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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**”  
EDUCATIONAL AND QUALIFICATION DEGREE: **MASTER OF SCIENCE**  
PROFESSIONAL QUALIFICATION: **ENGINEER**  
PERIOD OF STUDY: **2 YEARS**  
FORM OF TRAINING: **REGULAR**

### **REQUIREMENTS FOR THE SPECIALIST'S TRAINING**

Engineers majoring in Computer Systems and Technologies, Master's Degree, must be prepared to perform activities such as: design, manufacture and operation of units 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 sites, operation and maintenance of information means and technologies for realization of marketing activity in the field of computer and communication equipment and technologies, design and maintenance of technical means for automation, control and technological provision of mobile communication systems; design and software of computer means for management of communication facilities; ensuring quality of service by measuring and controlling the parameters of computer and communication networks and systems, as well as application of methods for digital processing and protection of information.

Acquiring knowledge, skills and competencies for these activities requires training to provide:

- Theoretical knowledge to be able to design and operate nodes and devices on analog, digital and optical principle, systems for processing and transmission of analog and digital information.
- Practical knowledge, skills and habits acquired during the seminars, laboratory and practical exercises, consistent with the nature of their future work, adaptability in accordance with the changing conditions in the implementation of specialists, both individually and as a team. Using modern computer technology to automate your work and business.
- This knowledge is acquired on the basis of fundamental and special training and specialized courses in the field of computer and information technology, increasing the professional skills of the specialist.

- The training of the specialists in the master's program of Computer Systems and Technologies is in accordance with the Bulgarian and world experience on the basis of an in-depth analysis of the curricula and programs for similar specialties of our and foreign universities, universities and colleges.

### **PROFESSIONAL SKILLS AND COMPETENCE**

Graduates of the specialty "Computer Systems and Technologies" with a Master's degree acquire professional skills and competencies:

- manage complex professional activities, including teams and resources;
- to maintain the norms and technical indicators of computer systems and equipment;
- for application of computer and information technologies in setup, control, diagnostics and maintenance of computer and telecommunication systems and networks;
- for development, use, implementation 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 security technologies.

## **DEGREE COURSE OF "COMPUTER SYSTEMS and TECHNOLOGIES" CURRICULUM**

<b>Firs year</b>			
Firs semester	ECTS credits	Second semester	ECTS credits
Signal and systems	5	Computer architectures	5
Data Transfer And Computer Communications	5	Microprocessor technology	5
Application of electronic circuits	5	Computer networks	5
Mathematics For Engineers	5	Sensors and sensor networks	5
Materials and building blocks in electronics	5	Power convertors	5
Electrical and special measurements	5	<b><i>Elective course from I gr.</i></b>	5
	Total: 30		Total: 30
<b>Second year</b>			
First semester	ECTS credits	Second semester	ECTS credits
Embedded microprocessor systems	6	Digital communications	5
Design of computer network	6	<b><i>Elective course from III</i></b>	5
Multimedia technologies	6	<b><i>Elective course from IV gr.</i></b>	5
Theory of engineering experiment	6	Graduation	15
<b><i>Elective course from II gr.</i></b>	6		
	Total: 30		Total: 30

**TOTAL FOR THE TWO 2 ACADEMIC YEARS: 120 LOANS**

## ANNOTATIONS OF THE COURSES

### SIGNALS AND SYSTEMS

<b>ECTS credits:</b> 5	<b>Semester:</b> I
<b>Evaluation:</b> written exam	<b>Hours per week:</b> 2 lectures+ 2 laboratory exercises
<b>Course type:</b> lectures+ laboratory exercises	<b>Course status:</b> Compulsory
	<b>Degree course:</b> Computer systems and technologies

**Lecturer:** Assoc. Prof. Dr. F. Batalov - [batalov@swu.bg](mailto:batalov@swu.bg)

**Assistant:** Assist. Prof. Dr. Eng. Ivan Todorin - [ivan\\_todorin@gmail.com](mailto:ivan_todorin@gmail.com)

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#### **Annotation:**

The course examines the basic concepts related to the representation of continuous and discrete signals and systems in the time and frequency domain. During their training students get acquainted with the spectral analysis of periodic and non-periodic signals, with the types of spectra and their main properties. Particular attention is paid to the nature of modulation and types of signal amplitude modulation, pulse modulation methods and their influence on bandwidth, increasing the bandwidth of communication systems, converting analog signals into digital form, types of digital filters and optimal linear filtering, noise-tolerant signal coding. By presenting the basic information about signals and systems in a basic course, students are given the opportunity to acquire fundamental knowledge that is necessary for the formation of their professional training in mastering the next specialized disciplines in the curriculum of the specialty.

#### **Purpose of the course:**

The aim of the course "Signals and Systems" is for students to have a look at the different possibilities for presenting signals and systems, their parameters, time and frequency characteristics needed to study their behavior in data transmission in communication channels related to the main processes - transmission, processing and storage of information.

#### **Educational Methods:**

The course is held in lecture halls.

#### **Prerequisites:**

Establishing the preliminary knowledge and skills of students in the discipline, their learning style, motives and interests in the discipline is an important factor in achieving the goals and objectives. To clarify these features, different approaches are provided for establishing the entry level of students, such as: conducting an oral discussion, test questionnaires or reports from students.

Depending on the level of preliminary preparation shown, an update of the content, volume and depth of the topics covered, as well as teaching methods is envisaged.

**Enrollment for training in the discipline:**

The course is mandatory and is studied by all students majoring in Computer systems and technologies

**Exam registration:**

The registration for the formation of the complex current assessment is coordinated with the holder of the discipline, the leader of the exercises and the educational department.

## DATA TRANSFER AND COMPUTER COMMUNICATIONS

<b>ECTS credits:</b> 5	<b>Semester:</b> I
<b>Evaluation:</b> written exam	<b>Hours per week:</b> 2 lectures+2 laboratory exercises
<b>Course type:</b> lectures+ laboratory exercises	<b>Course status:</b> Compulsory
	<b>Degree course:</b> Computer systems and technologies

**Lecturer:** Assoc. Prof. Dr. Filip Batalov - [batalov@swu.bg](mailto:batalov@swu.bg)

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### **Annotation:**

The training course "Data Transmission and Computer Communications" presents modern concepts in the development of this field of communications. The course "Data transmission and computer communication" aims to acquaint students with: methods and means of data transmission in computer and communication networks. The protocol architectures of the TCP / IP and OSI model for data transmission are considered, as well as the basic concepts in data transmission, the parameters of the communication signals and the communication channels, the types of transmission media. Particular attention is paid to topics related to linear coding and modulation of digital signals, methods for detecting and correcting bit and dynamic errors in digital data transmission, coding and manipulation of digital signals, protocols for automatic control of the channel layer and modes for Data Transmission.

### **Purpose of the course:**

The aim of the course is for students to get acquainted with modern concepts of data transmission, parameters of communication signals and communication channels, methods for detecting and correcting household and dynamic errors in digital data transmission, coding and manipulation of digital signals, protocols for automatic channel layer control and data transmission modes.

### **Educational Methods:**

The course is held in lecture halls. The exercises are conducted in laboratory groups of 10 students.

### **Prerequisites:**

Knowledge of Engineering Mathematics I, Engineering Mathematics II, Programming I is desirable.

### **Enrollment for training in the discipline:**

The course is mandatory and is studied by all students majoring in Information and Communication Technology.

