ANNOTATIONS

Program: **SOFTWARE AND INTERNET TECHNOLOGIES**
Professional orientation: **COMMUNICATIONS AND COMPUTER ENGINEERING**
Professional qualification: **COMPUTER ENGINEERING**
Academic degree: **BACHELOR**
Form of Study: **FULL-TIME**
Term of Study: **4 years / 8 semesters**

Discipline "Foreign Language - English", code (1)

The training in English aims at upgrading students' knowledge achieved at school and at developing their language skills: reading, writing, listening and speaking. Special attention is paid to lexical units and structures of General English, typical for technical literature. The emphasis is on developing students' oral and written communicative skills. The course in English is designed to enhance students' language competence: revision of common grammar and syntax structures, improving functional literacy in English. By the end of the course students will be able to express themselves fluently in a professional environment as well to make short oral presentations.
Main issues of the syllabus content:

- Revising English tenses;
- Revising Conditional Sentences;
- Revising Passive Voice as one of the most important structures in Technical English;
- Improving communicative skills: reading, writing, listening comprehension, speaking;
- Delivering oral presentations.

Discipline "Basic Mathematics", code (2)

The discipline "Basic Mathematics" provides fundamental preparation for the students of the specialty "SIT" at the Technical University - Varna. The aim is to develop students' mathematical knowledge and skills to create correct mathematical models and effective algorithms to solve practical problems in the field of computer engineering.
The course provides the study of technical disciplines (Electrotechnics, Measurements in Electronics, Computer Electronics, etc.) and most of the specific computer disciplines (Synthesis and Analysis of Algorithms, Discrete Structures, Graphic Design, Software Project Management, Artificial Intelligence etc.). The aim of this subject is to present to the students various concepts and theoretical facts from the above sections.
Main issues of the syllabus content:

- Complex numbers
- Analytical geometry
- Number theory
- Differential calculus of the function of one variable
- Numerical methods

Discipline "WEB Design", code (3)

The subject aims to acquaint students with the principles of designing functional web sites, the methods of publishing on WWW, the use of modern technologies such as HTML, XHTML and Java Script to create dynamic WEB documents.

During the course, the students develop independently the complete design and frontend of a Web site, according to given or selected themes as a course project. Emphasis is placed on writing quality code in line with current standards (HTML5 / CSS3 / JavaScript (ES5, ES6)), cross browser compatibility and good SEO practices.

The subject is based on the students' knowledge of creating documents with the tools of Web

Design and Microsoft Office and has initial links with the disciplines in which object programming and WEB technologies are studied.
Main issues of the syllabus content:

- WEB design principles
- HTML. Creation of documents, formatting, forms
- Java Script
- HTML DOM model
- Insert media into web documents
- Information search machines
- Web 2.0.
- Semantic Web

Discipline “Programming Fundamentals, part 1”, code (4)

The subject is oriented towards the fundamental preparation of the students of the specialty SIT. The aim is to give students the knowledge and skills of programming using high-level languages and their applications.
Main issues of the syllabus content:

- Computer software and hardware
- The organization of operating systems for personal computers
- Program algorithms and flowcharts
- Principles of programming and design of application programs
- Presentation of information and main types and structures of data in high-level programming languages
- Program structures in high-level languages
- Principles of structural, modular and object programming
- Working with libraries from standard subroutines

Discipline “Computer Electronics”, code (5)

The aim of the course is to teach students in Software and Internet Technologies to electronics used in computers but not directly related to the computing process, such as power supplies, indicators, OpAmps. The subject creates knowledge and skills in designing simple electronic circuits, connecting and testing them. Main measuring instruments are also studied - a multimeter and an oscilloscope. After each exercise, students prepare a report.
Main issues of the syllabus content:

- Electronic components
  - Semiconductor diodes. Characteristics
  - Bipolar transistors. Static characteristics
  - MOSFETs
- Measurements in electronics
  - Characteristics of signals in digital and pulse circuits
  - Measurement of static and dynamic characteristics
- Design of elementary circuit and circuits
  - Linear pulse circuits
  - Diode limiters
  - Transistor switch with bipolar transistors
- Power supply units
  - Transformers
  - Rectifiers
  - Stabilizers. Impulse stabilizers
  - Parameters of specialized power supplies
- Operational amplifiers
  - Basic information about OA

- Basic parameters of the OA without feedback
- Basic circuits of OA
- Sensors

Discipline “Specialized Sport Activities, part 1”, code (6a)

The discipline is connected with swimming training by specific swimming exercises for maintain the health status of the students. The given theoretic and training potential gives students skills on swimming styles and especially freestyle stroke. There is an entrance level provided for physical capabilities of the students educated. The teaching program consists of 30 hours exercises in a swimming pool.

