrotechnics*: PN diode, rectifiers, regulators of tension. Transistors. Linear integrated circuits and their function.

Developing general and specific competence (knowledge and skills)

Familiarization with fundamentals of electrotechnics and electronics.

Types of classes and methods of assessment

The course is carried out weekly, in the form of consultancy.

CHEMISTRY FOR ENGINEERS | **Course unit number: 4**

Hours weekly: 3+0+3+0/ I | **ECTS credits: 7**

Syllabus outline

Definition of chemistry: and its field of study. Matter and its chemical transitions. Structure of an atom and the periodical system of elements. Chemical laws of bonding related to mass and volume. Characteristics of solid matter, liquid and gaseous substances. The relative atomic and molecular mass and definition of mol as a measure of matter quantity. The chemical bond and structure of molecules. Types of solutions and quantitative definitions of their content. Colloids, electrolytes, acids and bases. Types of chemical reactions. Redox-reactions. The equilibrium, velocity and energetic exchange during chemical reactions. Properties of important elements and compounds and potential hazards in their use. Nuclear reactions. Types and properties of hydrocarbons. Their industrial use and potential hazards. Organic compounds with different functional groups: properties and potential hazards. Lipids and waxes. Carbohydrates, peptides and proteins. Polymer types: reactions of addition and condensation in their formation. Petroleum: chemical content and industrial processing.

Developing general and specific competence (knowledge and skills)

Familiarization with the structure and changes of chemical compounds during reactions. The emphasis is on compounds and reactions that may lead to chemical hazard and undesirable effects. Exercises develop the ability to solve numerical problems and introduce students to experimental work.

Types of classes and methods of assessment

The course is carried out weekly, in the form of consultancy.

FUNDAMENTALS OF SAFETY | **Course unit number: 5**

Hours weekly: 2+0+1+0 / II | **ECTS credits: 3**

Syllabus outline

Basic concepts: Definitions - incidents, accidents, injuries, damages, occupational diseases, diseases related to the place of work, hazards and noxiousness, risks and hazard assessment.
Theory about incidents and accidents: the fundamental theory about the incidental nature of accidents, acting on workers' perception and prevention of accidents, tendency towards accidents, theory of adjustment or stress theory, theory of defined goals and liberties, domino theory or theory of a sequential cause of accidents.
Accidents analysis: Accidents - study, classification, examination of causes, data processing, practical examples and analysis, tables of time-lasting workload.
Statistics of accidents at work.
Prevention of accidents: technical, organizational and individual factors in accidents prevention.
Keeping workers' interest in occupational safety.

Developing general and specific competence (knowledge and skills)

Familiarization with fundamentals of safety, analysis of injuries and different methods of analysis with respect to workers' safety.

Types of classes and methods of assessment

The course is carried out weekly, in the form of consultancy.

FOREIGN LANGUAGE I - ENGLISH | **Course unit number: 6**

Hours weekly: 1+0+1+0 / I | **ECTS credits: 3**

Syllabus outline

Vocabulary and linguistic patterns typical for the field of safety science.
Exercises include: Nouns. Articles. Personal pronouns. Possessive adjective and pronouns. Verbs: Modal verbs. Tenses (Present and past - simple and continuous; Present perfect and past perfect - simple and continuous).
Lectures selected from the booklet *Career Guide To The Safety Profession.*

Developing general and specific competence (knowledge and skills)

Independent reading and making comments on texts related to occupational safety. Acquiring grammar knowledge as pre-requisite for correct written and oral ways of expressing.

Types of classes and methods of assessment

The course is carried out weekly, in the form of consultancy.

FOREIGN LANGUAGE I - GERMAN | **Course unit number: 6**

Hours weekly: 1+0+1+0 / I | **ECTS credits: 3**

Syllabus outline

Reading and analysing texts concerning the safety profession. The accent is on understanding the terminology.
Concepts of occupational safety. Safety clothes and equipment. Working on the running line. Hazards of working on Sundays. Stress at work.
Grammar: Present tense, modal verbs, different kind of verbs in German. Pronouns. Imperative.

Developing general and specific competence (knowledge and skills)

Acquiring new terminology. Understanding and analysing texts. Basic conversation on safety matters.

Types of classes and methods of assessment

The course is carried out weekly, in the form of consultancy.

PHYSICAL EDUCATION | **Course unit number: 7**

Hours weekly: 0+0+2+0 / I, 0+0+2+0 / II **ECTS credits: -**

Syllabus outline

Classes are held in fitness center and as outdoor running exercises (cross country).
Through exercises students become aware of the importance of regular exercising.
Students also acquire basic information about physical education which has great influence on general heath, on capacity for work and defense mechanisms.
The above mentioned elements influence the development of functional and motoric ability as well as conative and cognitive characteristics of the human body.