### **Exam registration:**

The registration for the formation of the complex current assessment is coordinated with the holder of the discipline, the leader of the exercises and the educational department.

## APPLICATION OF ELECTRONIC CIRCUITS

<b>ECTS credits:</b> 5	<b>Semester:</b> I
<b>Evaluation:</b> written exam	<b>Hours per week:</b> 2 lectures+2 laboratory exercises
<b>Course type:</b> lectures+ laboratory exercises	<b>Course status:</b> Compulsory
	<b>Degree course:</b> Computer systems and technologies

**Lecturer:** Assoc. Prof., Eng. Vladimir Gebov, PhD – [askon@swu.bg](mailto:askon@swu.bg)

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### Annotation:

The course "Circuitry" is mandatory for students in the first semester. The aim of the course is for students to gain the necessary knowledge and skills for the application of electronic circuits, control devices, measurement and control of quantities and parameters. Analog and digital methods and tools are presented. The types and kinds of digital integrated circuits, their purpose and parameters are considered. Basic principles of building digital devices are mastered. The course also considers the relationship between analog and digital electronic devices, namely digital-to-analog and analog-to-digital converters, their parameters and characteristics. The laboratory exercises consolidate and expand the knowledge gained during the lectures and aim to get students used to the practical use of the acquired theoretical knowledge and results.

### Aim of the course:

The aim of the course is for students to acquire knowledge about the principle of operation, parameters, characteristics and design of electronic analog stages and devices. Teaching methods: The lectures are conducted in the classical way and the students get acquainted sequentially with the provided material. Frontal questions, dialogue with the more active students and argumentation of their opinions are envisaged. They are richly illustrated with graphic material, which is presented with a video projector or on foil, pre-developed material of Power Point

### Prerequisites:

Establishing the preliminary knowledge and skills of students in the discipline, their learning style, motives and interests in the discipline is an

important factor in achieving the goals and objectives. To clarify these features, different approaches are provided for establishing the entry level of students, such as: conducting oral talks, test questionnaires or reports from students. Depending on the level of preparation shown, an update of the content, volume and depth of the topics covered, as well as teaching methods is envisaged.

**Enrollment for training in the discipline:**

Compulsory course from the curriculum of the specialty "Computer Systems and Technologies", Master's Degree

**Exam registration:**

The registration for the formation of the complex current assessment is coordinated with the holder of the discipline, the leader of the laboratory exercises and the educational department.

## MATHEMATICS FOR ENGINEERS

<b>ECTS credits:</b> 5	<b>Semester:</b> I
<b>Evaluation:</b> written exam	<b>Hours per week:</b> 2 lectures+2 laboratory exercises
<b>Course type:</b> lectures+ laboratory exercises	<b>Course status:</b> Compulsory
	<b>Degree course:</b> Computer systems and technologies

**Lecturer:** Assoc. Prof. Vassil Grozdanov, PhD – [vassgroz@swu.bg](mailto:vassgroz@swu.bg)

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**Assistant:** Ch. Assist. Prof. Anka Markovska, PhD – [a\\_markovska@swu.bg](mailto:a_markovska@swu.bg)

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### **Annotation:**

The course includes the study of some special chapters of mathematical analysis, as well as some basic elements of probability theory and mathematical statistics. The course includes the study of Fourier series, functions of complex variables, elements of operational calculus, as well as some basic elements of probability theory and mathematical statistics.

### **Aim of the course:**

Discipline "Engineering Mathematics - Part Three" is a major mathematical discipline in the preparation of students. Knowledge is needed to study a number of basic and applied technical disciplines.

### **Teaching methods:**

Lectures, seminars, homework, consultations, tests. Prerequisites: Establishing the preliminary knowledge and skills of students in the discipline, their learning style, motives and interests in the discipline is an important factor in achieving the goals and objectives. In order to upgrade the knowledge it is necessary for the student to have knowledge of engineering mathematics parts 1 and 2.

### **Enrollment for training in the discipline:**

Compulsory course from the curriculum of the specialty "Computer Systems and Technologies", Master's Degree

### **Exam registration:**

The registration for the formation of the complex current assessment is coordinated with the holder of the discipline, the leader of the laboratory exercises and the educational department.



## MATERIALS AND BUILDING BLOCKS IN ELECTRONICS

<b>ECTS credits:</b> 5	<b>Semester:</b> I
<b>Evaluation:</b> ongoing assessment	<b>Hours per week:</b> 2 lectures+2 laboratory exercises
<b>Course type:</b> lectures+ laboratory exercises	<b>Course status:</b> Compulsory
	<b>Degree course:</b> Computer systems and technologies

**Lecturer:** Assoc. Prof., Eng. Valeri Vachkov, PhD – [v.vatchkov@swu.bg](mailto:v.vatchkov@swu.bg)

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### Description of the course:

The course aims to acquaint students with basic topics of semiconductor physics and PN junction, device, principle of operation, characteristics, parameters and equivalent circuits of semiconductor and passive building blocks in electronics, both in discrete and integrated performance. Some typical applications are considered. The behavior of materials in an electromagnetic field, on which the whole structure of electronic, communication and computer engineering is built, is studied. A classification is made on several grounds, and the materials are divided into four major groups - dielectric, conductive, semiconductor and magnetic materials. The properties of resistors, capacitors and magnetic cores for inductors are mainly considered.

### Aim of the course:

The aim of the course "Materials and Building Elements" is for students to get acquainted with the main topics of semiconductor physics and PN transition. The classification of materials is made and they are divided into four large groups - dielectric, conductive, semiconductor and magnetic materials. The main electrical properties of the above groups and the characteristics of the most common representatives are shown. In parallel and regardless of the relatively theoretical nature of the discipline, methodology and pedagogy, students get acquainted with the structure, principle of operation, characteristics, parameters and equivalent circuits of semiconductor and passive building blocks in electronics, both in discrete and integrated performance .

### Teaching methods:

The lectures are conducted in the classical way and the students get acquainted sequentially with the provided material. The application of interactive teaching methods is envisaged. The lectures are richly illustrated with graphic material, which is presented with a video projector. The visualization of the exhibited material enables the students to receive visual and tactile information.

**Prerequisites:**

Establishing the preliminary knowledge and skills of students in the discipline, their learning style, motives and interests in the discipline is an important factor in achieving the goals and objectives. To clarify these features, different approaches are provided for establishing the entry level of students, such as: conducting oral talks, test questionnaires or reports from students. Depending on the level of preparation shown, an update of the content, volume and depth of the topics covered, as well as teaching methods is envisaged.

**Exam registration:**

The registration for the formation of the complex current assessment is coordinated with the holder of the discipline, the leader of the laboratory exercises and the educational department.

## ELECTRICAL AND SPECIAL MEASUREMENTS

<b>ECTS credits:</b> 5		<b>Semester:</b> I
<b>Evaluation:</b> assessment	ongoing	<b>Hours per week:</b> 2 lectures+2 laboratory exercises
<b>Course type:</b> lectures+ laboratory exercises		<b>Course status:</b> Compulsory
		<b>Degree course:</b> Computer systems and technologies

**Lecturer:** Assoc. Prof. Dr. Eng. Ulyana Paskaleva PhD – [paskaleva\\_6@swu.bg](mailto:paskaleva_6@swu.bg),  
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### Description of the course:

The training in the discipline includes the study of the basic concepts and definitions in electrical measuring equipment, as well as methods for measuring the basic physical quantities, power, energy, phase difference, frequency, parameters of bipolar poles and others.