Main parts of content :

- Theoretic and methodic knowledge
- Special physical training
- Technical and tactic training
- Psychological and will training.

Discipline “Sport and Social Adaptation, part 1”, code (6b)

The education program on Sport and Social Adaptation Part 2 lays in education plan for Bachelor degree of all subjects. The program is intended for students who are obliged to select in 1-st year of education due to physical deceases and health problems. The lectures material is in two semesters and covers topics of basics of sport as a factor of good psychical and physical health and its influence to effective social adaptation.

Main parts of content :

- Sport
- Social adaptation
- The place of sport for an effective social adaptation.

Discipline “Mathematics for Computing”, code (7)

The discipline “Mathematics for computing” provides the fundamental preparation for the students of the specialty "SIT" at the Technical University - Varna. The aim is to develop students' mathematical knowledge and skills to create correct mathematical models and effective algorithms to solve practical problems in the field of computer engineering.

The course provides all special courses from the curriculum of the specialty and in particular: Data Management, Object Oriented Programming, Operating Systems Principles, Discrete Structures, System Analysis, Graphic Systems, Database Systems, Internet Data Protection, Information Systems, Cryptography and data protection, WEB Design etc., as well as the diploma project.

Main issues of the syllabus content:

- Analytical geometry (in the plane and in the space)
- Number theory (with algorithms)
- Combinatorics (with algorithms)
- Probability and mathematical statistics (with algorithms)

Discipline “Algorithms and Data Structures”, code (8)

The course is created for a first year students on Software and Internet Technologies. The course emphasis is on designing and analyzing of algorithms. Also fundamental data structures and its implementations are considered. The course forms knowledge and skills in the fields of correct and efficient programs and algorithms synthesis. It covers a range of important programming techniques and abstract data types (ADT).

At the end of the course, students understand date structures. They know how to use them, how to implement them several ways. The students can reason about efficiency with a big-O analysis and argue for the correctness of their implementations by referring to the invariant of the ADT. Another important effect of the course is the specification, design, and implementation experience.

Main issues of the syllabus content:

- Algorithms and its basic features, definitions, efficiency, correctness and so on.
- Methods and approaches for algorithm's and program's design (such as structure programming, object-oriented programming, recursion, backtracking, "divide and conquer" approach and so on)
- Structures of data, static and dynamic, linear and non-linear (such as stack, queues, double ended queues, lists, trees and graphs)
- Well-known classical algorithms. This part of the course includes such topics as algorithms for sorting, searching and hashing, heuristic and greedy algorithms, probabilistic and randomized algorithms, genetic algorithms, etc.

Discipline "Logic and Automation", code (9)

The course "Logic and Automation" is oriented towards the fundamental preparation of the students in the Technical University of Varna. The aim is to give the students knowledge and practical skills in methods of analysis and synthesis of logic circuits and their use in computer systems, technologies and simulations.

The discipline provides the basis for the following courses: Computer Organization and Architectures, Discrete Structures, Microprocessors and other specialized disciplines from the curriculum of the specialty.

Main issues of the syllabus content:

- Boolean algebra. Logical functions. Presentation of local functions. Elementary logical functions. Minimization of logical functions with Karnaugh maps
- Synthesis of combinational logical schemes
- Synthesis of functional logical schemes
- Analysis of logical circuits
- Abstract automata. Synthesis of Mealy and Moore machines. Minimization of finite state machines
- Flip-flops. Synthesis of triggers. Synthesis of finite state machines. Synchronous and asynchronous automata
- Synthesis of structural automata by using block diagrams
- Synthesis of sequential logical schemes based on shift registers
- Programmable logic devices

Discipline "Graphic Design", code (10b)

The graphical composition is the basis of all electronic screens, whether animated, video or multimedia. New, modern electronic technologies pose specific problems with color composition and lighting composition. Not knowing this specificity is inconceivable getting quality graphical electronic design. It is necessary to study the techniques and aesthetics of graphic design and related computer programs and technologies.

The lectures and exercises deal with text formatting, creating or entering graphical objects and fitting the materials of a chosen size.

Main issues of the syllabus content:

- Working with Adobe In Design Program
- Working with Adobe After Effect
- Create ad material

Discipline "Specialized Sport Activities, part 2", code (11a)

The discipline is connected with swimming training by specific swimming exercises for maintain the health status of the students. The given theoretic and training potential gives students skills on swimming styles and especially freestyle stroke. There is an entrance level provided for physical capabilities of the students educated. The teaching program consists of 30 hours exercises in a swimming pool.