Developing general and specific competence (knowledge and skills)

Students gain knowledge and develop skills in physical education to satisfy biological and psychosocial need for movement.

Types of classes and methods of assessment

Classes are carried out weekly in the form of physical exercises. The activity of the students is monitored.
There is no exam.

COMPUTERS IN SAFETY SCIENCE
INFORMATION TECHNOLOGY IN OCCUPATIONAL SAFETY

Course unit number: 9

Hours weekly: 2+0+3+0/ II

ECTS credits: 5

Syllabus outline

Informatics. Information. Information society. Information technology. A computer. Program support. Communications. Organization and information. System concept and definition. Theory of organization, management and decision-support models. Information systems. Expert systems. Development of data processing. Computer systems and their development. Choice of computer facilities. Mathematical and logical fundamentals of a computer. Presenting and organizing data. Redundancy. Program support for computer functioning. The evaluation of software facilities. Computer networks. Multimedia. Information system security. User information systems.
Windows, Word, Excel, Access and Internet.

Developing general and specific competence (knowledge and skills)

Students gain knowledge of basic terms in informatics as well as their meaning. During the exercises students will master Windows, Word, Excel , Access and Internet.

Types of classes and methods of assessment

The course is carried out weekly, in the form of consultancy.

HUMAN FACTORS IN SAFETY | **Course unit number: 10**

Hours weekly: 2+0+1+0 / II | **ECTS credits: 3**

Syllabus outline

Representatives and boards for health and safety. Psycho-physiological ability, personality trait and working ability. Analysis of work, methods, procedures, and fields in safety. Physical work, physiologic assumptions and workers' workload. Fatigue, physiologic background and prevention of fatigue. Consequences of stress at work. Safety and health. Rationalization of physical work. Motivation and safety. Communication of man and machine, attention. Inadequate condition of work. Forms, procedures and efficiency of professional selection with respect to safety. Professional education of workers for safe work. Psychological problems and prevention of accidents at work. Relation of sick-leave, staying away from work and occupational safety. Fluctuation of workers and safety.

Developing general and specific competence (knowledge and skills)

Familiarization with the importance of human factor in safety. Basic knowledge of psychology of work; occupational safety officer's duties and tasks; human factor in safety.

Types of classes and methods of assessment

The course is carried out weekly, in the form of consultancy.

SAFETY MEASURES IN ELECTRIC POWER EXPLOITATION | **Course unit number: 11**

Hours weekly: 2+0+2+0 / II **ECTS credits: 4**

Syllabus outline

Introduction to safety measures in electric power exploitation. Fundamental concepts and principles of basic electrotechnics. Impact of electric power on human beings. Kinds of electric power hazards. Technical safety in constructing high and low voltage plants. Technical safety in creating overhead power lines and cable lines. Regulations and safety measures when working on electric power plants. Safety measures in electric transformer stations, regulating plants, power plants; safety measures when working at overhead power lines, cable lines, underground plants, low voltage plants. Work under voltage exposure in power plants. Technical and personal safety equipment, tools and safety equipment in power plants. Regulations (internal regulations and national laws) and organization of safety at work. Offering emergency medical assistance and liberating injured people from electrical circuits.

Developing general and specific competence (knowledge and skills)

Familiarization with the effect of electricity on man; kinds of electric power hazards. Technical measures in constructing high and low voltage plants. Educating students to apply regulations and measures for safe work in plants and lines.

Types of classes and methods of assessment

The course is carried out weekly, in the form of consultancy.

THEORY OF COMBUSTION AND FIRE-EXTINGUISHING | **Course unit number: 12**

Hours weekly: 2+0+2+0 / II | **ECTS credits: 5**

Syllabus outline

Physical and chemical fundamentals of combustion process: Definition of combustion, conditions needed for combustion, thermodynamics, kinetic of combustion process, limits of explosiveness, fire hazards and methods of prevention, categorization of inflammables and partial and full combustion products. Quantity of reactors and products of combustion as to their volume and mass. Zones of hazard, storing and decanting of inflammable liquids and gasses. Hazard assessment.
Physical and chemical fundamentals of fire-extinguishing process: Definition and conditions needed for fire extinguishing. Assessing the needed quantity of fire-extinguishers. Mobile, partially mobile and fixed systems of fire extinguishing; fire alarm systems in chemical plants.
Legislative regulations.

Developing general and specific competence (knowledge and skills)

Familiarization with the theory of combustion and the conditions needed for burning and the limit of explosiveness. These are calculated with simple formulas. Familiarization with personal protective equipment and fire-extinguishing tools.

