



SOUTH-WEST UNIVERSITY "NEOFIT RILSKI"
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INFORMATION PACKAGE **/ECTS/**

FIELD OF HIGHER EDUCATION: **5. TECHNICAL SCIENCES**
PROFESSIONAL FIELD: **5.3. COMMUNICATION AND COMPUTER ENGINEERING**
SPECIALTY: **COMPUTER SYSTEMS AND TECHNOLOGIES**

QUALIFICATION CHARACTERIZATION
OF SPECIALTY "COMPUTER SYSTEMS AND TECHNOLOGIES"
Professional field: 5.3. Communication and Computer Engineering
Educational and qualification degree: Master of Science
Professional qualification: Computer Engineer
Period of study: 1 years (2 semesters)
Form of training: Regular

REQUIREMENTS FOR THE SPECIALIST PREPARATION

Engineers graduated the Master degree program "Computer Systems and Technologies" must be prepared to perform activities such as: design, manufacture and operation of facilities and devices in computer and communication systems and networks, research, implementation, modeling and operation of facilities, specialized technological equipment and means for connection with stationary and mobile objects, exploitation and maintenance of information resources and technologies for the implementation of marketing activities in the field of computer and communication equipment and technology, design and maintenance of technical means for automation, control and technological support of mobile communication systems; design and programming of computer means for communication facilities control; ensuring quality of service by measuring and monitoring the parameters of computer and communication networks and systems, as well as application of methods for digital processing and information protection.

Obtaining the knowledge, skills and competences for these activities requires training, providing:

- Theoretical knowledge, graduates to be able to design and exploit facilities and equipment of analog, digital and optical principle of work, of systems for processing and transmission of analog and digital information.
- Practical knowledge, skills and habits, learned during the seminars, laboratory and

practical exercises, adapted with the nature of their future work, adaptability in accordance with the changing conditions in the specialists realization, both individually and as a team. Use of modern computer technology for automation of labor and business.

This knowledge is acquired on the basis of fundamental and special training and specialized courses in the area of computer and information technologies, enhancing the professional skills of the specialist.

Specialists' training in Master degree program "Computer Systems and Technologies" is consistent with Bulgarian and world experience, based on a thorough analysis of curriculum and syllabuses for similar specialties of local and foreign universities and colleges.

PROFESSIONAL SKILLS AND COMPETENCE

Masters students in the specialty "Computer systems and technologies" acquire special skills in the field of computer components, assemblies, devices and systems, as well as of their setting up, diagnostics, repairing and maintenance; of maintaining the standards and performance of computer systems and equipment; of application of computer and information technologies in setting up, control, diagnostics and maintenance of computer and telecommunications systems and networks.

Master degree graduates in the specialty "Computer Systems and Technologies" receive professional competence in development, use, deployment and operation of systems in the field of computer and communication systems - fixed, mobile, wireless communications; processing, storage and transmission of information; security and information protection technologies.

**DEGREE COURSE OF COMPUTER SYSTEMS AND TECHNOLOGIES
CURRICULUM**

First academic year			
First semester	ECTS credits	Second semester	ECTS credits
Embedded microprocessor systems	6	Optimization of discrete structures	5
Computer networks design	6	<i>Elective choice</i>	5
		<i>Elective choice</i>	5
Multimedia technologies	6	Diploma Thesis	15
Engineering experiment theory	6		
<i>Elective choice</i>	6		
	Total:		Total:
	30		30

TOTAL: 60 CREDITS FOR ONE ACADEMIC YEAR

ANNOTATION OF COURSES

EMBEDDED MICROPROCESSOR SYSTEMS

ECTS: 6	Semester: I
Assessment: exam	Hours per Week: 2 lectures+2 exercises
CourseType: lectures+ laboratory exercises	Course Status: Compulsory
	Specialty: Computer Systems and Technologies

Lecturer: Assoc. Prof. Ljudmila Taneva, PhD – lucy_t@swu.bg

Assistant: Chief Assist. Prof. Anton Stoilov, PhD – antonstoilov@swu.bg

Department: Electrical Engineering, Electronics and Automatics –
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Course Description:

The "Embedded Microprocessor Systems" course aims to familiarize the students with the theory in the construction of embedded microprocessor systems for the industry. Topics include the classical design methods as well as the technical means and methods for transmitting and processing information. Included are some of the most popular microprocessor families, various multifunctional elements and the basic principles of their software.