### Aim of the course:

The aim of the course is for students to get acquainted with the basic theoretical issues of measurements, methods and means of measuring electrical quantities, as well as the basic metrological characteristics of measuring instruments, to learn to use in laboratory conditions the basic measuring instruments.

### Teaching methods:

Lecture, practical exercises.

### Prerequisites:

Establishing the preliminary knowledge and skills of students in the discipline, their learning style, motives and interests in the discipline is an important factor in achieving the goals and objectives. To clarify these features, different approaches are provided for establishing the entry level of students, such as: conducting oral talks, test questionnaires or reports from students. Depending on the level of preparation shown, an update of the content, volume and depth of the topics covered, as well as teaching methods is envisaged.

**Enrollment for training in the discipline:**

Compulsory course from the curriculum of the specialty "Computer Systems and Technologies", Master's Degree

**Exam registration:**

The registration for the formation of the complex current assessment is coordinated with the holder of the discipline, the leader of the laboratory exercises and the educational department.

## COMPUTER ARCHITECTURES

<b>ECTS credits:</b> 5	<b>Semester:</b> II
<b>Evaluation:</b> written exam	<b>Hours per week:</b> 2 lectures+2 laboratory exercises
<b>Course type:</b> lectures+ laboratory exercises	<b>Course status:</b> Compulsory
	<b>Degree course:</b> Computer systems and technologies

**Lecturer:** Assoc. Prof., Eng. Ludmila Taneva, PhD – [lucy\\_t@swu.bg](mailto:lucy_t@swu.bg)

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**Assistant:** Assist. Pavel Djunev – [djunev@swu.bg](mailto:djunev@swu.bg)

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### **Description of the course:**

The course "Computer Architectures" is part of the curriculum and includes 10 summary topics. As a form of control, current control and examination are provided. The subject of the discipline are modern single-processor and multiprocessor computer systems. The course aims to build knowledge of architectures for parallel processing at different levels and to create skills in their software. Computer architectures are presented in the context of methods for ensuring parallel execution of instructions, threads, processes and tasks in different topologies, connections and memory organization and within common models for parallel programming. The planned laboratory workshop focuses on the hardware-software interface in computer architectures. It deepens the knowledge of programming and management of system resources.

### **Aim of the course:**

The aim of the course "Computer Architectures" is to build knowledge of architectures for parallel processing and to create skills in their software. To study methods for addressing, segmentation and protection of memory, mechanisms for handling exceptions and interrupts, architectural support for servicing the memory hierarchy, parallel execution of instructions, types of processed data, parallel computer architectures and models for parallel programming, performance and efficiency of parallel computer architectures, planning and management of memory, processes and loads in parallel computer architectures.

### **Teaching methods:**

The lectures are conducted in the classical way and the students get acquainted sequentially with the provided material. The practical exercises are conducted in a laboratory of the department, equipped with the necessary personal computers and training simulators / emulators. After each topic of the study material provided for the exercises, students prepare a protocol containing the purpose and tasks that are set, experimental data that were obtained during the exercise and the relevant conclusions about the problem.

**Prerequisites:**

Establishing the preliminary knowledge and skills of students in the discipline, their learning style, motives and interests in the discipline is an important factor in achieving the goals and objectives. To clarify these features, different approaches are provided for establishing the entry level of students, such as: conducting oral talks, test questionnaires or reports from students. Depending on the level of preparation shown, an update of the content, volume and depth of the topics covered, as well as teaching methods is envisaged.

**Enrollment for training in the discipline:**

Compulsory course from the curriculum of the specialty "Computer Systems and Technologies", Master's Degree

**Exam registration:**

The registration for the formation of the complex current assessment is coordinated with the holder of the discipline, the leader of the laboratory exercises and the educational department.

## MICROPROCESSOR TECHNOLOGY

<b>ECTS credits:</b> 5	<b>Semester:</b> II
<b>Evaluation:</b> written exam	<b>Hours per week:</b> 2 lectures+2 laboratory exercises
<b>Course type:</b> lectures+ laboratory exercises	<b>Course status:</b> Compulsory
	<b>Degree course:</b> Computer systems and technologies

**Lecturer:** Assoc. Prof., Eng. Ludmila Taneva, PhD – [lucy\\_t@swu.bg](mailto:lucy_t@swu.bg)

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### **Description of the course:**

The course includes 10 generalized topics. As a form of control, current control and examination are provided. The proposed study studies the characteristics, operation, organization and use of microcontrollers. A program model of various microcontrollers, types of addresses and instructions, peripheral modules, organization of microprocessor systems, internal circuit interfaces and interfaces between individual microprocessor systems are considered. Part of the lecture material concerns the problems in the design, setup and testing of microcomputer systems.

### **Aim of the course:**

The aim of the course "Microprocessor Engineering" is for students to study the basic principles of operation and organization of microcontrollers, to work with various integrated environments for software development for microcontrollers, to program microcontrollers, to test and configure them, to design microprocessor systems.

### **Teaching methods:**

The lectures are conducted in the classical way and the students get acquainted sequentially with the provided material. It is planned to work with real microprocessor systems and make specific software decisions. The practical exercises are conducted in the laboratory of the department, equipped with the necessary training models with microcontrollers. After each topic of the study material provided for the exercises, students prepare a protocol containing the purpose and tasks that are set, experimental data that were obtained during the exercise and the relevant conclusions about the problem.

**Prerequisites:**

Establishing the preliminary knowledge and skills of students in the discipline, their learning style, motives and interests in the discipline is an important factor in achieving the goals and objectives. To clarify these features, different approaches are provided for establishing the entry level of students, such as: conducting oral talks, test questionnaires or reports from students. Depending on the level of preparation shown, an update of the content, volume and depth of the topics covered, as well as teaching methods is envisaged.

**Enrollment for training in the discipline:**

Compulsory course from the curriculum of the specialty "Computer Systems and Technologies", Master's Degree

**Exam registration:**

The registration for the formation of the complex current assessment is coordinated with the holder of the discipline, the leader of the laboratory exercises and the educational department.



## COMPUTER NETWORKS

<b>ECTS credits:</b> 5	<b>Semester:</b> II
<b>Evaluation:</b> written exam	<b>Hours per week:</b> 2 lectures+2 laboratory exercises
<b>Course type:</b> lectures+ laboratory exercises	<b>Course status:</b> Compulsory
	<b>Degree course:</b> Computer systems and technologies

Lecturer: Ch. Assist. Filip Tzvetanov, PhD – [ftsvetanov@swu.bg](mailto:ftsvetanov@swu.bg)

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### **Description of the course:**

The study material studies the basics of computer networks and the Internet: architecture of computer networks; methods for access to the communication environment and realizations of local networks; global network protocols; routing protocols; architecture and basic network services on the Internet.

### **Aim of the course:**

The aim of the course is for students to gain the necessary knowledge and skills to design, build and administer local and global computer networks.

### **Teaching methods:**

The course is held in lecture halls. The exercises are conducted in subgroups, in computer rooms.

### **Prerequisites:**

Establishing the preliminary knowledge and skills of students in the discipline, their learning style, motives and interests in the discipline is an important factor in achieving the goals and objectives. To clarify these features, different approaches are provided for establishing the entry level of students, such as: conducting oral talks, test questionnaires or reports from students. Depending on the level of preliminary preparation shown, an update of the content, volume and depth of the topics covered, as well as teaching methods is envisaged.