Types of classes and methods of assessment

The course is carried out weekly, in the form of consultancy.

BASICS OF THE LAW AND LEGISLATION OF SAFETY | **Course unit number: 13**

Hours weekly: 2+0+2+0/ II | **ECTS credits: 5**

Syllabus outline

Introduction in law: legal notions, categories, institutes and legal relationships in the field of the protection at work, protection of the nature and other relationships regulated by the legislation of safety. Human rights and freedoms. Rights on work and in connection with work. Regulations and subjects of the enactment, realization and protection of rights in constitutional, civil, criminal, commercial and labour law and law of the protection at work and protection from fire. Procedure. Control. Responsibility.

Developing general and specific competence (knowledge and skills)

Developing of the basic knowledge about law and legal system in legislation of safety (at work, protection from fire etc.) and procedure in regulation, realization and protection of rights.

Types of classes and methods of assessment

The course is carried out weekly, in the form of consultancy.

FOREIGN LANGUAGE II - ENGLISH | **Course unit number: 14**

Hours weekly: 1+0+1+0 / II | **ECTS credits: 3**

Syllabus outline

Vocabulary and linguistic patterns typical for the field of safety science.
Exercises include: Questions words and question tags. Verb tenses (Future - shall/will, going to future, future perfect simple and continuous).
Lectures selected from the booklet *Career Guide To The Safety Profession.*

Developing general and specific competence (knowledge and skills)

Independent reading and making comments on texts related to occupational safety. Acquiring grammar knowledge as pre-requisite for correct written and oral ways of expressing.

Types of classes and methods of assessment

The course is carried out weekly, in the form of consultancy.

FOREIGN LANGUAGE II - GERMAN | **Course unit number: 14**

Hours weekly: 1+0+1+0 / II | **ECTS credits: 3**

Syllabus outline

Reading and analysing texts concerning the safety profession. The accent is on understanding the terminology.
Industrial trade unions. Inadequate heating at the place of work. Transport of hazardous cargo. Safety in road and railway transport.
Writing a CV.
Grammar: past tenses, ordinal numbers, declension of adjectives.

Developing general and specific competence (knowledge and skills)

Acquiring new terminology. Understanding and analysing texts. Basic conversation on safety matters.

Types of classes and methods of assessment

The course is carried out weekly, in the form of consultancy.

PROFESSIONAL SUMMER WORK EXPERIENCE | **Course unit number: 15**

Hours weekly: 0+0+0+(x) / II | **ECTS credits: 2**

Syllabus outline

Professional summer work experience is to be gained after completing the first academic year during the summer months. Work experience lasts for one month. The content of the professional work experience depends on students' field of study. Students must prepare a written report describing the experience gained. Professional work experience is to be gained in companies, workshops and institutions with an emphasis on occupational safety.

Developing general and specific competence (knowledge and skills)

Gaining practical experience and skill in companies or institutions.

Types of classes and methods of assessment

The course is carried out weekly, in the form of consultancy.

FOREIGN LANGUAGE III - ENGLISH | **Course unit number: 16**

Hours weekly: 1+0+1+0 / III | **ECTS credits: 3**

Syllabus outline

Vocabulary and linguistic patterns typical for the field of safety science.
Exercises include: Conditional (if) clauses. Comparison of adjectives.
Lectures selected from the booklet *Career Guide To The Safety Profession.*
Students are introduced to individual research work and reading of texts related to their field of specialization.

Developing general and specific competence (knowledge and skills)

Independent reading and making comments on texts related to occupational safety. Acquiring grammar knowledge as pre-requisite for correct written and oral ways of expressing.

Types of classes and methods of assessment

The course is carried out weekly, in the form of consultancy.

FOREIGN LANGUAGE III - GERMAN | **Course unit number: 16**

Hours weekly: 1+0+1+0 / III | **ECTS credits: 3**

Syllabus outline

Reading and analysing texts concerning the safety profession. The accent is on understanding the terminology.
Fire protection. Occupational diseases. Smoking. Monotony at work.
Dependent clauses. Infinitive clauses. Shortening of sentences by using the Infinitive. Declensions.

Developing general and specific competence (knowledge and skills)

Acquiring new terminology. Understanding and analysing texts. Basic conversation on safety matters.

Types of classes and methods of assessment

The course is carried out weekly, in the form of consultancy.