Course Aims:

The purpose of this course is to provide students with the necessary knowledge and skills for design, building and maintenance of modern microprocessor systems. The study material includes the basic principles of operation of the microprocessor systems as well as their main blocks - CPU, memory, interface circuits, etc. The studied processor is from the most popular microprocessor families. The course includes also the modern trends in microprocessor technology and its applications.

Teaching Methods:

In the teaching process are included multimedia for better visualization of the material, as well as development systems (kits) with Microcontrollers and other HW modules for hands on experience. For better understanding and enhancement of the teaching, it is possible to carry out demonstrations to illustrate the lecture material.

COMPUTER NETWORKS DESIGN

ECTS credits: 6	Semester: I
Evaluation: exam	Hours per week: 2 lectures+2 exercises
Course type: lectures+ laboratory exercises	Course status: Compulsory
	Degree course: Computer Systems and Technologies

Lecturer: Assoc. Prof., Eng. Valentin Hristov, PhD – v_hristov@swu.bg
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Annotation:

The course discusses the problems concerning design, building and application of computer networks. The study material considered theoretical and practical knowledge and skills on basic principles, methods and tools for building computer networks for processing and transmission of data, sound and images.

Purpose of the course:

The aim of the course is to provide students with the necessary knowledge and skills for design of computer networks and students are able to apply the approaches, methods and technical tools for analysis, design and implementation of embedded systems.

Educational Methods:

Lectures (with slides, multimedia projector) and additional text materials; laboratory work (based on instructions) with a tutorial for every laboratory theme.

MULTIMEDIA TECHNOLOGIES

ECTS credits: 6	Semester: I
Evaluation: exam	Hours per week: 2 lecture+2 exercises
Course type: lectures+ laboratory exercises	Course status: Compulsory
	Degree course: Computer Systems and Technologies

Lecturer: Assoc. Prof. Ivan Trenchev, PhD – trenchev@swu.bg

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Annotation:

Multimedia is the combined use of text, graphics, sound, animation, and video. A primary objective of this course is to teach participants how to develop multimedia programs. Another objective is to demonstrate how still images, sound, and video can be digitized on the computer. Participants in this workshop will create their own multimedia courses using Adobe Maya on the windows platform.

Purpose of the course:

The course aims to give the students knowledge of the existing standards and basic techniques related to the recording and reproduction of both sounds and images, and the concept of sampling which is fundamental to digital media technologies.

Educational Methods:

Lectures and seminars.

ENGINEERING EXPERIMENT THEORY

ECTS credits: 6	Semester: I
Evaluation: exam	Hours per week: 2 lectures+2 exercise
Course type: lectures + laboratory exercises	Course status: Compulsory
	Degree course: Computer Systems and Technologies

Lecturer: Assoc. Prof. Dimitrina Kerina, PhD – d_kerina@swu.bg

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Annotation:

Main topics of the course are: Theoretical foundations of engineering experiment, Planning and organization of engineering experiment, Statistical methods for processing of experimental results and Methodology development and defence of master's thesis.

Purpose of the course:

The course in Theory of Engineering Experiment aims to provide theoretical and practical knowledge of M. Sc. Degree students for the development and defence of Master's thesis.

Educational Methods:

Lectures are prepared on Power point. The contemporary technical equipment as multimedia, software, models, etc. is used for these lectures. Lectures are visualized by demonstrations and laboratory tasks performance during the laboratory classes.

