POLYTECHNIC OF RIJEKA

PROGRAMME OF STUDY

PROFESSIONAL UNDERGRADUATE STUDY OF TELEMATICS

- **LIST OF COURSES**

Programme of the Professional Undergraduate Study of Telematics

1st year of study – 1st semester (Winter Semester)

Course unit number	Title of course unit	Hours per week				ECTS-credits	Exam
		L	S	E	P		
1	Mathematics	3	-	4	-	8	1
2	Basic Elements of Telematics	4	-	2	-	7	1
3	Basics of Information Science	2	-	2	-	5	1
5	Programming I	2	-	2	-	5	1
6	Internet Communication	2	-	2	-	5	1
7	Physical Education			(2)			
	Totally per semester	**13**		**12 (14)**		**30**	**5**

1st year of study – 2nd semester (Summer Semster)

Course unit number	Title of course unit	Hours per week				ECTS-credits	Exam
		L	S	E	P		
4	Business Organization	2	2	-	-	5	1
9	Basics of Marketing	2	1	-	-	4	1
10	Algorithms and Data Structures	2	-	2	-	5	1
11	Signal Theory	2	-	2	-	6	1
12	Developing Communication and Presentation Skills	2	-	2	-	4	1
13	Communication Technique	2	-	2	-	6	1
7	Physical Education			(2)			
	Totally per semester	**12**	**3**	**8(10)**		**30**	**6**

2nd year of study – 3rd semester (Winter Semester)

Course unit number	Title of course unit	Hours per week				ECTS-credits	Exam
		L	S	E	P		
14	Programming II	2	-	3	-	6	1
15	Databases	3	-	3	-	6	1
16	Mobile Communication	2	-	1	-	4	1
17	Project Management	2	2	-	-	5	1
18	Transport Logistics	2	1	-	-	5	1
19	English Language I	2	-	1	-	4	1
	Totally per semester	**13**	**3**	**8**		**30**	**6**

2nd year of study – 4th semester (Summer Semester)

Course unit number	Title of course unit	Hours per week				ECTS-credits	Exam
		L	S	E	P		
20	Software Engineering	3	-	3	-	6	1
39	Concepts of Operating Systems	2		2		5	1
22	Telecommunication Networks and Services	2	-	2	-	5	1
23	System Design in Telematics	2		2	-	5	1
24	English Language II	2	-	1	-	4	1
	Elective course*	2	-	2	-	5	1
	Totally per semester	**13**	**-**	**12**		**30**	**6**

3rd year of study – 5th semester (Winter Semester)

Course unit number	Title of course unit	Hours per week				ECTS-credits	Exam
		L	S	E	P		
25	Web Programming	2	-	2	-	5	1
26	Systems and Process Control	2	-	2	-	5	1
27	Geographic Information Systems	2	-	2	-	5	1
28	Telematics in Transport	2	2	-	-	6	1
40	Project in Telematics	1		3		4	1
	Elective course	2	-	2	-	5	1
	Totally per semester	**11**	**2**	**11**		**30**	**6**

3rd year of study – 6th semester (Summer Semester)

Course unit number	Title of course unit	Hours per week				ECTS-credits	Exam
		L	S	E	P		
30	Professional Internship	-	-	-	**(x)**	13	-
31	Final Thesis	-	-	**(x)**	-	17	1
	Totally per semester			**(x)**	**(x)**	**30**	**1**

***Elective courses:**

(32) Safety and Quality Management in Telematics 4. Sem. active
(33) Multimedia Systems 4. Sem. active
(34) Media Rights not active
(35) Human Resources in Telematics not active
(36) Automation of Facilities 5.sem. active
(37) e-Business 5.sem. active

Total - entire curriculum of the Professional Undergraduate Study of Telematics:

Semester of study	Hours per semester					ECTS-credits	Exams
	L	S	E	P	Totally		
1st semester	180	60	150	-	360	30	6
2nd semester	165	15	165	-	345	30	6
3rd semester	180	75	105	-	360	30	6
4th semester	165	60	120	-	345	30	6
5th semester	180	60	120	-	360	30	6
6th semester	-	-	(x)	(x)	-	30	-
Totally during the study	**870**	**270**	**660**	**(X)**	**1770**	**180**	**30**

During the course of study students attend the total of 1770 teaching hours, and by fulfilling all their obligations are awarded 180 ECTS-credits in total.