PROBABILITY AND STATISTICS | **Course unit number: 17**

Hours weekly: 2+0+2+0 / III | **ECTS credits: 6**

Syllabus outline

Descriptive statistics: Statistic set. Arranging data. Numerical indicators of a central tendency for dispersion and shaping.
Fundamentals of combinations: permutations, combinations and variations.
Probability: Definition of probability. Probability of union and intersection. Conditional probability and independence of events. The law of total probability and the Bays theorem. Geometric probability.
Random variables: Discreet and continuous random variables. Expectations and variations. Binomial, Poisson, normal and gamma dispersion. χ^2-test.
Inferential statistics: Sample and parameters of the sample and of the root set. Central limit theorem. Intervals of reliance
Correlation and regressive analysis: Method of minimal quadrants. Linear correlation and regression.

Developing general and specific competence (knowledge and skills)

Familiarization with fundamental techniques for statistical research. Special emphasis is on those concepts, methods and processes related to students' field of study.

Types of classes and methods of assessment

The course is carried out weekly, in the form of consultancy.

ORGANIZATION AND MANAGEMENT | **Course unit number: 18**

Hours weekly: 2+2+0+0/ III | **ECTS credits: 6**

Syllabus outline

Introduction to organization. Legal forms of corporate organization in Croatia: Organization of companies; Complex forms; Organizational form of concerns and holdings. Organization of company departments. Company organization on the basis of responsibility centres.
Management definition and characteristic. Planning – nature and purpose of planning, hierarchy and types of strategies, decision making. Organizing – organization and its contents, organization structure modelling, classical and modern organizational forms, modern trends, organizational culture. Human resource management – prediction of needs, recruitment and selection, career management, education and development, salaries and compensations. Leadership – definition, leader, leadership skills, leadership elements, power and authority, leadership styles, motivation theories and techniques. Control – process of control; phases of control; system and techniques of control.

Developing general and specific competence (knowledge and skills)

Developing general competence with reference to organizing and managing of companies and/or other organizations in general. Students learn how to apply methods and techniques of management.

Types of classes and methods of assessment

The course is carried out weekly, in the form of consultancy.

CHEMICAL AND BIOLOGICAL NOXIOUSNESS | **Course unit number: 19**

Hours weekly: 3+0+1+0 / III | **ECTS credits: 5**

Syllabus outline

Chemical hazards: noxious and toxic chemical substances; entry, absorption, bio-transformation and effects on human organism; excretion; cumulative effects. Chemical hazards in working environment; toxicants, mutagenes, cancerogenes, theratogenes. Occupational diseases caused by chemical substances; poisonings by metals, diseases caused by aerosols, poisonings by gasses and vapors, poisonings by pesticides; irritative and allergic dermatoses. Prevention of exposure to chemical hazards.
Biological hazards: microorganisms and parasites, mechanism of pathogen affection. Natural process, symptoms and results of infectious diseases. Spread of infectious diseases; epidemiological chain; carrier state; anthropozoonoses; disease vectors, contagious diseases. Resistance to infectious diseases; immunity. Occupational bacterial, viral, micotic and parasitic diseases. Occupational dermatoses caused by biological hazards. Prevention of exposure to biological hazards.

Developing general and specific competence (knowledge and skills)

Familiarization with characteristics of toxic and noxious chemical substances and biological noxiousness and their influence on human organism. Student become qualified to recognize and prevent hazards of exposure to chemical and biological noxiousness in the working environment.

Types of classes and methods of assessment

The course is carried out weekly, in the form of consultancy.

FUNDAMENTALS OF ENGINEERING | **Course unit number: 37**

Hours weekly: 2+0+2+0 / IV | **ECTS credits: 5**

Syllabus outline

Materials in engineering. Metal alloys. The Fe-C system. Heat treatment of steel. Strength, strain, Hook's law, Poisson's ratio, bending, shear, hardness. Tolerances and fits. Assembly of materials. Permanent joining. Temporary joining. Strength conductors.
Descriptive geometry, types of projection, projection of simple geometric shapes. Side view. Axonometric projection. Isometric projection. Oblique projection. Perspective.
Technical drawing, introduction, types of drawing, paper sizes, line types. Drawing scales. European projection. Technical writing. CAD – drawing aided by computers.

Developing general and specific competence (knowledge and skills)

Proper application of materials in engineering. Noticing types of construction strain and possible breaking points. Suggesting a way of improvement of a possible critical construction. Differentiating typical engine parts. Developing, interpreting and updating simple technical drawings by hand and using a computer in the program AutoCAD.

Types of classes and methods of assessment

The course is carried out weekly, in the form of consultancy.