Main parts of content :

- Theoretic and methodic knowledge
- Special physical training
- Technical and tactic training
- Psychological and will training.

Discipline “Sport and Social Adaptation, part 2”, code (11b)

The education program on Sport and Social Adaptation Part 2 lays in education plan for Bachelor degree of all subjects. The program is intended for students who are obliged to select in 1-st year of education due to physical deceases and health problems. The lectures material is in two semesters and covers topics of basics of sport as a factor of good psychical and physical health and its influence to effective social adaptation.

Main parts of content :

- Sport
- Social adaptation
- The place of sport for an effective social adaptation.

Discipline “Practice, part 1”, code (12)

Discipline “Discrete Structures”, code (13)

The Discrete Structures course is dedicated to the second year students in Software and Internet Technologies. Students are familiarized with the theoretical knowledge in informatics. The main objectives and tasks are understanding of the basics of the discrete systems; and to give the students knowledge and skills in Analysis and synthesis of formal means for describing discrete systems; Analysis and synthesis of abstract machines for the representation of discrete systems; Formalizing practical problems, describing them with discrete systems and solving them with programming tools.

Main issues of the syllabus content:

- Theoretical foundations of informatics
- Set theory, relations and functions
- Regular sets and expressions
- Formal grammars and expressions
- Approaches for synthesis and analysis of formal grammars and languages
- Theory of algorithms
- Abstract automata, data structures and programs for their implementation
- Turing machine
- Theory of graphs
- Parallel systems and processes. Parallel systems description models
- Mathematical logic
- Resolution method
- Python logic programming language

Discipline “Data Management”, code (14)

The "Data Management" (MS) course is designed for Bachelor's degree students of Software and Internet Technologies and is particularly important in all special disciplines because it is the basis of software technologies, particularly in information technology. It aims to acquaint future specialists with database theory as one of the main computer sciences. They examine database physical and logical foundations. The basic data models – ERM, relational, network, hierarchical and object-relational are subject to in-depth study, with the ERM and relational being the most detailed. The properties of relational information structures, methods for their analysis and synthesis (design) are given, using data modeling systems (Oracle Data Modeler). The high level languages for access to data and for describing databases models are discussed. Here the main place is the SQL standard, presented at DDL (Data Definition Language), DML (Data Manipulation Language), TCL (Transaction Control Language), DCL (Data Control Language) level. All subjects in the course are practiced, using up to date client-server environment, including Oracle database server, Oracle SQL Developer.

The subject is related to the prerequisites: "Programming Fundamentals", "Object-Oriented Programming", "Programming Systems"; and output connections to subjects: "Systems with Data Bases", "Internet Technologies ", "Business Intelligence Systems" and others.

Main issues of the syllabus content:

- Databases - models
- ERM, relational model
- Design of relational databases, normalization
- Oracle data modeler
- Oracle database server, Oracle SQL developer
- SQL language – DDL, DML
- SQL language – TCL, DCL

Discipline “Object-Oriented Programming Fundamentals(C++)”, code (15)

The course is based on the knowledge acquired by the students through the preceding courses “Programming Fundamentals” and “Algorithms and Data Structures”. The latest trends in the appropriate courses from leading universities in Europe and USA as well as the recommendations of the C and C++ users’ association have been taken into consideration for course content’ designing. Presented material introduces the students with contemporary technologies for application development with usage of C++. The course consists of two parts – “Object-oriented programming in C++” and “Standard library of STL template classes”. The basic principles of the object-oriented programming are presented through implementation of algorithms and data structures already studied in previous courses, while the course itself extends the knowledge in algorithms including generalization of the term algorithm and the way of its implementation.

Main issues of the syllabus content:

- Objects and classes
- Inheritance and polymorphism
- Instruments for programs’ organization
- STL library - description
- Consecutive containers
- Suggestive containers
- Adapters of containers
- Implementation of base structures in STL – stacks, queues, priority queues
- Object functions and adapters
- Invertors. Iterative adapters
- Algorithms and containers
- General algorithms – creation principles, based on STL

Discipline “Computer Organization and Architectures”, code (16)

The first part of the discipline presents knowledge about the structure and organization of the digital computing machine. For this purpose, the presentation of the data and algorithms of the executable operations is considered. Based on the principles of building modern digital computing machines, it motivates the composition of the necessary devices and systems. In this connection, the structure and organization of the operation of arithmetic-logic devices, storage devices, control devices are considered. The methods of organization and the means of realization of the command system, the storage system, the interruption system and the system of I / O exchange are considered.