OPTIMIZATION OF DISCRETE STRUCTURES

ECTS credits: 5	Semester: II
Evaluation: exam	Hours per week: 2 lectures+1 exercise
Course type: lectures + laboratory exercises	Course status: Compulsory
	Degree course: Computer Systems and Technologies

Lecturer: Prof. Ivan Mirchev, D.Sc. – mirchev@swu.bg

Department: Informatics – informatics@swu.bg

Faculty: Mathematics and Natural Sciences – pmf@swu.bg

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Assistant: Assist. Prof. Fatima Sapundzhi, PhD – sapundzhi@swu.bg

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Annotation:

In this course are considered some elements of the following main topics:

- introduction in graph theory (essential concepts and definitions. modeling with graphs and networks, data structures for networks and graphs;
- computational complexity;
- heuristics;
- tree algorithms (spanning tree algorithms. variations of the minimum spanning tree
- problem. branchings and arborescences);
- shortest-path algorithms (types of shortest-path problems and algorithms, shortest- paths from a single source, all shortest-path algorithms, the k- shortest-path algorithm, other shortest paths).

Purpose of the course:

Students should obtain basic knowledge and skills for solving optimization problems for graphs and networks.

Educational Methods:

Lectures, tutorials, individual student's work.

INTEGRATED COMPUTER SYSTEMS AND NETWORKS

ECTS credits: 6	Semester: I
Evaluation: exam	Hours per week: 2 lectures+2 exercises
Course type: lectures+ laboratory exercises	Course status: Compulsory
	Degree course: Computer Systems and Technologies

Lecturer: Assoc. Prof., Eng. Valentin Hristov, PhD – v_hristov@swu.bg
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Annotation:

The syllabus discusses the following main topics: physical representation and storage of information in computer systems; digital write/read processes to/from magnetic type cartridge; fault detection and correction during the process of information storage on magnetic type cartridge; visual information registration methods; organization of the write process by means of indication; organization of the read process from the visual information cartridges; optical disc-based memories; speech input/output devices in computer systems, etc.

Purpose of the course:

The aim of this course is to acknowledge students with: computer systems information cartridges; data organization and access methods to different areas on such cartridges; logical structure and organization of various peripheral systems which are part of the computer systems.

Educational Methods:

Lectures are presented using advanced visualization tools. The lab exercises are guided according the laboratory exercises textbook. Students prepare separate protocols for each topic being checked by the assistant.

WIRELESS COMMUNICATION SYSTEMS

ECTS credits: 6	Semester: I
Evaluation: exam	Hours per week: 2 lectures+2 exercises
Course type: lectures+ laboratory exercises	Course status: Compulsory
	Degree course: Computer Systems and Technologies

Lecturer: Assoc. Prof. Alexey Stefanov, PhD – astef@swu.bg

Assistant: Prof. Filip Atanasov Tsvetanov, PhD - ftsvetanov@swu.bg

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Annotation:

The course introduces basic wireless technologies, protocols and services common on wireless networks. The course introduces basic wireless technologies, protocols and services common on wireless networks. Are represented the building blocks of wireless communications, client hardware and infrastructure. Also examined architecture of wireless local, global, public and personal networks. Described are the standard and additional infrastructure services and protocols. Also examined architecture of wireless local, global, public and personal networks. Described are the standard and additional infrastructure services and protocols. Emphasis is put on the correct choice of type of communication, components, and network configuration, choice of components and construction and study of application software for the industrial communication network.

Purpose of the course:

Purpose of the course is that students acquire the theoretical knowledge and practical skills and competencies for most appropriate choice of protocol for the construction of industrial network design and industrial network with the selected protocol. The systematization of this knowledge allowing passing to be acquainted with the methodology of their use.

Educational Methods:

The course is held in multimedia lecture halls. Practical exercises are conducted in groups; usually groups are up to 10 students.

SERVER TECHNOLOGIES

ECTS credits: 5	Semester: II
Evaluation: ongoing assessment	Hours per week: 2 lectures+1 exercise
Course type: lectures+ laboratory exercises	Course status: Elective
	Degree course: Computer Systems and Technologies

Lecturer: Chief Assist. Prof. Anton Stoilov, PhD – antonstoilov@swu.bg
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Annotation:

The course "Server technologies" is part of the curriculum and includes 15 topics summarized in server technology with an emphasis on server administration. As a form of control in training are provided for monitoring and ongoing evaluation.