MATHEMATICS **Course unit number 1**

Hours weekly: 3+0+4+0/I **ECTS credits: 8**

Syllabus outline

Revising and determining the basics of Mathematics. Determining previous knowledge.
Term, the way of giving and some forms of functions. The domain of a function. Function composition. Inverse function. Classification of functions. Basic functions. Graphical display and features of some elementary functions. The examples of using elementary functions in telematics.
Polynomials. Polynominal factorization and determining null points. Fractional rational functions, domain, null points, asymptotes. Equations/ Inequations, linear, quadratic, nth degree equations. The term matrix and some special types of matrices. Operations with matrices. Determinants. Features of determinants. Calculating the value of a determinant. The rank of a matrix. Invertible matrix. Matrix equations. Fractional rational functions. Vector spaces. Vector module, direction and orientation. Adding and subtracting vectors and scalar multiplication. A display of vectors using coordinates. Scalar and vector product. Linear dependence and independence of vectors The application of a vector calculus at alternating current.
The term row. Limit of a sequence. Convergence and divergence, types of sequences. Limit of a function. Term and definition of a derivation in a point exemplified by the tangent (Leibnitz) and a problem of a current velocity (Newton). A derivative of certain table derivatives. Basic rules for derivation. Technics of derivation using table derivatives (simple derivatives). Derivatives of a complex function. Logarithm derivation. Extremes and optimum. Solving the limit by using derivations – L'Hospital's rule. Integral calculus. The application of a differential calculus in telematics. The Laplace transformation and the application in system modelling.

Developing general and specific competence (knowledge and skills)

The programme ensures that students master mathematical terms, procedures and methods of mathematics basics, basics of mathematics logic and basics of mathematics algebra. Students gain competence to recognize, formulate, analyze and solve mathematical problems by applying different procedures acquired during the programme. Students master vector calculus , basic terminology in relation to mathematical statistics and basics of mathematical analysis. Students develop their abilities of logical reasoning , analysis and synthesis in computing and expressing mathematical facts. They are trained to define and formulate problems related to communication and IT technology as mathematical forms and models and to solve these using acquired methods and accompanying procedures.

Types of classes and methods of assessment

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

BASIC ELEMENTS OF TELEMATICS **Course unit munber: 2**

Hours weekly: 4+0+2+0 / I **ECTS credits: 7**

Syllabus outline

Introduction into telematics. Units of measurement in telematics. Electric basics of matter. Conductors, semiconductors and insulators. Electron as a charge carrier. Electricity. Resistance. Direct current. Direct electrical circuit. Electric field and potential. Electrical circuit laws – Ohm's Law and Kirchoff's Laws. Serial and parallel circuit. Power and energy. Modern sources of charge. Magnetism. Magnetic field, magnetic induction. A conductor in a magnetic field. A scroll. Electricity as a consequence of magnetism. Alternating current – basic terminology. Alternating current frequency, maximum and effective power of charge. Inductance and capacity in the context of alternating current. Vector diagrams. A transformer. The strength of the triangle. Three-phase system and the rotating magnetic field. Phase and line charge. The triangle and star connection. The influence of electric force on a human, dangers and first aid. Electrical machines – application and operating principles. A DC generator and motor. Synchronous and asynchronous machines. Measurement procedures in electrotechnics. Measurement mistakes. Modern digital measurement instruments; oscilloscopes – a comparison between digital and analogue. Measurement resistance, charge, electricity, power. Measuring amplifiers and attenuators. Obstacles and standard measuring signals. AD converter. The significance of semiconductors and its application. A diode, transistor, thyristor. Photoelectric elements –solar cells, lasers, LED technology. Optic cables and accompanying technology of data transfer. SM and MM technology. Some features of amplifier connectors – frequency characteristics, negative backward connection. Controllable and uncontrollable semiconductor valves. Thyristors. Electricity and charge converters. AC-AC, DC-DC, AC-DC and DC-AC converters – the importance and the way of operating. Controllable switches. Sensory analysis and the introduction into measurement converters. Measurement converters – practical examples. Basics of wireless communication.

Developing general and specific competence (knowledge and skills)

Student gain knowledge on the structure of matter and occurrences in relation to electrostatic fields. They develop the ability of logical reasoning on direct and alternating electric currents and occurrences in magnetic fields. They will be able to analyze properly the way semiconductor components operate and basics of electric systems, optic components and devices, especially their implementation in engineering on a daily basis.

Types of classes and methods of assessment

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

BASICS OF INFORMATION SCIENCE **Course unit number: 3**

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

Syllabus outline

Information science. Information. Information society. Information technology. Computer. Software Communications. Organization and information. Notion of system. System theory. Information system. Develpoment of data processing. Computer systems and their develpoment. Selection of computer equipment. Mathematical and logical basics of computers. Data presentation and organization. Redundancy. Software support for computer work. Software selection. Computer networks. Multimedia. Information system security. Practice: Windows, Word, Excel, Access, Power Point and Internet

Developing general and specific competence (knowledge and skills)

Acquisition of knowledge about basic concepts of IT and their meaning. Through exercises students will overcome Windows, Word, Excel, Access, Power Point and Internet.