### **Enrollment for training in the discipline:**

Compulsory course from the curriculum of the specialty "Computer Systems and Technologies", Master's Degree

**Exam registration:**

The registration for the formation of the complex current assessment is coordinated with the holder of the discipline, the leader of the laboratory exercises and the educational department.

## SENSORS AND SENSOR NETWORKS

<b>ECTS credits:</b> 5	<b>Semester:</b> II
<b>Evaluation:</b> written exam	<b>Hours per week:</b> 2 lectures+2 laboratory exercises
<b>Course type:</b> lectures+ laboratory exercises	<b>Course status:</b> Compulsory
	<b>Degree course:</b> Computer systems and technologies

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### **Description of the course:**

The course "Sensors and sensor networks" covers the main issues related to the characteristics, design and principle of operation of sensors, design and construction of sensor networks. Having successfully passed the exam in "Sensors and sensor networks" will acquire the necessary minimum of theoretical knowledge and practical skills in choosing sensors, as well as building wired and wireless sensor networks.

### **Aim of the course:**

The aim of the course "Sensors and sensor networks" is for students to receive in a systematic way basic knowledge of the physical nature and structure of sensors, the principles of operation, signal processing, construction of intelligent sensors and sensor networks. To get acquainted with the areas of application, the interfaces of the sensors and the criteria for their selection, to acquire practical skills for the incorporation of the sensors in systems for management and control of technological processes and monitoring of technological processes.

### **Teaching methods:**

The course is held in lecture halls together with students majoring in "Electronics" and "Communication Engineering and Technology".

### **Prerequisites:**

Establishing the preliminary knowledge and skills of students in the discipline, their learning style, motives and interests in the discipline is an important factor in achieving the goals and objectives. To clarify these features, different approaches are provided for establishing the entry level of students, such as: conducting oral talks, test questionnaires or reports from students. Depending on the level of preliminary preparation shown, an update of the content, volume and depth of the topics covered, as well as teaching methods is envisaged.

**Enrollment for training in the discipline:**

Compulsory course from the curriculum of the specialty "Computer Systems and Technologies", Master's Degree

**Exam registration:**

The registration for the formation of the complex current assessment is coordinated with the holder of the discipline, the leader of the laboratory exercises and the educational department.

## POWER CONVERTORS

<b>ECTS credits:</b> 5	<b>Semester:</b> II
<b>Evaluation:</b> ongoing exam	<b>Hours per week:</b> 2 lectures+2 laboratory exercises
<b>Course type:</b> lectures+ laboratory exercises	<b>Course status:</b> Compulsory
	<b>Degree course:</b> Computer systems and technologies

**Lecturer:** Ch. Assist. Prof. Ivo Angelov, PhD – [ivo.angelov@swu.bg](mailto:ivo.angelov@swu.bg)

**Assistant:** Ch. Assist. Prof. Ivo Angelov, PhD – [ivo.angelov@swu.bg](mailto:ivo.angelov@swu.bg)

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### Description of the course:

The course "Conversion technology and power supply" introduces students to power supply and converter devices used to power electronic equipment and computers. The principles of operation and the device of the most common power supply and converter devices are considered. Particular attention is paid to converters of electricity from one type to another and to mains power supply systems. The course is based on uncontrollable and controllable rectifiers and filters, DC voltage regulators with analog and pulse action, inverters. Special attention is paid to uninterruptible power supplies, autonomous and non-traditional sources of electricity. Laboratory exercises are provided, through which practical habits are acquired and current control of students' knowledge is carried out.

### Aim of the course:

The aim of the course is for students to acquire knowledge about the principles of operation and design of the most common power supply and converter devices. The course is based on uncontrollable and controllable rectifiers and filters, DC voltage stabilizers with analog and pulse action, current and surge protectors, inverters and more.

### Teaching methods:

Active methods are used through laboratory exercises in a laboratory equipped with the necessary equipment and models, tests for knowledge control are conducted, and the solution of relevant practical classes is assigned.

### Prerequisites:

Establishing the preliminary knowledge and skills of students in the discipline, their learning style, motives and interests in the discipline is an important factor in achieving the goals and objectives. To clarify these features,

different approaches are provided for establishing the entry level of students, such as: conducting oral talks, test questionnaires or reports from students. Depending on the level of preliminary preparation shown, an update of the content, volume and depth of the topics covered, as well as teaching methods is envisaged.

**Enrollment for training in the discipline:**

Compulsory course from the curriculum of the specialty "Computer Systems and Technologies", Master's Degree

**Exam registration:**

The registration for the formation of the complex current assessment is coordinated with the holder of the discipline, the leader of the laboratory exercises and the educational department.

## PROGRAMMING

<b>ECTS credits:</b> 5	<b>Semester:</b> II
<b>Evaluation:</b> ongoing exam	<b>Hours per week:</b> 2 lectures+2 laboratory exercises
<b>Course type:</b> lectures+ laboratory exercises	<b>Course status:</b> Elective
	<b>Degree course:</b> Computer systems and technologies

**Lecturer:** Assoc. Prof. Ivan Trenchev, PhD – [trenchev@swu.bg](mailto:trenchev@swu.bg)

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**Assistant:** Assist. Prof. Dr. Eng. Ivan Todorin - [ivan\\_todorin@gmail.com](mailto:ivan_todorin@gmail.com)

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### Annotation:

The course focuses on C ++ programming - an object-oriented programming language based on the C language. The successful combination of the good sides of the C language and the tools for object-oriented programming are the reason for the great popularity and widespread use of C ++. The course provides knowledge about the basic ideas and characteristics of computers, programming, programming languages, algorithms. The Dev C ++ and CodeBlocks programming environments, error handling, data types, comments, input and output, variables and constants, operators, procedures and functions are introduced. Skills for working with cyclic structures and arrays are formed.

### Purpose of the course:

The main goal of the course is to master the principles of programming and the basics of the C ++ programming language, forming skills for compiling and implementing algorithms.

Upon successful completion of the Programming course, students will:

- know the main data types of C ++, variables and constants;
- work with streaming input and output;
- work with branched structures, numerical comparisons and Boolean operations;
- understand the structuring of code through functions, the concept of transmission
- parameters, documentation, scope of variables, recursion;
- use cyclic structures;
- work with arrays.

### Educational Method

The course is held in lecture halls together with the students from the bachelor programs of the Technical Faculty. The exercises are held in groups, as the groups are usually composed of 12 students.

**Prerequisites:**

Basic knowledge of mathematics is desirable.

**Enrollment for training in the discipline:**

The course is studied by all students majoring in Information and Communication Technology, as it is mandatory.

**Exam registration:**

The enrollment for the formation of the complex current assessment is coordinated with the holder of the discipline, the leader of the laboratory exercises and the training department.



## COMPUTER DESIGN

<b>ECTS credits:</b> 5	<b>Semester:</b> II
<b>Evaluation:</b> ongoing exam	<b>Hours per week:</b> 2 lectures+2 laboratory exercises
<b>Course type:</b> lectures+ laboratory exercises	<b>Course status:</b> Elective
	<b>Degree course:</b> Computer systems and technologies

**Lecturer:** : Assist. Prof., Eng. Emil Frenski – [emil\\_f@swu.bg](mailto:emil_f@swu.bg)

**Assistant:** Assist. Prof., Eng. Emil Frenski – [emil\\_f@swu.bg](mailto:emil_f@swu.bg)

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### **Description of the course:**

Practical exercises, solving computer design problems, drawings of electrical circuits and devices, PCB topology, and SPICE simulation.