MECHANICS AND MECHANICAL HAZARDS | **Course unit number: 20**

Hours weekly: 3+0+3+0 / III **ECTS credits: 7**

Syllabus outline

Axioms of mechanics. Co-ordinate systems. Joining of forces on flat surface and in space. Definition of moment of a force and couple of forces. Harmony of forces on flat surface and in space. Friction. Fundamental concepts of supports and internal forces (bending moment, radial forces and axial forces). Defining speed and acceleration. Principles of movement of particles and solid bodies. Newton laws. Dynamics of movement. Moments of inertia. Mechanical work and power. Basic principles of fluid mechanics. Basic concepts of hydrostatics. Elements of hydrodynamics and outflow (equation of continuity, equation of Bernoulli). Flowing in pipes.
Mechanical constructions as source of potential hazards. Safety constructions. Methods of assessing damage causes. Mechanical hazards. Safety at handling movable and handy mechanic tools. Principal groups of safety equipment. Fundamental principles of safety in constructing machines.

Developing general and specific competence (knowledge and skills)

Familiarization with principles of mechanics (statics, kinematics, dynamics and hydrodynamics). Familiarization with potential mechanical hazards consequent from the principles of mechanics. Recognizing mechanical hazards and their prevention.

Types of classes and methods of assessment

The course is carried out weekly, in the form of consultancy.

OCCUPATIONAL MEDICINE | **Course unit number: 22**

Hours weekly: 2+0+1+0 / III | **ECTS credits: 3**

Syllabus outline

Occupational physiology and psychology, anthropometry, biomechanic, ergonomic formation of work places. Occupational diseases, work-related diseases, diseases aggravated on work, occupational exposure to noxious effects and substances, occupational accidents. Working ability. Physiological aspects of work-loads; muscular system and work: static and dynamic work, isometric and isotonic contractions, energy consumption and work; cardiovascular system and work: heart frequency, beat volume, minute volume, arterial blood pressure, EKG; respiratory system and work: pulmonary ventilation, frequency and profun-dity of respiration, spiroergometrics – static and dynamic tests. Fatigue; types and signs, classical theories and modern understanding of fatigue, aspects of fatigue evaluation, relation of fatigue and working time, prevention of fatigue. Occupational accidents and injuries: contributing factors – human, environmental, socio-economic; prevention of occupational accidents. Fundamental principles of first aid.

Developing general and specific competence (knowledge and skills)

Identification of human, ecological and socio-economic factors and their importance for workers' health. Students are qualified act preventively as to fatigue, accidents at work, occupational diseases, diseases related to workplace, diseases worsened by the place of work.

Types of classes and methods of assessment

The course is carried out weekly, in the form of consultancy.

FOREIGN LANGUAGE IV - ENGLISH | **Course unit number: 23**

Hours weekly: 1+0+1+0 / IV | **ECTS credits: 3**

Syllabus outline

Vocabulary and linguistic patterns typical for the field of safety science.
Exercises include: Passive Voice. Sequence of tenses. Direct and indirect speech.
Lectures selected from the booklet *Career Guide To The Safety Profession* and other actual issues - texts are downloaded from the Internet.
Students are introduced to individual research work on an actual issue of their interest related to occupational safety and their future area of specialization.

Developing general and specific competence (knowledge and skills)

Independent reading and making comments on texts related to occupational safety. Acquiring grammar knowledge as pre-requisite for correct written and oral ways of expressing.

Types of classes and methods of assessment

The course is carried out weekly, in the form of consultancy.

FOREIGN LANGUAGE IV - GERMAN | **Course unit number: 23**

Hours weekly: 1+0+1+0 / IV | **ECTS credits: 3**

Syllabus outline

Reading and analysing texts concerning the safety profession. The accent is on understanding the terminology.
Commercial correspondence: writing enquiries, replying to enquiries.
Subjunctive mood. Future tense. Passive voice.

Developing general and specific competence (knowledge and skills)

Acquiring new terminology. Understanding and analysing texts. Basic conversation on safety matters.

Types of classes and methods of assessment

The course is carried out weekly, in the form of consultancy.

PRODUCTION PROCESSES AND SYSTEMS | **Course unit number: 26**

Hours weekly: 3+0+1+0 /IV **ECTS credits: 5**

Syllabus outline

Basic concepts and classification of production processes and systems. Machineless material processing. Casting: moulding, mould and core mould designing, melting furnace and cast refining. Sintering. Processing of materials by deformation: cutting, punching, bending, deep drawing and forging. Processing of materials by dividing and joining: electric arc, welding, soldering and pasting. Machine material processing. Theoretical basis: kinematics and elementary geometry of work-piece and tools, tool cutting-edge consumption and durability, cutting tools. Different types of machining: turning lathe, planing, drilling, milling, broaching, grinding and fine machining procedures. Thermal treatment of metals: metallographic presentation of structure, types of annealing, tempering, improving and cementing. Projecting of production processes: preliminary study, technological concept, definition of location and production resources, area calculations, material flow and arrangement of production resources.