Types of classes and methods of assessment

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

PROGRAMMING I **Course unit number: 5**

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

Syllabus outline

Features of programming languages. Compiler, interpreter and virtual machine. Programming fundamentals – syntax and notation (diagrams and syntaxes). Development of programming languages (direct, procedural, structural, objective). Structural and modular programming and functional decomposition of programs. Variables, data types, constants. Complex data types (fields, structures), operating with files. Control structures (sequencing, selection, multiple selection, repetition, structural programming). Top-down method and pseudo code for algorithm building and expressing of algorithm solutions in the form of computer programs.

Developing general and specific competence (knowledge and skills)

Learning the processes required to solve the programming problems. Mastering the basic data and control structures. Mastering the procedure of a programming language. Development of logical deduction ability and analytical reasoning through solving problem exercises. Systematic and precise defining of software basis for a company's information system.

Types of classes and methods of assessment

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

INTERNET COMMUNICATION **Course unit number: 6**

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

Syllabus outline

ISO/OSI model; layers of TCP/IP model; construction of TCP/IP packages; network layer and IP addressing; Ipv4 and Ipv6; network routers and gateways; TCP/IP transport layer protocols – TCP and UDP; ports and network sockets; application layer in TCP/IP model – operating of services and protocols: telnet, ftp, e-mail, NNTP, chat, HTTP; WWW - HTML, CSS, Java Script, CGI, Perl

Developing general and specific competence (knowledge and skills)

After successfully completing this course, students will have acquired the knowledge comprised in the syllabus. The aim of the course is to develop logical deduction ability and analytical reasoning through solving problem exercises which deal with preparing and conveying actual information and data by using the internet.

Types of classes and methods of assessment

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

PHYSICAL EDUCATION **Bourse unit umber: 7**

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

Syllabus outline

Regular 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 greatly influences general heath, fitness for work and defense mechanisms.
The above mentioned elements have the influence on the development of functional and motoric ability as well as co-native and cognitive characteristics of the human body.

Developing general and specific competence (knowledge and skills)

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

Types of classes and methods of assessment

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

BUSINESS ORGANIZATION **Course unit number: 4**

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

Syllabus outline

Concept of organization. Factors in organization structuring: internal structuring factors, external structuring factors. Organizational structure. Formal and informal structure. Elements of organizational structure. Types – functional, divisional, matrix, processing, network. Advanced organizational types. Centralization and decentralization problems. Operative and workers' management: basic organization functions. Delegation of authority and responsibility. Management hierarchy. Management styles. Decision making. Company development. Entrepreneurship. Corporate alliances. Allocation of functions. Organizational dynamics. The role of conflicts in organizational structuring. Company's problems solution. Network planning methods. Types of business entity.

Developing general and specific competence (knowledge and skills)

Acquisition of theoretical and practical knowledge regarding organization as a complex and significant system of every company. Development of skills leading to a successful recognition and solving of different organizational problems, particularly through a team work.

Types of classes and methods of assessment

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

BASICS OF MARKETING **Course unit number: 9**

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

Syllabus outline

Conception of marketing, basic concepts, evolution of conception. Levels of marketing application. Marketing environment; external and internal environment. Market research process. Marketing information systems. Consumers' behavior; characteristics of consumers' behavior. Market segmentation, forecasting and positioning. Product policy. Price policy (expenses calculation, coverage calculation, controlling). Distribution and logistics. Promotion policy. Sales management. Organizing of marketing activities.

Developing general and specific competence (knowledge and skills)

After successfully completing this course students will have acquired the knowledge regarding the possibilities of marketing application in various fields of economy. Students will also have gained the knowledge of the impact of marketing conception on the business operation. Through solving problem exercises, students will develop the abilities in problem analysis, logical deduction and creative thinking.