The material included in the second part of the discipline is dedicated to the specifics of modern computer architectures. Emphasis is placed on CPU pipelined work, processor architecture with

multiple functional drives, and distributed memory processors.
Main issues of the syllabus content:

- Presentation of the data
- Presentation of logical and operational structures
- Logical structure of storage device
- Organization of the computation process
- Organization of the storage system
- Organization of the control system
- Architecture of modern processors. Introduction to parallel processing. Conveyor execution of commands in the processor
- Processors with multiple functional devices. Distributed memory processors
- Vector processors
- Memory architecture in parallel computers. Architecture of external memory in parallel computers

Discipline “Computer Organization and Architectures”, code (17)

The discipline is devoted to the structural organization and functioning of modern computer systems. Types of data and the standards for their presentation are considered. Algorithms of arithmetic with fixed and floating point numbers are studied. Based on the principles of organization and implementation of the computer, the logical structure and functioning of its main devices and systems are considered. The attitude of individual structural elements and primary algorithms to various programmatic problems is elucidated.
Main issues of the syllabus content:

- Data - logical, symbolic, numeric. Number representation - fixed and floating point. Standards for number representation. Features. Accuracy. Machine codes. Formal means for presenting logical structures and language of micro-operations.
- Arithmetic-logic device for a fixed point numbers. Arithmetic-logic floating point device.
- Storage devices and operations in them. RAM-memory - static and dynamic organization. FIFO and LIFO structures. Associative memory - associative operations. Applications.
- Organization of the computation process. Command cycle. Machine command system. Addressing methods. Registers.
- Interruption. Organization of the interruption system. Organization of an I / O system. System bus. Exchange methods.
- Organization of the storage system. Buffer memories, commands, and management algorithms. Organization of virtual memory.
- Principles of organization of control. Logical structures of micro-programming control devices.

Discipline “Specialized Sport Activities, part 3”, code (18a)

Discipline “Sport Management, part 1”, code (18b)

Discipline “Object-Oriented Programming Fundamentals (JAVA) ”, code (19)

Using the main conceptions and principles of object-oriented programming, the students learn programming language Java and get knowledge and skills on Java programming. The course is considered the basic language statements and constructions. Such topics as Declaring Classes, Declaring Member Variables, Defining Methods, Constructors for Classes Providing, Passing Information to a Method or a Constructor, Creating Objects, Using Objects Inner Class Example and so on are discussed.
Main issues of the syllabus content:

- Abstract classes
- Packages

- Generics
- Interfaces
- Inheritance

Discipline “WEB Applications”, code (20)

The course teaches ways to generate web content and data exchange between web browser and server scripts based on PHP server scripting language; comment the syntax, PHP coding style and documentation; addresses issues related to the PHP database script interaction, ways to recognize web application users, ways to handle exceptions, and more. It also discusses the interaction of PHP with XML as well as the generation of graphics in PHP. The exercises are practice-oriented, the goal is to acquire skills to design and develop dynamic web sites with a link to MySQL database.

Main issues of the syllabus content:

- Architecture of web applications and technologies for their creation
- Design and development of web applications with PHP - characteristics
- Methods for transmitting data from client to server and methods of accessing data in PHP script
- Access external files in web applications
- Object-oriented approach to web application development
- Means for recognizing the web application user
- Processing exceptions in web applications
- Interaction of a PHP script with database (SQLite, MySQL, etc.)
- Interaction of PHP and XML

Discipline “Microprocessors”, code (21)

The architecture of the 32-bit microprocessors is studied: operational unit structure, internal organization, main information exchange methods and instruction set. The programming model of the microprocessor is defined and its registers, addressing modes, exceptions and interrupts are examined. Assembly language and basic programming structures that can be implemented with it are studied during the laboratory exercises. The goal here is to master the machine code instructions and the computational process organization, becoming acquainted with the operation of the microprocessor at the lowest level, up to a single bit. Skills for algorithmization of linear, branching, loop and combined programming structures and their optimal implementation in Assembler are developed, including with translation from the C language. Invocation of assembly language subroutines from input / output programs in C is studied in practice, paying attention to parameter passing and passing back the return value.

The knowledge gained during the study of “Computer Organization and Architectures”, “Base Programming”, and “Object-Oriented Programming – part 1” is relied upon. The knowledge about microprocessors is used in “Language Processors”.