Developing general and specific competence (knowledge and skills)

Familiarization with basic procedures of material processing - machining and machineless processing, types of tools, and the basic machine parts. Familiarization with process and types of thermal treatments. Projecting of production processes, technological concepts and defining types of production.

Types of classes and methods of assessment

The course is carried out weekly, in the form of consultancy.

PERSONAL PROTECTIVE EQUIPMENT | **Course unit number: 27**

ECTS credits: 4

Hours weekly: 2+0+1+0 / IV

Syllabus outline

Organisational and technical methods in developing working areas, in shipbuilding in particular. Procurement, store keeping, maintenance and handling of personal protective equipment. A supervision system for personal protective equipment wearing. Protective equipment for: head, eyes and face, hearing, breading, hands, legs, body, against ionised emission, against fall from heights and against drowning. Specific equipment in fire fighting. Materials used for making personal protective equipment and conditions that the materials need to fulfil. Equipment testing.

Developing general and specific competence (knowledge and skills)

Familiarisation with personal protective equipment and learning how to use it to minimise and prevent danger at working area.

Types of classes and methods of assessment

The course is carried out weekly, in the form of consultancy.

PHYSICAL NOXIOUSNESS | **Course unit number: 28**

Hours weekly: 3+0+3+0 / IV | **ECTS credits: 6**

Syllabus outline

Noise: Basic concepts, volume and units. Physical characteristics of sound. Human ear and the effect of noise on man. Criteria to evaluate noise, regulations and principles. Measuring noise and instruments. Protection from noise. *Vibrations*: What creates vibrations and parameters to describe them. Structure and characteristics of human body. Effect of vibrations and strokes on human body and evaluation. Methods and procedures of safeguarding from vibrations and strokes. *Lights*: Basic concepts and calculations. Structure and function of human eye, field of sight and its segments. Electrical sources of light, lamps and technical characteristics of light. Indoor and outdoor illumination. *Ionizing radiation*: Introduction to ionizing radiation. Types and source of ionizing radiation. Measurement. Human environment and radiation consequences. Protection from radiation. *Temperature factors of the working environment*: Composition, temperature and humidity of air. Main sources of body energy and its consumption. Forms of temperature exchange. Temperature balance equation. Limits of tolerance. Methods of protection.

Developing general and specific competence (knowledge and skills)

Familiarization with basic concepts, events, specific characteristics and consequences of some physical noxiousnesses on human body. Types and methods of measurement. Legislative regulations, principles. Protective measures and equipment.

Types of classes and methods of assessment

The course is carried out weekly, in the form of consultancy.

QUALITY ASSURANCE | **Course unit number: 29**

Hours weekly: 2+0+1+0 / IV **ECTS credits: 4**

Syllabus outline

Quality, concept and meaning. Quality of products, services and processes. Definition and types of elementary processes. Approach to quality assurance. International principles of the Quality Control System HRN EN ISO 9000 ff. Fundamentals of the regulation HRN EN ISO 9001:2002. Documentation of the Quality Control System. Implementation and monitoring of the Quality Control System. Evaluation of the Quality Control System. Evaluation independent from the Quality Control System. Certification of the Quality Control System. Elimination of incongruities and methods of improving quality. Visits of the monitoring and certification committee. The cost of quality.

Developing general and specific competence (knowledge and skills)

Familiarization with the fundamentals of developing and implementing a Quality Control System in an industrial company.

Types of classes and methods of assessment

The course is carried out weekly, in the form of consultancy.

FIRE PROTECTION AT CONSTRUCTION SITES | **Course unit number: 30**

Hours weekly: 2+0+1+0 / V | **ECTS credits: 3**

Syllabus outline

Overview of legislative regulations, prescriptions and legal procedures for assessing construction measures in fire-protection. Principles of construction measures in fire protection prescribed by the fundamental European document, structure of documents and the new European system of labelling fire protection factors.
Basic principles of construction measures in fire protection.
Fundamental issues: fire burden, fire-protection walls, protection from smoke, protection from carrying fire to the neighbouring building, fire brigade access to buildings, net of hydrants, characteristics of construction materials. Calculating resistance to fire of carrying constructions and fire burden. Determining the size of fire sectors and the required fire resistance of carrying constructions. Calculating the ventilation needed to liberate from smoke. Determining fire exits and classes of combustion for construction materials used for fire exits.

Developing general and specific competence (knowledge and skills)

Familiarization with measures for fire prevention (construction measures in fire protection), particularly fire hazard assessment and methods of assessment. Introduction to most important legislative regulations and prescriptions as to fire protection.

Types of classes and methods of assessment

The course is carried out weekly, in the form of consultancy.