Types of classes and methods of assessment

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

ALGORITHMS AND DATA STRUCTURES **Course unit number: 10**

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

Syllabus outline

Fields and vectors (syntax, semantics, multidimensional fields, development of container class); FIFO and LIFO (sleep awaiting, data arranging); Data structures for chain of characters (String, StringBuffer/String tokenizer); Algorithms verification (correctness, static and dynamic finity, guarantee, verification rules, termination); Expenses and complexity (expenses account, effectiveness, comparison of algorithms, complexity classification); Recursion (divide and conquer – strategies, implementation and dynamic complexity of recursive algorithms); Chain lists (simple and double chain lists with and without empty initial and final elements, cyclic chain lists; entering, adapting and removing the elements on the list, complexity of operation on the list); Trees (structure and notions, searching, entering and removing nods in a binary tree, formation of search trees, traversation, balancing, multiple tree); Elementary search engine (sequential search, binary search, interpolative search); Browsing of data given in an unpredictable order
(deduction transformations, transition linking, chart).

Developing general and specific competence (knowledge and skills)

Upon completion of this course students will have developed the abilities of logical deduction and analytical reasoning, through solving problem exercises in the fields of data acquisition technology and operational information production, through the complex processes in a company.

Types of classes and methods of assessment

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

SIGNAL THEORY **Course unit number: 11**

Hours weekly: 2+0+2+0/II **ECTS credits: 6**

Syllabus outline

IT description of a communicative system. Entropy and information content. An outline and types of signals: continuous, discreet and digital. The linear transformations system. Correlation and convolution. Characteristics of random signals and noise. Spectral density. Channel capacity. SISO and MIMo channel models. Boundaries of a safe information transfer. IT features and principles of medium coding: language, sound, image and video. Characteristics of the speech signal. Speech coding. Image coding. Procedures of compressing the image. Basics of modulation processes. Time continuous modulation and time discreet modulation. Multiplexing principles: space-division multiplexing, frequency-division multiplexing, time-division multiplexing and wavelength-division multiplexing. Orthogonal frequency division multiplex. OFDM modulation procedures.

Developing general and specific competence (knowledge and skills)

By fulfilling the program, students will acquire knowledge to understand the communication system, knowledge on types of signals and ways of their processing in transfer systems, but also in their characteristic sizes, characteristics of a speech signal, sound and image and the possibilities of their coding and modulation and modulation procedures.

Types of classes and methods of assessment

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

DEVELOPING COMMUNICATION AND PRESENTATION SKILLS **Course unit number: 12**

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

Syllabus outline

Basics of communication. Verbal and non - verbal communication. Learning and understanding various styles of communication and behaviour. Basics of multimedia communication. The role of multimedia communication in business environment. Multimedia document. Basic types of multimedia documenats and how to make them. Data models in multimedia presentation: modelling of media, navigation, data perception and transfer.
Techniques of presentation. Models of making a good presentation. The goal and rules of a presentation. Tools for creating multimedia presentations.Techniques of modelling. Additional tools and media. Team work.

Developing general and specific competence (knowledge and skills)

Through this course students gain knowledge of how to develop communication and presentation skills. The goal is also to develop logical reasoning and analytic approach when solving problem tasks in the area of application and presentation using information-communication technologies in the real business world.

Types of classes and methods of assessment

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

COMMUNICATION TECHNIQUE **Course unit number: 13**

Hours weekly: 2+0+2+0 / II **ECTS credits: 6**

Syllabus outline

Basics of digital communication; available infrastructures (LAN; WAN, Wireless and other); Models of communication; Open systems communication; ISO / OSI reference models; Seven layers; Layers 1-3 exemplary (LAN, ISDN, ATM); Transfer media; Economy in stratification; Network application
Client- Server Interaction; electronic mail; Data transfer and data retrieval; Network management, Network security; Systems of telecommunication, telephone, fax.

Developing general and specific competence (knowledge and skills)
Through this course students gain knowledge in communication techniques. The goal is to develop logical reasoning and analytic approach when solving problem tasks in the communication between various parts and functions in a specific organization.

Types of classes and methods of assessment
The course is carried out weekly, in the form of consultancy.

PROGRAMMING II **Course unit number: 14**

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

Syllabus outline

Introduction into object-oriented languages (C++, C#, Java) and division into procedural and functional languages; Objects and classes (structure, syntax, encapsulation, principle of privacy); Object-oriented analysis (OOA); Object-oriented design (OOD); Object-oriented modelling with UML (aspects and diagrams, class diagram, diagram of the application case, component diagram, chart of division, diagram of state, sequence and collaboration, application of UML tools, GO and Poseidon); Attributes (constants, variables, parameters, accessibility, right of access , class and object attributes); Operations (call – by – value, call – by- reference, class methods in objects etc.); Object associations (agregation, composition, cardinality, aspects of association implementation); Control structures (arrays, choice, multiple choice, iteration, structural programming); applications and applets; documentation and guidelines for making a source code, source code documentation.