The content of the program covers the main issues related to the types of server operating systems, cloud structures, server virtualization, high performance computing, mobile applications, IP telephony server technologies for storage, WEB services and others.

Which receives ongoing assessment over weak on "Server administration" will acquire the necessary knowledge in the application of modern technologies and methods for building advanced server systems and technologies.

Purpose of the course:

The aim of the course "Server technologies" is for students to acquire knowledge to work with different types of server systems and provide a variety of WEB services and applications. To learn about the application areas of server technology and the types of WEB services and applications. Students acquire knowledge about the application of modern methods of administration of server systems and various techniques for creating WEB services and applications.

Educational Methods:

Lectures are illustrated with computers, multimedia projector and LCD panel, demonstrational software, visual aids, boards and diagrams.

DIGITAL COMMUNICATIONS

ECTS credits: 5	Semester: II
Evaluation: ongoing assessment	Hours per week: 2 lectures+1 exercise
Course type: lectures+ laboratory exercises	Course status: Compulsory
	Degree course: Computer Systems and Technologies

Lecturer: Assoc. Prof., Eng. Valentin Hristov, PhD – v_hristov@swu.bg
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Annotation:

This course gives an overview of modern telecommunication networks and technology for multiplexing and transmission of signals in communication networks plesiochronous (PDH) and Synchronous Digital Hierarchy (SDH). Students will become familiar with synchronous transport networks (SDH networks) as well as the subscriber's access to communication networks and networks for subscriber access. The course examines digital network with integrated services (ISDN), and broadband integrated services (VISDN). Particular attention is paid to the ATM networks of their architecture, protocols, signaling and routing traffic in ATM networks and their management. Students will acquire basic knowledge and next-generation networks (NGN networks) starting to build hard thanks to technological developments in the field of communications.

Purpose of the course:

The aim of this course is to acknowledge students with objectives, physical nature and technological features of integrated computer systems, computer networks and network technologies. To learn about the application areas of the types of computer networks, communication environments, and the main protocols and network services on the Internet.

Educational Methods:

Lectures are presented using advanced visualization tools. The lab exercises are guided according the laboratory exercises textbook. Students prepare separate protocols for each topic being checked by the assistant.

CODING AND DATA COMPRESSION

ECTS credits: 5	Semester: II
Evaluation: ongoing assessment	Hours per week: 2 lectures+1 exercise
Course type: lectures+ laboratory exercises	Course status: Compulsory
	Degree course: Computer Systems and Technologies

Lecturer: Assoc. Prof., Peter Boyvalenkov – peter@moi.math.bas.bg

Department: Mechanical Engineering and Technologies

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Annotation:

The course is an elective in the fourth semester and aims to provide students with knowledge and skills on the problems of coding and compression of data. The course focuses on noise protection coding linear and cyclic codes. Discussed are basic strategies for data compression and Huffman coding and Lampe-Ziv coding.

Purpose of the course:

The aim of the course "Coding and data compression" is to provide students with knowledge of the fundamental aims, objectives and methods of encryption and compression of data loss and without loss of quality.

Educational Methods:

Lectures and exercises.

DYNAMIC WEB APPLICATIONS

ECTS credits: 5	Semester: II
Evaluation: ongoing assessment	Hours per week: 2 lectures + 1 exercise
Course type: lectures+ laboratory exercises	Course status: Elective
	Degree course: Computer Systems and Technologies

Lecturer: Assoc. Prof. Stanko Shtrakov, PhD – sshtrakov@swu.bg

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Annotation:

The subject "Web design" focuses on gaining knowledge and skills in the field of Internet programming. The course covers the basic principles of programming with HTML and some software packages for creating WEB sites. Students learn the basics of programming languages PHP, Java and Java Script and the use of database applications for the Internet.

The laboratory work helps to better rationalization of lecture material and contribute to formation of practical skills.

Purpose of the course:

The course aims to provide students with knowledge of modern programming languages (visual and object programming) and their application to solve different types of problems, and some of the main tools for creating WEB applications.

Educational Methods:

Lectures (with slides, multimedia projector) and additional text materials; laboratory work (based on instructions) with a tutorial for every laboratory theme.