OCCUPATIONAL SAFETY ORGANIZATION | **Course unit number: 31**

Hours weekly: 2+0+1+0 / IV | **ECTS credits: 3**

Syllabus outline

Basic and special regulations as to occupational safety. Determining jobs with special work condition. Principles and technical regulations for safety at work. Reports and files. Ways of signalling safety condition and general information. Working safely. Testing machines and tools with a higher level of hazard. Hazards, noxiousness and workload at job. Evaluating the place of work. Implementing occupational safety at places where dangerous substances are used. Procedures in cases of injuries and occupational diseases. Co-operation with institutions that carry out inspections of workplace. In-house monitoring of occupational safety regulation implementation. Transportation of hazardous substances and their labelling. Methods of hazard assessment. Fire protection measures, purchase and distribution of fire protection equipment.

Developing general and specific competence (knowledge and skills)

Familiarization with occupational safety regulations. Implementation of occupational safety regulations in a company. Introduction to instruments used for measuring chemical and physical noxiousness in working environment.

Types of classes and methods of assessment

The course is carried out weekly, in the form of consultancy.

SAFETY SYSTEMS | **Course unit number: 32**

Hours weekly: 2+0+1+0 / V | **ECTS credits: 5**

Syllabus outline

Analysis of the necessity to introduce security systems. Sources, types and level of hazards. Types of security. Characteristics of passive and active detectors. Central devices and appliances for sound alarming. Transmit of alarm signal. Physical barriers. Security systems: pressure detectors, ultrasound, piezoelectric effect, electromagnetic field, photoelectric effect, and infrared radiation. An example of safety alarm systems for indoors and outdoors, models of security, security in transport, detecting and alarming other hazardous events. Video control and its usage in security systems. Examples of security systems in industry, banking business, commerce, computing centres, transport and tourism. Use of computers in security systems.

Developing general and specific competence (knowledge and skills)

Familiarization with security system components and devices. Creating the skill to find strategic solutions to specific security demands.

Types of classes and methods of assessment

The course is carried out weekly, in the form of consultancy.

ERGONOMICS AND SAFETY | **Course unit number: 37**

Hours weekly: 2+0+1+0 / V | **ECTS credits: 4**

Syllabus outline

Definition and development of ergonomics. General principles and field of application. Necessity to use the theory of probability and statistics in ergonomics. Antropometry and its variables. Antropodynamic and anatomic features of man. Biomechanics of human locomotive system. Biomechanics of human hard and soft tissues. Methods of assessing human workload and muscle fatigue. Principles of ergonomically designed workplace, machines and tools. Theory of sitting and design of seats. Designing workplace environment by means of computers. Safety in projecting technical constructions from an ergonomical perspective. Workers' clothes and shoes for different working conditions from an ergonomical point of view. Characteristics of materials, their hygienic and warming peculiarities, textile material as a safety element. Mental activity at workplace, mental fatigue, stress, boredom and monotony in a safety perspective. Working hours, night shifts and nourishment. Noise and vibrations. Indoor climate.

Developing general and specific competence (knowledge and skills)

Familiarization with human body characteristics and potentials. Learning methods of making working environment adequate to man.

Types of classes and methods of assessment

The course is carried out weekly, in the form of consultancy.

SAFETY IN TRANSPORTATION OF GOODS AND PEOPLE | **Course unit number: 45**

Hours weekly: 2+0+2+0 / V **ECTS credits: 5**

Syllabus outline

Structure and complexity of transportation system. Safety and security in the transport process. Goals and regulations of traffic safety and security. Safety in road traffic. Legislative regulations on road traffic safety. Analysis of traffic accidents. Safety of goods and people in road traffic. Security factors in railroad traffic. Railroad traffic safety management. Unexpected events. Legislative regulations for railroad traffic safety. Safety of goods (cargo) and people in maritime traffic. Safety of the crew. Safety of the ship. Safety of the cargo. International conventions and Croatian legislation on safety in maritime traffic. Safety of airports, airport personnel, passengers and cargo. Hazardous materials in traffic. International regulations and Croatian legislation on hazardous materials transportation.

Developing general and specific competence (knowledge and skills)

Giving theoretical and practical to safety professionals in organizing road, railroad and maritime traffic. Teaching students to monitor and manage traffic processes. Analysing and improving active safety in given segments of transport.

Types of classes and methods of assessment

The course is carried out weekly, in the form of consultancy.