Developing general and specific competence (knowledge and skills)

Through this course students gain knowledge in programming. The goal is to develop logical reasoning and analytic approach when solving problem tasks in the area of developing programming software as a basis for introduction of modern technology in enterprises.

Types of classes and methods of assessment
The course is carried out weekly, in the form of consultancy.

DATABASES I **Course unit number: 15**

Hours weekly: 3+0+3+0/III **ECTS credits: 6**

Syllabus outline

Theory of databases. Databases modelling using ER method. Notation types of ER model. The concept of functional interdependence. Interdependence in relational databases. The key of relational scheme. Entity integrity. External key. Referential integrity.
"File sharing" and DBMS architecture of databases. Types of program systems for database users (standalone, client-server, web). Types of data (logical, physical). Redundancy, anomalies, decomposition. Normalization through decomposition and normal forms (1NF, 2NF, 3NF i BCNF). Codd's rules and outline of their application. Relational algebra, relational operators. Rissanen's principle of reversibility. Introduction into SQL. DDL, DML, DQL and DD. Joining relations: natural joining, external joining of relations. Horizontal division of relation (group by). Data integrity (referential integrity – cascade, restriction, zeroing). The right to access a database.

Developing general and specific competence (knowledge and skills)

Through this course students gain knowledge in databases. The goal is to develop logical reasoning and analytic approach when solving problem tasks in the area of creating and application of relevant types of databases for successful functioning of IT system.

Types of classes and methods of assessment

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

MOBILE COMMUNICATION **Course unit number: 16**

Hours weekly: 2+0+1+0 / III ECTS credits: 4

Syllabus outline

Introduction and development; -Telecommunication systems: from digital radio to mobile multimedia: -Technical basis (strategy of approach, spectrum, standardization etc...) -GSM, GPRS, HSCSD -UMTS / 3G -Wireless LANs, Wi- F -Satelite systems -Broadcast- system -Support to mobile communication, Roaming -Mobil IP –Network layer.
-Transport layer -Mobile portals -IMS I –Mtld. Market trends-assessment- assessment of market capacity
-Regulations and licensing in the view of international agreement such as spectrum allocation, global circulation etc...; -activity and application; -parts of construction and finished products; -Charging & Billing; -security aspects.

Developing general and specific competence (knowledge and skills)

Through this course students gain knowledge in mobile communication. The goal is to develop logical reasoning and analytic approach when solving problem tasks in the area of communication between various parts and functions in a specific organization.

Types of classes and methods of assessment

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

PROJECT MANAGEMENT **Course unit number : 17**

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

Syllabus outline

Definition and characteristics of management. Management vs. entrepreneurship. The person of a manager and levels of managers, their activities and roles, manager's skills. Planning – levels and process of planning, types of plans; prediction, strategic planning, levels of strategies, modelling of strategies. Theory of decision making. Organizing – the concept and content of organizing, modelling and types of organizational structures, traditional and modern forms of organization, contemporary trends in organization modelling. Human resources management – recruitment and selection, career management, performance appraisal and rewarding, education and development, salaries and compensations. Leadership and a leader - definition, leadership skills, elements, power and authority, styles of leadership, approaches to leadership. Theory of motivation, techniques of motivation. Control – concept and process of controlling, phases of control, methods and techniques of control.

Developing general and specific competence (knowledge and skills)

Through this course students gain knowledge about basics of management. The goal is to develop logical reasoning and analytic approach when solving problem tasks in modelling the function of management. Developing abilities to use methods and techniques of management.

Types of classes and methods of assessment

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

TRANSPORT LOGISTIC **Course unit number: 18**

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

Syllabus outline

An outline and explanation of terms and interdependence, as well as basic issues in the field of logistics, the flow of information and material resources; Entrepreneurial logistics: tasks, definition, limits, centres of logistics and their meaning; Organization and process control, order processing and disposition; Supply Chain Management: definition and basics, application of technology, electronic supply chain management, possibility of their use in companies; Supply Chain Execution: tasks and System Electronic Data Interchange in logisitcs: methods and standards, the use of XML. An outline and explanation of transport logistics: tasks, definition, limits; Transport services, business models, networks and organizations; The application of IT- system in transport logistics: systems of dispositions and orders, tour optimization, Tracking + Tracing, Bord - Computer - Systems on vehicles, communication of vehicles; an ouline of the fleet of vehicles system, information system and fleet management, observing cost-benefit when applying fleet management system; a study of the use of cards for fuel in the fleet, cost-benefit EDI to transport logistics: standards and methods, application of XML

Developing general and specific competence (knowledge and skills)

Through this course students gain knowledge of the logistics in telematics. The goal is to develop logical reasoning and analytic approach when solving problem tasks in the field of logistics function and services based on activities in a particular company.