Main syllabus items:

1. Structure of the microprocessor, main units. Programming model, registers.
2. Instruction set. Instruction types. Memory addressing modes.
3. System bus and signals of the microprocessor.
4. Vector floating point unit.
5. Exceptions and interrupts.
6. Memory management unit.
7. Microprocessor architecture development.

Discipline “Programming Systems”, code (22)

The course introduces students to the environment, technology and technology for application programming in the WINDOWS environment. The discipline examines:

- basic programming software under WINDOWS (message processing, menu operations, dialog and graphic elements, etc.), and

- tooling and programming tools for creating complex applications (DLL, COM, MFC, ATL, ActiveX and ODBC interface).

The course provides all special subjects from the curriculum of the specialty, using the knowledge of system programming in high-level languages (C, C ++) and forming a user interface in the Windows graphical operating environment: "Computer graphics", "Databases", "Operating Systems", "Technology of Programming", "Programming Technologies on the Internet" and part of the optional courses and the diploma project in creating Windows applications and the Internet.

Main issues of the syllabus content:

- Organization of program components in WINDOWS
- WINDOWS Window Object Model, Event Programming, Message Exchange
- Basic WINDOWS concepts, resolving resources, dynamic libraries, program component interaction, RAM management
- Create custom dialog, resource editor, dialog elements
- Manage user dialogs, menus, dialog boxes, dialogs
- Device Context, Graphics, Keyboard and Mouse Control
- Principle of operation of complex controls: tree control, tabular control
- Creating and accessing dynamic libraries (DLLs)
- COM-modules, principle of operation, exemplary COM modules
- Libraries and modules for user dialogue management MFC, ATL, ActiveX
- Access to databases, ODBC interface, database management functions

Discipline “Graphic Systems”, code (23)

The aim of the course is to introduce students to the basic methods of computer graphics and visualization necessary for the construction of different types of graphic systems (GC). Different aspects of graphical applications are discussed as a set of software, hardware, data, manipulation, storage, analysis and visual representation of data in systems with different application areas. The course includes lectures on topics such as the mathematical foundations of computer vision, models, types and specifics of graphical systems. Mathematical tools needed to represent the geometric aspects of graphical objects, especially for modeling of smooth shapes and surfaces, have been specially studied. The themes of computer modeling of light, colors, exposure, reproduction, and composition of the frame, as well as the ways of storing graphic data are discussed. Attention is paid to the methods and means of storing graphic data. Algorithms for visualization of two-dimensional and three-dimensional graphic objects, business, technological and management, geographic and other graphic systems are also explored. The content includes questions about the synthesis of realistic images, the movement of graphics objects, animation systems, and the creation of virtual reality. The course also envisages the development of different types of graphics systems in the OpenGL graphics environment.

Main issues of the syllabus content:

- Graphic program libraries
- Raster graphics. Two-dimensional graphics
- Business graphics
- Algorithms for plotting graphic primitives (segment, circle, etc.)
- Algorithms for two-dimensional cutting and filling closed areas
- Transformations of graphic objects
- Three-dimensional graphics. Design transformation
- Algorithms to remove hidden lines
- Coloring 3D objects with realistic color

Discipline “Object-Oriented Programming Fundamentals (C++) - project”, code (24)

This course is based on the theoretic and practical knowledge of the students of the previous courses “Object-oriented programming Fundamentals”, “Programming Fundamentals” and “Synthesis and Analysis of Algorithms”.

Design objects are specific individual assignments related to the development of C ++ applications. Design tools are Microsoft Visual Studio 2010 (Microsoft Visual C ++ .NET).

The course project aims at consolidating and expanding the knowledge of the students from the part of the OOP discipline in the third semester. The material covered covers the application of the accumulated knowledge of classes, objects, inheritance and polymorphism, working with different types of data, abstract classes, algorithms and the principles of their realization.

Acquired knowledge and practical skills can be used in the development of course and diploma design and using C ++ as a design tool.

All knowledge from other previous and current disciplines concerning the methods and technical means of designing applied software is used.

Form of content delivery:

Each student receives an individual assignment for the course design by the lead lecturer.

The consultations are held weekly within the planned hours.

The results of the project implementation are demonstrated on a computer in the form of a working program and are written in the explanatory note.

The final grade of the course project is formed during the last academic week of the semester based on the submitted written material and an oral question on the content of the project.

Main issues of the syllabus content:

- Algorithmization;
- Structuring;
- Logical organization;
- Experimental tests;
- Program documentation.