SAFETY AND PROTECTION IN HOTEL INDUSTRY AND TOURISM | **Course unit number: 46**

Hours weekly: 2+0+2+0 / V | **ECTS credits: 5**

Syllabus outline

Health problems of workers in hotel industry and tourism due to long-hour standing position, lifting and carrying weight: varicose veins, thrombosis, thrombophlebitis; reactions of their body to workload of bones, joints, spine, feet; rheumatism; abdominal hernia; protection from adverse body pose. Handling machines, equipment, tools; accidents, injuries; protection from accidents and injuries. Biological factors in working environment; infectious intestinal diseases, food poisonings, parasites, hepatitis A, BSE, legionellose; legislative for food handling personnel, efficacy of periodical health examination; possibilities of importation of infectious diseases not present in Croatia due to tourism migrations. Physical factors in working environment: microclimate conditions in kitchens and other spaces. Chemical factors: soaps, detergents; DDD-substances; poisonings, allergies, occupational dermatoses. Personal protection equipment. Working clothes in hotel industry.

Developing general and specific competence (knowledge and skills)

Familiarization with occupational diseases, diseases related to workplace, diseases worsened by the place of work as to hotel-industry professionals. Students are qualified to identify and prevent hazards which hotel-industry and tourism professionals meet in their professional activity.

Types of classes and methods of assessment

The course is carried out weekly, in the form of consultancy.

SAFETY IN HEALTH CARE PROFESSION | **Course unit number: 47**

Hours weekly: 2+0+2+0 / V | **ECTS credits: 5**

Syllabus outline

Health care professionals' working conditions and tasks: stress conditions; standing position and problems with bones, joints, spine; lifting, carrying and transporting patients; accidents and injuries. Occupational hazards in medicine; physical: noise and vibrations; radiation – non-ionising (medical ultrasound, infrared rays, laser, micro-waves, magnetic resonance) and ionising (electromagnetic, corpuscular; X-rays, accelerators; primary and secondary radiation; radioactive materials: open and closed radiation sources); chemical: noxious and toxic substances, citostatics, drugs, inhalation anesthetics, liquid and compressed gasses, laboratory reagents and chemicals, chemical substances used for sterilisation and desinfection, acids and basis; biological: acute hepatitis B and C, HIV infection, TB, varicellae, measles, rubella, mumps. Prevention: general and specific measures. Medical instruments and equipment. Working clothes and other personal protection facilities.

Developing general and specific competence (knowledge and skills)

Familiarization with occupational diseases, diseases related to workplace, diseases worsened by the place of work as to health-care professionals. Students are qualified to identify and prevent hazards of exposure to noxious factors and substances which health-care professionals meet in their professional activity.

Types of classes and methods of assessment

The course is carried out weekly, in the form of consultancy.

OCCUPATIONAL SAFETY MANAGEMENT | **Course unit number: 48**

Hours weekly: 1+0+1+0 / V | **ECTS credits: 3**

Syllabus outline

Goals and objects of occupational safety. Occupational safety management within a block scheme of system management. Modelling of elements that are part of organizational and physical structure of a management system. Applying information technology in modelling elements that are part of organizational and physical structure and of occupational safety. Applying principles of occupational safety on elements that are part of organizational and physical structure. Risk level assessment. Plans to reduce risk level. Technological processes management and control. Analysis and reports. Ways of implementing occupational safety regulations.

Developing general and specific competence (knowledge and skills)

Familiarization with occupational safety management within a management system; a modern approach by applying information technology.

Types of classes and methods of assessment

The course is carried out weekly, in the form of consultancy.

PROFESSIONAL SEMESTRAL WORK EXPERIENCE | **Course unit number: 49**

Hours weekly: 0+0+0+(x) / VI **ECTS credits: 10**

Syllabus outline

The content of the professional work experience depends on students' field of study. The co-ordinator assigns tasks for every field of study. The co-ordinator of professional work experience, as agreed with the mentor appointed from a given company or institution, defines the content and the dynamics of gaining the professional semestral work experience.

Developing general and specific competence (knowledge and skills)

Gaining practical experience and skill in companies or institutions.

Types of classes and methods of assessment

The course is carried out weekly, in the form of consultancy.

BACHELOR PAPER | **Course unit number: 50**

Hours weekly: 0+0+(x)+0 / VI **ECTS credits: 20**

Syllabus outline

Bachelor paper is students' individual thesis that demonstrates his professional knowledge in solving independently a practical professional task. The content is based on the application of acquired professional knowledge in students' field of study. Bachelor paper can be taken only within a choice of a few professional courses. Its subject is chosen by the student himself during the VI semester. The subject is confirmed by the teacher i.e. mentor who supervises student's work. The workload of Bachelor paper as student's individual work is estimated to 225 working hours.

Developing general and specific competence (knowledge and skills)

Independent problem solving of a practical professional task by applying knowledge acquired during the course of study. During the writing of the thesis, the mentor guides the student to successfully meet the given goals.

Types of classes and methods of assessment

The course is carried out weekly, in the form of consultancy.