Types of classes and methods of assessment

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

ENGLISH LANGUAGE I **Course unit number: 19**

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

Syllabus outline

Learning and explaning basic terms such as : Networks (LAN, WAN); the Internet, Internet Service Providers, TCP/IP (Transfer Control Protocol/Internet Protocol), World Wide Web (www), Email protocols – SMTP, POP, IMAP; Web pages, XML, HTML,communication systems.
Grammar: tenses - present simple, present continuous, past simple and continuous, present perfect simple and past perfect, comparison of adjectives, relative pronouns, passive, plural of nouns.

Developing general and specific competence (knowledge and skills)
Through this course students gain knowledge about modern communication systems. The goal is to develop logical reasoning and analytic approach using authentic material and to apply it in creating and using modern IT systems in companies.

Types of classes and methods of assessment
The course is carried out weekly, in the form of consultancy.

SOFTWARE ENGINEERING **Course unit number: 20**

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

Syllabus outline

Concept of software engineering. Software engineering methodology. Development stages of system programming. Approaches to the development of system programming. Development project of the system programming. Organization of the programming team. Program specifications. Structural analysis of the system. Object oriented system analysis. Tools in the development of system programming (CASE tools). Requirement Engineering. Creating and designing of system programming. Management of changes. Quality bases of system programming. Economy bases of system programming.

Developing general and specific competence (knowledge and skills)

Getting through the syllabus a student acquires the contents of the course.The accent is on the development of ability to make logical conclusions and think analytically while developing programming systems for a particular business domain.

Types of classes and methods of assessment

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

CONCEPTS OF OPERATING SYSTEMS **Broj kolegija 39**

Hours weekly: 2+0+2+0/IV **ECTS bodova: 5**

Syllabus outline

Introduction into operating systems. History and development of operating systems. Types of operating systems. Hierarchical structure of operating systems. Connecting operating systems and machines, communication between elements. Basic elements: process, glitches, memory management, working with entry and exit devices, data flow systems, safety, human and systematic calls. Competition and synchronization of a process, glitches, managing the processor. Paging, segmentation and memory protection. Allocating resources. Dealing with files, safety and protection. Thread. Multithread-systems. Communication among threads. Shells to work with an operating system. And their programming. The client-attendant concept. Examples of installation of operating systems. Operating systems configuration. Virtual machines. Operating systems for mobile devices.

Developing general and specific competence (knowledge and skills)

Students gain knowledge on concepts of operating systems and the way they function. Students acquire knowledge on advantages and disadvantages of certain operating systems on the basis of examining the concept of functioning. Students gain the ability to install and adjust operating systems in real and virtual systems.

Types of classes and methods of assessment

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

TELECOMMUNICATION NETWORKS AND SERVICES **Course unit number: 22**

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

Syllabus outline

Telephony; Telephone net; ISDN, ADSL technologies; Operaters and Telecommunication units; VOIP, Internet Telephony; Speech Technology and Telephone Systems, IVR, ACD, Dialer, Call Centres, Contact Centres; Customer Relationship Management (CRM) and Call Statistics

Developing general and specific competence (knowledge and skills)

Getting through the syllabus a student acquires the contents of the course. The accent is on the development of ability to make logical conclusions and think analytically while solving problem exercises from the domain of creation and specific usage of the telecommunication-net for transfer and data processing in a company.

Types of classes and methods of assessment

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

SYSTEM DESIGN IN TELEMATICS **Course unit number: 23**

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

Syllabus outline

Definition and purpose of the project. Specific qualities of the HW project in relation to the SW project. Development project phases. Project management. Development processes and tools. Types of Circuits. Integrated circuits technologies. Circuit architecture. Designing Methodology. Functional simulation. Design implementation. Design verification. Packing and connecting techniques on the semiconductor board and printed circuit board. Project documentation. Quality ensured.

Developing general and specific competence (knowledge and skills)

Getting through the syllabus a student acquires the contents of the course. The accent is on the development of ability to make logical conclusions and think analytically while solving problem exercises from the domain of establishing a contemporary system of project management in particular companies.

Types of classes and methods of assessment

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

ENGLISH LANGUAGE II **Course unit number: 24**

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

Syllabus outline

English language II should cover the following professional terminology: Computing support, Data safety: viruses, antivirus programmes; backup HSM, hackers, software engineering, object-oriented programming; the latest developments in the IT; The future of IT; electronic publishing industry.
Grammar: Modal Verbs, Direct and Indirect Speech, Sequence of Tenses, Conditional Clauses, Gerund or Infinitive, different ways of expressing future, Word formation – prefixes and suffixes.