Discipline “Specialized Sport Activities, part 4”, code (25a)

Discipline “Sport Management, part 2”, code (25b)

Discipline “Practice, part 2”, code (26)

Discipline “Operating Systems Principles”, code (27)

The course examines the principles of organization and operation of the operating systems. Different issues related to the operation of different core subsystems of modern OSs such as: Process and Thread Management Subsystem, Memory Management Subsystem, Input / Output Management Subsystem, Interrupt System, Network Subsystem, Resource Management, file subsystem and more are discussed. Emphasis is placed on the specifics of the OS work on multiprocessor and multi-computer architectures, methods of protecting programs and data, building virtual environments, features and requirements of OS for mobile devices, etc. The principles of parallel and distributed programming are given, issues of synchronization of parallel processes and threads and prevention of mutual deadlock are discussed.

Main issues of the syllabus content:

- Operating systems - basic concepts. Requirements to the OS. Development of the OS
- Structure of the OS. Functions of the OS. System calls.
- Creating executable programs. Linkers. Loading programs.
- Processes. Process states.
- Switching the context of processes. Basic operations on processes.
- Process synchronization. Critical section. Mutual-exclusive access.
- Programming solutions for mutually exclusive access. Algorithms of Decker and Peterson.
- Semaphores. Basic operations on semaphores. Solution of the "Producer-Consumer" problem.
- Monitors. Graph of process states in the monitor.
- Processes scheduling. Criteria. Scheduler.

- Algorithms for process scheduling. Algorithms with preemption and without preemption.
- Scheduling strategies: First-Come-First-Serve, Shortest-Job-First, Shortest-Remaining-Time-First, Round-Robin, Multi-level Queues.
- Memory management. Static and dynamic address linking. Logical and physical addresses.
- Continuous organization of the memory.
- Paged organization of the memory.
- Segmented organization of the memory
- Page swapping. Replacement strategies.
- File system. Files and operations on them. Access methods.
- Directory Structure. Organization. Access control.

Discipline “Software Requirements and Specifications”, code (28)

The aim of the subject is to give the students basic knowledge in the field of program specifications and their use during the different phases of the software life cycle, especially for analyzing and specifying the requirements and design of a software system. The discipline tracks the development of paradigms and languages for analysis and software specification. The focus of the discipline is the object-oriented method for analyzing and specifying software and the unified object-oriented language for analysis and modeling UML - one of the most used modern methods and tools for analysis and modeling of the UO. By using different CASE tools during laboratory exercises, students will acquire practical habits for object-oriented analysis and software modeling.

Main issues of the syllabus content:

- UML Application for the Programming System design: Description of the user’s goals – use case diagram
- UML Application for the Programming System design: Static System Model – Class Descriptions and Class Diagrams. Interfaces
- Dynamic Model of the System. Sequence diagrams. Collaboration Diagrams
- Description of Procedural Logic, Business Process Modeling and Workflow: Activity diagram, StateChart Diagrams
- Component and System Overview: Deployment Diagrams

Discipline “Systems with Data Bases”, code (29)

The "Systems with Databases" (SDB) course is designed for Bachelor's degree students of Software and Internet Technologies and aims to give students knowledge of up to date systems with databases, as well as practical experience in the design, programming and administration of databases.

Different system architectures are discussed with databases, as well as data models, methods, and media, through which can be designed and constructed up to date database systems. Different types of databases are being studied - relational (RDB), object-oriented (OODB), Analytical (OLAP), NoSQL, and others.

The course includes programming systems with databases based on PL/SQL - structure of the language, data types and control structures and focuses on specific databases objects such as cursors, functions, procedures, packages, triggers and others.

The course examine different types of application systems with databases used in business, such as CRM, ERP, SCM) and more.

The practical side of the discipline includes design and implementation of databases by current versions of Oracle DBMS, programming of the PL/SQL and administration of the database through SQL Developer and / or other, during laboratory and by development of individual course project.

The subject is related to the prerequisites: "Data Management", "Programming Fundamentals", "Object Oriented Programming", "Software systems"; and output connections to the courses: "Design of Information Systems", "Internet technology" and others.

Main issues of the syllabus content:

- Systems with Databases - architectures

- Oracle database server, Oracle SQL developer
- PL/SQL. Structure
- PL/SQL. Functions
- PL/SQL. Stored procedures, Exceptions
- PL/SQL. Triggers, Cursors
- Other types of database systems – NoSQL, OLAP, etc.