### **Aim of the course:**

The aim of the course is to provide knowledge and formation of practical skills in the field of computer systems for automated design and optimization of various types of analog and digital circuits.

### **Teaching methods:**

Lectures and practical exercises.

### **Prerequisites:**

Establishing the preliminary knowledge and skills of students in the discipline, their learning style, motives and interests in the discipline is an important factor in achieving the goals and objectives. To clarify these features, different approaches are provided for establishing the entry level of students, such as: conducting oral talks, test questionnaires or reports from students. Depending on the level of preliminary preparation shown, an update of the content, volume and depth of the topics covered, as well as teaching methods is envisaged.

### **Enrollment for training in the discipline:**

Elective course from the curriculum of the specialty "Computer Systems and Technologies", Master's degree.

### **Exam registration:**

The registration for the formation of the complex current assessment is coordinated with the holder of the discipline, the leader of the laboratory exercises and the educational department.

## COMPUTER SIMULATION WITH MatLAB

<b>ECTS credits:</b> 5	<b>Semester:</b> II
<b>Evaluation:</b> ongoing exam	<b>Hours per week:</b> 2 lectures+2 laboratory exercises
<b>Course type:</b> lectures+ laboratory exercises	<b>Course status:</b> Elective
	<b>Degree course:</b> Computer systems and technologies

**Lecturer:** Assoc. Prof. Ivan Trenchev, PhD – [trenchev@swu.bg](mailto:trenchev@swu.bg)

**Aassisstant:** Assoc. Prof. Ivan Trenchev, PhD – [trenchev@swu.bg](mailto:trenchev@swu.bg)

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### **Description of the course:**

In the course the main components of MATLAB are considered - graphical interface, system commands, basic operations with vectors, matrices and polynomials, the most commonly used graphical commands and functions for numerical and symbolic calculations. MATLAB is a software system that integrates the capabilities for analytical transformations, numerical calculations and high-quality visualization of the results.

It discusses the basic functions of the MATLAB kernel and how to create new programs (m-files). Particular attention is paid to programming and creating user programs. The aim of the seminars is to acquaint students with the graphical environment for simulating SIMULINK systems and the rich capabilities of MATLAB for calculating boundaries, derivatives, integrals, research of functions and actions with complex numbers. The laboratory exercises are thematically related to the lecture material and provide an opportunity to acquire practical skills for working with the product.

### **Aim of the course:**

The aim of the course is to acquaint students with the rich capabilities of MATLAB, which is a solid basis for performing analytical and numerical calculations in a number of areas of engineering, as well as to create their own packages of programs. It is assumed that students have certain habits in working with Windows applications and have studied some programming language.

### **Teaching methods:**

The course is held in lecture halls together with the students from the Master's programs of the Technical Faculty. The exercises are conducted in groups, and usually the groups are composed of 12 students.

**Prerequisites:**

Establishing the preliminary knowledge and skills of students in the discipline, their learning style, motives and interests in the discipline is an important factor in achieving the goals and objectives. To clarify these features, different approaches are provided for establishing the entry level of students, such as: conducting oral talks, test questionnaires or reports from students. Depending on the level of preliminary preparation shown, an update of the content, volume and depth of the topics covered, as well as teaching methods is envisaged.

**Enrollment for training in the discipline:**

Elective course from the curriculum of the specialty "Computer Systems and Technologies", Master's Degree

**Exam registration:**

The registration for the formation of the complex current assessment is coordinated with the holder of the discipline, the leader of the laboratory exercises and the educational department.

## EMBEDDED MICROPROCESSOR SYSTEMS

<b>ECTS credits:</b> 6	<b>Semester:</b> III
<b>Evaluation:</b> written exam	<b>Hours per week:</b> 2 lectures+2 laboratory exercises
<b>Course type:</b> lectures+ laboratory exercises	<b>Course status:</b> Compulsory
	<b>Degree course:</b> Computer systems and technologies

**Lecturer:** Assoc. Prof., Eng. Ludmila Taneva, PhD – [lucy\\_t@swu.bg](mailto:lucy_t@swu.bg)

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**Assistant:** Assist. Pavel Djunev – [djunev@swu.bg](mailto:djunev@swu.bg)

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### Description of the course:

The course "Embedded microprocessor systems" is part of the curriculum and includes 10 generalized topics. As a form of control, current control and examination are provided. The proposed curriculum studies the requirements for "embedded systems"; the design algorithm; the peculiarities of designing the input and output interface; software systems for embedded systems design; the peculiarities of designing single-processor, two-processor and hierarchical architectures of embedded systems; the means and methods for setting up and documenting the embedded systems. Part of the lecture material deals with problems in the design, setup and testing of embedded systems.

### Aim of the course:

The aim of the course is for students to learn and be able to apply the approaches, methods and technical means for analysis, design and application of embedded systems, specialized circuits and single-chip microcomputers in accordance with their needs and interests and to acquire new knowledge and opportunities in this subject. area.

### Teaching methods:

The lectures are conducted in the classical way and the students get acquainted sequentially with the provided material. It is planned to work with real embedded microprocessor systems and make specific software decisions. The lectures are richly illustrated with graphic material, which is presented with a multimedia projector. The visualization of the presented material allows

students to receive visual information about the circuit solutions in the design of microprocessor systems.

**Prerequisites:**

Establishing the preliminary knowledge and skills of students in the discipline, their learning style, motives and interests in the discipline is an important factor in achieving the goals and objectives. To clarify these features, different approaches are provided for establishing the entry level of students, such as: conducting oral talks, test questionnaires or reports from students. Depending on the level of preliminary preparation shown, an update of the content, volume and depth of the topics covered, as well as teaching methods is envisaged.

**Enrollment for training in the discipline:**

Compulsory course from the curriculum of the specialty "Computer Systems and Technologies", Master's Degree

**Exam registration:**

The registration for the formation of the complex current assessment is coordinated with the holder of the discipline, the leader of the laboratory exercises and the educational department.

## DESIGN OF COMPUTER NETWORKS

<b>ECTS credits:</b> 6	<b>Semester:</b> III
<b>Evaluation:</b> written exam	<b>Hours per week:</b> 2 lectures+2 laboratory exercises
<b>Course type:</b> course project	<b>Course status:</b> Compulsory
	<b>Degree course:</b> Computer systems and technologies

Lecturer: Ch. Assist. Filip Tzvetanov, PhD – [ftsvetanov@swu.bg](mailto:ftsvetanov@swu.bg)

**Assistant:** Assist. Pavel Djunev – [djunev@swu.bg](mailto:djunev@swu.bg)

*Department:* Communication and Computer Engineering – [technical\\_kktt@swu.bg](mailto:technical_kktt@swu.bg)

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### Description of the course:

The course "Computer Network Design" is designed for students of the specialty "KST" trained in a master's program. The study material discusses theoretical and practical knowledge and skills in the basic principles, methods and tools for building computer networks for processing and transmission of data, sound and images. The architecture of computer networks is considered; the methods for access to the communication environment and logical local networks, WAN protocols, routing protocols and others are implemented. Internet.

### Aim of the course:

The aim of the course "Computer Network Design" is for students to acquire knowledge about the goals, tasks, physical nature and technological features of computer systems, computer networks, and network technologies. To get acquainted with the areas of application, the types of computer networks, communication environments, as well as the basic protocols and network services on the Internet.