Developing general and specific competence (knowledge and skills)

Getting through the syllabus a student acquires the contents of the course. The accent is on the developing of ability to make logical conclusions and think analytically while using foreign literature for designing and applying contemporary technological and information systems.

Types of classes and methods of assessment

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

WEB PROGRAMMING **Course unit number: 25**

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

Syllabus outline

Extensible Markup Language (XML); Separation of structure, form and content in files; Data Type Definition (DTD); XML Shema Definition (XSD); XML Stylesheets (XLS/XLST); Wireless Application Protocol (WAP); Development of wireless Web application with WML and WMLScript; PHP programming on servers – standard libraries, forwarding parameters, Web forms processing; Java Servlet – basic concepts, Servlet engine Tomcat, development and installment of Java Servlet; Java Beans and Java Server Pages (JSP) – syntax and semantics of JSP, integration with Java Beans and installation in Servlet engine; Web services – standards for Web Services Broker (UDDI, ebXML); Web services stack – XML / WSDL / SOAP / UDDI; Programming and integration of Web service Apache SOAP and Java; Apache Axis; Access to Web services with PHP and SOAP.

Developing general and specific competence (knowledge and skills)

Getting through the syllabus a student acquires the contents of the course. The accent is on the developing of ability to make logical conclusions and think analytically while solving problem exercises for Internet usage as a logistic function in a particular company's communication with its environment.

Types of classes and methods of assessment

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

SYSTEMS AND PROCESS CONTROL **Course unit number: 26**

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

Syllabus outline

Introductory discussions and basic notions. Electrical engineering and electrical systems bases. Consumer plants, systems, installations and devices. Structure and architecture of electrical systems management. Classification and formal presentation of electrical systems management. Mathematical modeling. Interface of system processes – binary, impulse, analogue and commands. System components for electrical systems management. Digital automatic control systems. Usage of programmable logic controllers. Examples of usage and system management.

Developing general and specific competence (knowledge and skills)

Familiarizing with the main concept of electrical systems management, their primary function and quality management. Gaining knowledge about electrical systems and the elements of management system.

Types of classes and methods of assessment

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

GEOGRAPHIC INFORMATION SYSTEMS **Course unit number: 27**

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

Syllabus outline

GIS basic functions. Data compilation. Standards. Attributes. Layer attribute table. Symbol Attributes. Determination of geographical position. Co-ordinate systems. Cartographic projections. Main structures of geographical data. Vector data. Screen data. Geographical data base. Meta data. Georeference. Arranging spatial and attribute data. Data search. Spatial analysis. Presenting data.

Developing general and specific competence (knowledge and skills)

Familiarizing with the basic concept of geographic information systems, their primary functions and main abilities. Gaining knowledge and ability to design geographic information systems and their integration in business systems. Usage of geographic information systems in the decision making process.

Types of classes and methods of assessment

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

TELEMATICS IN TRANSPORT **Course unit number: 28**

Hours weekly: 2+2+0+0/V **ECTS credits: 6**

Syllabus outline

Basic structure and function of ITS. Defining the transport resources management system in a company as well as the objectives of navigating vehicles in motion. Telematic system for logistics, surveillance and protection of a vehicle fleet. PROMETHES, GALILEO i EGNOS. Integration of Standardized Technologies GPS+GMS+Internet=GTTS. EDIFACT and integrated information system used to connect all the participants in public transport in a functional and dynamic way. Systematic analysis of narrative and financial effects of ITS in transport companies.

Developing general and specific competence (knowledge and skills)

By successfully fulfilling their tasks and obligations, students acquire the contents of the course. The emphasis is on developing of the ability for logical concluding and analytical reasoning in order to create the functions of managing vehicle fleet and vehicles. Developing of the ability for using methods and technologies to rationalize the transport system of a company and a country.

Types of classes and methods of assessment

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

PROFESSIONAL INTERNSHIP **Course unit number: 30**

Hours weekly: 0+0+0+(X)/VI **ECTS credits: 13**

Syllabus outline

The content of the task of professional practice results from the content of the curriculum. It is defined by the supervisor. In agreement with the mentor in a particular company, the supervisor of the professional practice defines the content and the dynamics of the professional practice performance.