Discipline “Computer Networks and Internet”, code (30)

The main objective of the course is to provide the students with basic knowledge about the purpose and operation of network devices, configuration of end devices and network devices. The students receive a basic knowledge of computer network performance; they differentiate different types of network devices, and know how to develop network solutions. The course makes the students familiar with current standards and modern terminology related to computer networks. In the context of local and Internet networks, security, performance, reliability and fault-tolerance are considered. They are familiar with the main diagnostic tools for monitoring and troubleshooting networking issues. Initial knowledge for building a physical topology and skills for designing logical topology of computer networks is given.

Main issues of the syllabus content:

- Basic terms related to computer networks. LAN, WAN, and the Internet. Network architectures. International standards for the design, construction and testing of computer networks.
- OSI and TCP / IP model. Network protocols and communications. Rules of the communication. Collision and Broadcast Domains
- Designing the network design. Structured cabling. Testing of copper and fiber optic cable systems.
- OSI physical layer. Media. Presentation of the data.
- OSI Data Link Level. Frame Format. Access to the network media (MAC).
- Ethernet. Types of Ethernet. Collision and its Removal (CSMA / CD)
- ARP protocol. Network segmentation. Switches.
- Network layer. Addressing of networks. Types of IP addresses. IPv4 and IPv6 protocols.
- Protocols, running on the network layer. Router architecture. Routing table. Access to local and remote network resources (direct and indirect routing).
- Subletting Fixed length and variable length subnet masking (VLSM).
- Transport layer. TCP and UDP protocols.
- Application layer. Application protocols and services - DHCP, NAT, FTP, HTTP, SMTP, DNS.
- Configuring and testing the local network. Selection of devices, protocols. Managing of configuration files.
- Wireless Technology. Home networking technologies. VPN
- Network and Information Security. Types of threats.

Discipline “Software Production Technology”, code (31)

This course is based on the theoretic and practical knowledge of the students of the previous courses “Object-oriented programming”, “Program Systems”, etc. The goal of Software Engineering is the construction of complex, maintainable software at reasonable cost. Software engineering applies both computer science and engineering principles and best practices to the design, implementation, testing, maintenance and evolution of software. This course covers not only the technical aspects of building software systems, but also management issues. Today, software engineering, as a discipline, is a cornerstone of the information technology sector and a significant factor in our economy. The course will focus on the problems, design, techniques, and tools which are involved with the development of large software systems by groups of people. Methods for software specification and design are emphasized. Additional topics include design for change, configuration management, and software tools.

The main objective of the discipline is to combine the knowledge gained so far into a unified system covering the whole life cycle of the software by using a modern integrated environment for developing Windows Forms applications and teamwork. For this purpose, during laboratory work, Visual Studio.Net environment and C# language are used for software project development. The course is related to a number of further disciplines, both in Bachelor's and Master's degree.

Main issues of the syllabus content:

- Software Life Cycle and Software Development Processes
- Software maintenance and documentation
- The Human Factor in Software Production
- Software Quality metrics
- Testing and Other Verification Methods
- Software change strategies
- Interaction Styles (User interface design)
- Software Cost Estimation methods
- Software Change strategies

Discipline “Programming Systems - project”, code (32a)

The course project aims to deepen students' knowledge of the basic methods and tools for building different types of Programming Systems (PSs). The project. Students perform a job, a module that implements a specific WINDOWS application. The development task includes exploring the basic algorithms required for task assignment, interface design, program implementation and its testing. The project deepens the knowledge of the instrumental and programming tools for the creation of complex applications (DLL, COM, MFC, ATL, ActiveX and ODBC-interface), discussed theoretically in the previous discipline "Programming Systems".

Main issues of the syllabus content:

- Development of window applications with business and administrative application areas
- Development of window applications in the field of education
- Development of game applications

Discipline “Object-Oriented Programming FundamentalS (JAVA) - project”, code (32b)

The aim of the course project is to extend the knowledge gained by students in "Object oriented programming fundamentals I and II". Students must implement a simple system with graphical user interface (GUI) with necessary controls. For implementing of the system must be used different approaches like Model-View-Controller design pattern, Observer-Observable, and etc. The technologies on which is based the project are Java, JDBC and MySQL. The project finishes with final documentation and technical review of the implementation. As a result, students gain practical skills in more advanced implementation.

Main issues of the syllabus content:

- Layer for communication with database
- Creation of database for storing and retrieving data
- Model-View-Controller design pattern

Discipline “Graphic Systems - project”, code (32d)

The course project aims to deepen students' knowledge of the basic methods and tools for building different types of Graphical Systems (GS), considered as a set of hardware, data and software for manipulating, storing, analyzing and visualizing information in different fields of application. Students independently realize a job, a module that implements a specific graphic application. The development task includes exploring the basic algorithms required for task assignment, interface design, program implementation and its testing. The software is implemented in the OpenGL graphics environment. The course project is based on the previous "Graphic Systems" discipline.