### Teaching methods:

The lectures are conducted in the classical way and the students get acquainted sequentially with the provided material. The application of interactive teaching methods is envisaged, overlapping mainly the discussion methods - discussion, discussion and situational methods - method of specific situations, solving cases on various technological problems, simulation of real production problems and making specific technological decisions. The lectures are richly illustrated with graphic material, which is presented with a video projector. The visualization of the exhibited material allows students to receive visual and tactile information about the technological sequence in the manufacture of the sewing product.

**Prerequisites:**

Establishing the preliminary knowledge and skills of students in the discipline, their learning style, motives and interests in the discipline is an important factor in achieving the goals and objectives. To clarify these features, different approaches are provided for establishing the entry level of students, such as: conducting oral talks, test questionnaires or reports from students. Depending on the level of preliminary preparation shown, an update of the content, volume and depth of the topics covered, as well as teaching methods is envisaged.

**Enrollment for training in the discipline:**

Compulsory course from the curriculum of the specialty "Computer Systems and Technologies", Master's Degree

**Exam registration:**

The registration for the formation of the complex current assessment is coordinated with the holder of the discipline, the leader of the laboratory exercises and the educational department.

## MULTIMEDIA TECHNOLOGIES

<b>ECTS credits:</b> 6	<b>Semester:</b> III
<b>Evaluation:</b> written exam	<b>Hours per week:</b> 2 lectures+2 laboratory exercises
<b>Course type:</b> course project	<b>Course status:</b> Compulsory
	<b>Degree course:</b> Computer systems and technologies

**Lecturer:** Assoc. Prof. Ivan Trenchev, PhD – [trenchev@swu.bg](mailto:trenchev@swu.bg)

**Aassisstant:** Assoc. Prof. Ivan Trenchev, PhD – [trenchev@swu.bg](mailto:trenchev@swu.bg)

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### Description of the course:

The program offers specialized practical training in the field of multimedia, computer design, three-dimensional modeling and computer graphics. The training is carried out in three main areas - development and integration of multimedia applications, three-dimensional modeling and design, computer animation. The content and structure of the lectures reflect the latest trends in the development of relevant technologies.

Extracurricular learning forms include projects, practical assignments, term papers.

### Aim of the course:

Skills to develop individually and in a team of:

- projects that combine the application of modern technological solutions with the creation of artistically made products;
- for application of the main technological means in the field of multimedia, computer graphics and animation and can purposefully apply them in the development of practical tasks.

### Teaching methods:

The course is held in lecture halls together with the students from the Master's programs of the Technical Faculty. The exercises are conducted in groups, and usually the groups are composed of 12 students.

### Prerequisites:

Establishing the preliminary knowledge and skills of students in the discipline, their learning style, motives and interests in the discipline is an important factor in achieving the goals and objectives. To clarify these features,



different approaches are provided for establishing the entry level of students, such as: conducting oral talks, test questionnaires or reports from students. Depending on the level of preliminary preparation shown, an update of the content, volume and depth of the topics covered, as well as teaching methods is envisaged.

**Enrollment for training in the discipline:**

Compulsory course from the curriculum of the specialty "Computer Systems and Technologies", Master's Degree

**Exam registration:**

The registration for the formation of the complex current assessment is coordinated with the holder of the discipline, the leader of the laboratory exercises and the educational department.

## THEORY OF ENGINEERING EXPERIMENT

<b>ECTS credits:</b> 6	<b>Semester:</b> III
<b>Evaluation:</b> written exam	<b>Hours per week:</b> 2 lectures+2 laboratory exercises
<b>Course type:</b> course project	<b>Course status:</b> Compulsory
	<b>Degree course:</b> Computer systems and technologies

**Lecturer:** Assoc. Prof. Dimitrina Kerina, PhD – [d\\_kerina@swu.bg](mailto:d_kerina@swu.bg)

**Assistant:** Assoc. Prof. Fatima Sapundzhi, PhD – [sapundzhi@swu.bg](mailto:sapundzhi@swu.bg)

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### **Description of the course:**

The course "Theory of Engineering Experiment" is mandatory for students majoring in Communication Engineering and Technology, Educational and Qualification Degree - Master. The course on "Theory of Engineering Experiment" includes the following main sections: theoretical foundations of engineering experiment, research hypothesis, methodology of engineering experiment, mathematical support of research, planning and organization of engineering experiment and methodology of development and defense of master's thesis . As a form of control, current control and examination are provided.

Having successfully passed the exam in "Theory of Engineering Experiment" will acquire the necessary minimum of theoretical knowledge in the field of organization, conduct, analysis and application of the results of an engineering experiment.

### **Aim of the course:**

The aim of the course is for students to acquire knowledge for successful engineering experiment as well as to use ready-made software products in the processing of experimental results. The course covers a wide range of issues from the methodology of the engineering experiment and the mathematical support of the engineering experiment.

### **Teaching methods:**

Lecture, independent work with a textbook and scientific literature, exercises, collective discussion and discussion on the tasks, independent work.

**Prerequisites:**

Establishing the preliminary knowledge and skills of students in the discipline, their learning style, motives and interests in the discipline is an important factor in achieving the goals and objectives. To clarify these features, different approaches are provided for establishing the entry level of students, such as: conducting oral talks, test questionnaires or reports from students. Depending on the level of preliminary preparation shown, an update of the content, volume and depth of the topics covered, as well as teaching methods is envisaged.

**Enrollment for training in the discipline:**

Compulsory course from the curriculum of the specialty "Computer Systems and Technologies", Master's Degree

Exam registration:

The registration for the formation of the complex current assessment is coordinated with the holder of the discipline, the leader of the laboratory exercises and the educational department.

## INTEGRATED COMPUTER SYSTEMS AND NETWORKS

<b>ECTS credits:</b> 6	<b>Semester:</b> III
<b>Evaluation:</b> ongoing assessment	<b>Hours per week:</b> 2 lectures+2 laboratory exercises
<b>Course type:</b> course project	<b>Course status:</b> Elective
	<b>Degree course:</b> Computer systems and technologies

**Lecturer:** Ch. Assist. Filip Tzvetanov, PhD – [ftsvetanov@swu.bg](mailto:ftsvetanov@swu.bg)

**Assistant:** Assist. Pavel Djunev – [djunev@swu.bg](mailto:djunev@swu.bg)

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### **Description of the course:**

The course "Integrated Computer Systems and Networks" is designed for students of the specialty "KST" trained in a master's program. The study material discusses theoretical and practical knowledge and skills in the basic principles, methods and tools for building integrated computer systems and networks for processing and transmission of data, sound and images. The basics of computer networks and the Internet are also considered: architecture of computer networks; methods for access to the communication environment and realizations of local networks; global network protocols; routing protocols; architecture and basic network services on the Internet.

### **Aim of the course:**

The aim of the course "Integrated Computer Systems and Networks" is for students to acquire knowledge about the goals, tasks, physical nature and technological features of integrated computer systems, computer networks, and network technologies. To get acquainted with the areas of application, the types of computer networks, communication environments, as well as the basic protocols and network services on the Internet.