Developing general and specific competence (knowledge and skills)

Acquiring of practical knowledge and skills in companies or institutions

Types of classes and methods of assessment

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

FINAL THESIS **Course unit number: 31**

Hours weekly: 0+0+(X)+0/VI **ECTS credits: 17**

Syllabus outline

Final thesis represents individual work and assessment of a candidate`s competence which needs to prove certain level of ability required for the independent solving of a particular professional assignement. The content of the final thesis is based upon the use of the specific competence derived from the content of the course. It can be set only as part of a particular professional course. The topic of the final thesis is chosen by a student in the VI term. It is set by the teacher mentor who will guide the student in the process of writing the final thesis. The length of the final thesis regarded as the candidate`s individual work is set up within the 225 hours workframe.

Developing general and specific competence (knowledge and skills)

Training for the independent solving of a particular problem by using knowledge aquired during the course. While writing the final thesis, the mentor will lead a student towards the succesful realization of the established goals.

Types of classes and methods of assessment

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

SAFETY AND QUALITY MANAGEMENT IN TELEMATICS **Course unit number: 32**

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

Syllabus outline

Concept and meaning of quality. Quality management as a precondition of success in business. Historical development of quality management. TQM. IS quality assessment – the value of information in a business system. Application of quality standards in the development of information systems. Need for the information system analysis and revision. Assessement of ISO 9001 standards in informatics.

Developing general and specific competence (knowledge and skills)

Acquiring of knowledge and skills in the system quality management. Application of the acquired knowledge in the process of anticipation and making decisions referring to the quality of system functioning.

Types of classes and methods of assessments

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

MULTIMEDIA SYSTEMS **Course unit number: 33**

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

Syllabus outline

Processing of sygnals for media integration. Interface for the multimedia interaction between a man and a machine. Multimedia communication and networking. Multimedia security and content protection. Multimedia data bases. Multimedia computer systems and tools. Hardware and software support for multimedia systems. Multimedia systems standards. Multimedia application. Multimedia services quality.

Developing general and specific competence (knowledge and skills)

By successfully fulfilling their tasks and obligations, students acquire the contents of the course. The emphasis is on developing of the ability for logical concluding and analytical reasoning at solving problem exercises in the field of defining modern systems with the intention to control processes in a company.

Types of classes and methods of assessment

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

ELECTRONIC BUSINESS **Course unit number: 37**

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

Syllabus outline

Commercial models: - tradesman vs. client; - eCommerce-a / eBusiness economy; - B2B, B2C, B2E itd., mCommerce; - Factors of success and examples of success (Yahoo!, Amazon, Ebay); - horizontal application; - payment process; - security; - eMarketing, 1-to-1 Marketing, fun with a goal (online games); -eLearning; - vertical applications; - status quo and examples of success in different fields of trade, - eGovernment: - different fields of technologies and architecture; - personalization, communities, portals; - commerce systems, peer-to-peer (P2P)

Developing general and specific competence (knowledge and skills)

By realisation of the programme, a student acquires the contents of the course. The accent is on the developing of ability for logical concluding and analythical reasoning at solving problem exercises in the field of measuring business success of a specific company.

Types of classes and methods of assessment

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

AUTOMATION OF FACILITIES **Course unit number 36**

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

Syllabus outline

Introduction to Facility Management: structures, definitions, functions; basics of building automation; requirements in housing and specified construction; applications; construction and infrastructural solutions of building automation; working groups and managing groups.
Technical components of building automation: machine cluster; managing appliances; appliances networking; wired and wireless networking; Homebus- systems and standards (EIB, Lon, EHS, Konnex); remote control techniques; Gateway techniques; Open System Gateway Architecture (OSGi)

Developing general and specific competence (knowledge and skills)

Undergraduates of this course rely on the basics of Facility Managementa and building automation. Different sections of building automation as well as functional Requirements and activities arising from them , will be covered. Technical solutions derive from these Requirements and what is more they represent standards in building automation. The aim is to understand the complex structures in the automation of buildings and from thisdevelop structural solutions.

Types of classes and methods of assessment

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

A PROJECT IN TELEMATICS **Course number 40**

Hours weekly: 1+0+3+0/V **ECTS credits: 4**

Syllabus outline:

Problems in telematics structured in a task. Developing a project (HW, SW or an ideal solution). Individual and team work. Developing weekly reports and respecting the set deadlines. Adjusting solutions to demands Developing a detailed project documentation. Developing a project presentation..

Developing general and specific competence (knowledge and skills)

Gaining specific knowledge and skills for independent and team development of a project based on a problem in telematics. Acquiring skills to develop a set task using previously gained knowledge and skills. Acquiring abilities to cope individually with a problem in telematics by creating a final solution. Gaining presentation skills by showing your own solution of a problem in telematics.

Types of classes and methods of assessment

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