### **Teaching methods:**

The lectures are conducted in the classical way and the students get acquainted sequentially with the provided material. The application of interactive teaching methods is envisaged, overlapping mainly the discussion methods - discussion, discussion, discussion and situational methods - method of specific situations, solving cases on various technological problems, simulation of real production problems and making specific technological decisions. The lectures are richly illustrated with graphic material, which is presented with a video projector. The visualization of the exhibited material allows students to receive visual and tactile information about the technological sequence in the manufacture of the sewing product.

**Prerequisites:**

Establishing the preliminary knowledge and skills of students in the discipline, their learning style, motives and interests in the discipline is an important factor in achieving the goals and objectives. To clarify these features, different approaches are provided for establishing the entry level of students, such as: conducting oral talks, test questionnaires or reports from students. Depending on the level of preliminary preparation shown, an update of the content, volume and depth of the topics covered, as well as teaching methods is envisaged.

**Enrollment for training in the discipline:**

Elective course from the curriculum of the specialty "Computer Systems and Technologies", Master's Degree

**Exam registration:**

The registration for the formation of the complex current assessment is coordinated with the holder of the discipline, the leader of the laboratory exercises and the educational department.

## WIRELESS COMMUNICATION SYSTEMS

<b>ECTS credits:</b> 6	<b>Semester:</b> III
<b>Evaluation:</b> ongoing assessment	<b>Hours per week:</b> 2 lectures+2 laboratory exercises
<b>Course type:</b> course project	<b>Course status:</b> Elective
	<b>Degree course:</b> Computer systems and technologies

**Lecturer:** Ch. Assist. Filip Tzvetanov, PhD – [ftsvetanov@swu.bg](mailto:ftsvetanov@swu.bg)

**Assistant:** Assist. Pavel Djunev – [djunev@swu.bg](mailto:djunev@swu.bg)

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### **Description of the course:**

The course "Wireless Communication Systems" introduces students to the general characteristics of network communications in industrial environments, network topologies and methods for access to the physical environment, communication mechanisms in industrial networks. The most frequently applied specifications in industrial conditions of these networks are considered, as well as their components and specific features in their industrial realization. Emphasis is placed on the correct choice of communication type, components, network configuration, selection of components and construction and study of application software for the respective industrial communication network.

### **Aim of the course:**

The aim of the course is for students to acquire theoretical knowledge and practical skills and competencies for the most appropriate choice of protocol for building an industrial network and to design an industrial network with the selected protocol. The systematization of this knowledge makes it possible to get acquainted with the methodology of their use.

### **Teaching methods:**

The course is held in multimedia lecture halls. The practical exercises are conducted in groups in laboratories with computers and specialized equipment.

### **Prerequisites:**

Establishing the preliminary knowledge and skills of students in the discipline, their learning style, motives and interests in the discipline is an important factor in achieving the goals and objectives. To clarify these features, different approaches are provided for establishing the entry level of students, such as: conducting oral talks, test questionnaires or reports from students. Depending on the level of preliminary preparation shown, an update of the content, volume and depth of the topics covered, as well as teaching methods is envisaged.

**Enrollment for training in the discipline:**

Elective course from the curriculum of the specialty "Computer Systems and Technologies", Master's Degree

**Exam registration:**

The registration for the formation of the complex current assessment is coordinated with the holder of the discipline, the leader of the laboratory exercises and the educational department.

## DIGITAL COMMUNICATIONS

<b>ECTS credits:</b> 6	<b>Semester:</b> IV
<b>Evaluation:</b> Ongoing assessment	<b>Hours per week:</b> 2 lectures+1 laboratory exercises
<b>Course type:</b> lectures + laboratory exercises	<b>Course status:</b> Compulsory
	<b>Degree course:</b> Computer systems and technologies

**Lecturer:** Assoc. Prof. Gabriela Atanasova, PhD – [gatanasova@swu.bg](mailto:gatanasova@swu.bg)

**Assistant:** Assist. Eng Georgi Georgiev, PhD – [goshko.georgiev@gmail.com](mailto:goshko.georgiev@gmail.com)

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### Description of the course:

The course Digital Communications is included in the curriculum as an elective course for students majoring in "Computer Systems and Technologies" in the second semester of their studies. This course provides an overview of modern telecommunications networks, technologies for multiplexing and signal transmission in communication networks, plesiochronous (PDH) and synchronous digital hierarchies (SDH). Students will get acquainted with synchronous transport networks (SDH networks), as well as with subscriber access to communication networks and subscriber access networks. The course also covers the Digital Integrated Services Network (ISDN) and the Broadband Integrated Services Network (BISDN). Particular attention is paid to ATM networks, their architecture, protocols, signaling and routing, ATM network traffic and their management. Students will also gain basic knowledge about the new generation of networks (NGN networks), which are beginning to be built intensively thanks to the development of technologies in the field of communications.

### Aim of the course:

The aim of the course "Digital Communications" is for students to acquire knowledge about the goals, objectives, physical nature and technological features of integrated computer systems, computer networks and network technologies. To get acquainted with the areas of application, the types of computer networks, communication environments, as well as the basic protocols and network services on the Internet.

### Teaching methods:

Lectures and exercises.



**Prerequisites:**

Establishing the preliminary knowledge and skills of students in the discipline, their learning style, motives and interests in the discipline is an important factor in achieving the goals and objectives. To clarify these features, different approaches are provided for establishing the entry level of students, such as: conducting oral talks, test questionnaires or reports from students. Depending on the level of preliminary preparation shown, an update of the content, volume and depth of the topics covered, as well as teaching methods is envisaged.

**Enrollment for training in the discipline:**

Elective course from the curriculum of the specialty "Computer Systems and Technologies", Master's Degree

**Exam registration:**

The registration for the formation of the complex current assessment is coordinated with the holder of the discipline, the leader of the laboratory exercises and the educational department.

## SERVER TECHNOLOGIES

<b>ECTS credits:</b> 6	<b>Semester:</b> IV
<b>Evaluation:</b> Ongoing assessment	<b>Hours per week:</b> 2 lectures+1 laboratory exercises
<b>Course type:</b> lectures + laboratory exercises	<b>Course status:</b> Elective
	<b>Degree course:</b> Computer systems and technologies

**Lecturer:** Assoc. Prof., Eng. Anton Stoilov, PhD – [antonstoilov@swu.bg](mailto:antonstoilov@swu.bg)

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### Description of the course:

The course "Server Technologies" is part of the curriculum and includes 15 generalized topics in the field of server technology with an emphasis on server administration and programming in the WEB. As a form of control in the training, current control and current assessment are provided. The content of the program covers the main issues related to types of server operating systems, cloud structures, server virtualization, high-performance computing, mobile applications, IP telephony, server storage technologies, WEB services and more. Those who receive an ongoing assessment of poor in "Server Technology" will acquire the necessary knowledge in the application of modern technologies and methods for building modern server systems and technologies. In the practice classes, students explore and apply methods, configure various server systems.

### Aim of the course:

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

### Teaching methods:

The lectures are held on the basis of pre-designed presentations with a multimedia projector. Each lecture is accompanied by practical examples and tasks that are solved in class. Throughout the lecture, an interactive dialogue with

students is maintained through control questions and answers. The discussion on the new material is held at the end of the lecture.

**Prerequisites:**

Establishing the preliminary knowledge and skills of students in the discipline, their learning style, motives and interests in the discipline is an important factor in achieving the goals and objectives. To clarify these features, different approaches are provided for establishing the entry level of students, such as: conducting oral talks, test questionnaires or reports from students. Depending on the level of preliminary preparation shown, an update of the content, volume and depth of the topics covered, as well as teaching methods is envisaged.

**Enrollment for training in the discipline:**

Elective course from the curriculum of the specialty "Computer Systems and Technologies", Master's Degree

**Exam registration:**

The registration for the formation of the complex current assessment is coordinated with the holder of the discipline, the leader of the laboratory exercises and the educational department.

## OPTIMIZATION OF DISCRETE STRUCTURES

<b>ECTS credits:</b> 6	<b>Semester:</b> IV
<b>Evaluation:</b> Ongoing assessment	<b>Hours per week:</b> 2 lectures+1 laboratory exercises
<b>Course type:</b> lectures + laboratory exercises	<b>Course status:</b> Elective
	<b>Degree course:</b> Computer systems and technologies

**Lecturer:** Assoc. Prof. Fatima Sapundzhi, PhD – [sapundzhi@swu.bg](mailto:sapundzhi@swu.bg)

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### **Description of the course:**

The proposed curriculum mainly focuses on providing knowledge of an applied nature, which are related to modeling in discrete structures. The basic principles in the study of operations, the typical classes of optimization problems, the basic principles in decision making - in case of determinism, nondetermination, risk conditions and in case of multicriteria optimizations are considered. Methods for optimization of large-scale tasks are given, the latter being illustrated by examples in the field of informatics, economics and management - network planning, breaking down macrosystems into strongly connected components, organization and management of macrosystems, deployment of civil, economic and military sites, selection of optimal strategies and routes. In the lecture course a reasonable balance was sought between the theoretical and applied aspect of the given knowledge with a preference for applicability.

### **Aim of the course:**

The main goal of the studied discipline is for the student to study some emblematic basic algorithms related to search in graphs and to develop his algorithmic thinking.

The main task is for the student to get an idea of the possibility to model through discrete structures and processes. The student after acquaintance with the proposed algorithms to implement them on a computer. With this lecture course to make an interdisciplinary connection with the disciplines - programming and graphs and networks.

### **Teaching methods:**

The lectures are conducted in the classical way and the students get acquainted sequentially with the provided material. The application of interactive teaching methods is envisaged, advocating mainly the discussion

methods - discussion, discussion, discussion and situational methods - a method of specific situations, solving specific practical tasks. The lectures are richly illustrated with graphic material, which is presented with a video projector.

The practical exercises are conducted in a laboratory of the department, equipped with the necessary computers and specialized software. Before each practical lesson, students are informed about the need for preliminary preparation on the topic. The application of interactive teaching methods is envisaged, overlapping mainly the discussion methods - discussion and the situational methods - a method of specific situations and solving specific practical tasks.

**Prerequisites:**

Establishing the preliminary knowledge and skills of students in the discipline, their learning style, motives and interests in the discipline is an important factor in achieving the goals and objectives. To clarify these features, different approaches are provided for establishing the entry level of students, such as: conducting oral talks, test questionnaires or reports from students. Depending on the level of preliminary preparation shown, an update of the content, volume and depth of the topics covered, as well as teaching methods is envisaged.

**Enrollment for training in the discipline:**

Elective course from the curriculum of the specialty "Computer Systems and Technologies", Master's Degree

**Exam registration:**

The registration for the formation of the complex current assessment is coordinated with the holder of the discipline, the leader of the laboratory exercises and the educational department.

## DATA CODING AND COMPRESSION

<b>ECTS credits:</b> 6	<b>Semester:</b> IV
<b>Evaluation:</b> Ongoing assessment	<b>Hours per week:</b> 2 lectures+1 laboratory exercises
<b>Course type:</b> lectures + laboratory exercises	<b>Course status:</b> Elective
	<b>Degree course:</b> Computer systems and technologies

**Lecturer:** Ch. Assist. Prof. Margarita Todorova, PhD – [todorova@swu.bg](mailto:todorova@swu.bg)

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### **Description of the course:**

The course is elective in the 4th semester and aims to give students knowledge and skills on the problems of data coding and compression. Attention is paid to noise protection coding, linear and cyclic codes. Basic strategies for lossy and lossless data compression (Huffman and Lempel-Ziv coding) are considered.

### **Aim of the course:**

The aim of the course "Data Coding and Compression" is for students to acquire knowledge about the main goals, tasks and methods of data coding and compression with loss and without loss of quality.

### **Teaching methods:**

Lectures and exercises.

### **Prerequisites:**

Establishing the preliminary knowledge and skills of students in the discipline, their learning style, motives and interests in the discipline is an important factor in achieving the goals and objectives. To clarify these features, different approaches are provided for establishing the entry level of students, such as: conducting oral talks, test questionnaires or reports from students. Depending on the level of preliminary preparation shown, an update of the content, volume and depth of the topics covered, as well as teaching methods is envisaged.

**Enrollment for training in the discipline:**

Elective course from the curriculum of the specialty "Computer Systems and Technologies", Master's Degree

**Exam registration:**

The registration for the formation of the complex current assessment is coordinated with the holder of the discipline, the leader of the laboratory exercises and the educational department.

## DYNAMIC WEB APPLICATIONS

<b>ECTS credits:</b> 6	<b>Semester:</b> IV
<b>Evaluation:</b> Ongoing assessment	<b>Hours per week:</b> 2 lectures+1 laboratory exercises
<b>Course type:</b> lectures + laboratory exercises	<b>Course status:</b> Elective
	<b>Degree course:</b> Computer systems and technologies

**Lecturer:** Assoc. Prof., Eng. Anton Stoilov, PhD – [antonstoilov@swu.bg](mailto:antonstoilov@swu.bg)

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### **Description of the course:**

The curriculum is designed for the course "Dynamic Web Applications" for students majoring in "Computer Systems and Technologies" at Southwestern University "Neofit Rilski" - Blagoevgrad. The course is designed to give students knowledge of modern programming languages (visual and object-oriented programming) as well as some of the basic tools for creating dynamic WEB applications. The basic principles of building databases and their use through visual software packages are given. Special attention is paid to Internet programming. The basic principles of programming with HTML and some software packages for creating WEB - sites (Front Page, etc.) are considered. Information is provided on the use of Java and Java Script in Internet programming and the use of a database in Internet applications.

The exercises provided in the program aim to further develop the knowledge and create practical skills for using visual programming languages in solving specific tasks. In addition, students will acquire habits for working on the Internet, including creating simple applications.

### **Aim of the course:**

The aim of the course is for students to get acquainted with the principles of developing software applications with modern programming environments. They must be able to freely use program module objects to embed in program applications. Students must learn to develop Web pages and sites and publish materials on the Internet.

### **Teaching methods:**

The course is held in lecture and computer rooms. The exercises are conducted in groups. The application of interactive teaching methods is



envisaged. The lectures are richly illustrated with graphic material, which is presented with a video projector.

**Prerequisites:**

Establishing the preliminary knowledge and skills of students in the discipline, their learning style, motives and interests in the discipline is an important factor in achieving the goals and objectives. To clarify these features, different approaches are provided for establishing the entry level of students, such as: conducting oral talks, test questionnaires or reports from students. Depending on the level of preliminary preparation shown, an update of the content, volume and depth of the topics covered, as well as teaching methods is envisaged.

**Enrollment for training in the discipline:**

Elective course from the curriculum of the specialty "Computer Systems and Technologies", Master's Degree

**Exam registration:**

The registration for the formation of the complex current assessment is coordinated with the holder of the discipline, the leader of the laboratory exercises and the educational department