Main issues of the syllabus content:

- Software development by OpenGL libraries

- Realization of realistic 3D objects
- Software development, including animation components and virtual images

Discipline “System Programming”, code (33)

In this discipline the system administration and programming in multi-user systems are considered. Knowledge and principles are extended of development, functioning and application of modern multi-user and multi-tasking operating systems. The methods for users’ authentication and security of the system, user applications and data are emphasized. The details are considered of the command line interpreters, file systems, synchronization and communication of processes and the input-output system. Base concepts are considered of the multiprocessor and distributed systems as well as the main functions of the operating system kernel for network applications development.

The discipline is based on the previous disciplines: "Operating systems", "Algorithms and Data Structures", "Computer networks", etc. It provides the basis for "Distributed programming", "Web Applications Development", "Networks Administration" and the graduation work.

Main issues of the syllabus content:

- Main concepts of system programming
- File systems
- Input-output system and buffering
- Processes
- Signals
- Named and unnamed pipes
- Shared memory
- Messages queues
- Semaphores

Discipline “Internet Servers and Services”, code (34)

The course “Internet Servers and Services” aims to introduce the students to the principles of modern Internet services. Knowledge about the features of the most widely used services, such as DNS, DHCP, NAT, Web Services, e-mail are given. Particular attention is paid to the problems associated with network attacks and the protection of network communications as well as the implementation of firewall and VPN infrastructures. There are also issues related to virtual infrastructures and cloud computing and services.

Main issues of the syllabus content:

- Internet Architecture. Basic concepts. Organizations (IANA). Standards (RFC). Client-server model. Access to Internet services.
- Server Operating Systems. OS Linux. Microsoft Windows Server OS. Administering services.
- Autonomous systems. Routing between autonomous systems. BGP routing protocol.
- Dynamic device configuration. Architecture. DHCP servers and clients. DHCP processes and interaction.
- Translating Internet Addresses (NAT). Static NAT. Dynamic NAT.
- Domain name system (DNS). Basic concepts. Host names. Resolving addresses into names. Alternative naming services (HOSTS.TXT, WINS, NIS).
- DNS Servers. BIND DNS. Zones and resource records. Master and slave servers. Caching. Forwarding. Subdomains. DNS security. Dynamic DNS.
- Remote access to services. Remote Access Architecture. TELNET. Remote login. SSH, SSL.
- Remote Access. PPP protocol. PPPoE protocol. Remote Desktop Protocol.
- Virtual private networks (VPNs). Concepts and solutions. VPN of the types client-network and network-network. VPN implementation - tools and devices.
- Web Architecture. Web servers and clients. HTTP protocol. HTTP proxies.
- Apache Web Server. Architecture. Configuration.
- E-mail. Architecture. SMTP protocol. Mail servers. Transport agents. POP and IMAP protocols.

- Virtualization. Virtual Infrastructures. Virtualization platforms (Oracle VirtualBox, Microsoft Hyper-V, VMware ESXi, Xen).
- Cloud Services. Cloud infrastructures. Cloud business models (IaaS, PaaS, SaaS).

Discipline “Software Projects Management”, code (35)

The aim of the course is to acquaint students with the main stages of project development and management. It presents the logical stages of the design process, teamwork, resource management, cost optimization, and more. Fundamental attention is given to the techniques, tools and methods of identifying, developing, presenting, implementing, managing and evaluating projects.

The possibilities of separating the software system of subsystems and modules and the management of the dependencies between them are considered; simplify application logic; creating a precise and compact programming code, and various strategies to reorganize the program code.

The discipline provides and develops knowledge for project creation and management, including: choosing an optimal organizational structure, building a project model and calculating the parameters of the network scheduling, defining the critical path and the time / resource reserves, value and duration of the project, team project development, creation of optimal programming code.

Main issues of the syllabus content:

- Fundamentals of project management. Project Management Framework
- Analysis and optimization of the project plan
- Nature and specificity of the projects in the field of information technology
- Types of software development process models. Iterative models
- Planning a software project. Means for planning a software project
- Monitoring and quality control of project implementation
- Measurement, tracking and control of software production
- Manage and control workflow in software project development
- Risk management of the project
- Teamwork, leadership and communications in software project management

Discipline “Programming for Mobile Internet Devices”, code (36)

The course is based on students' knowledge of the following subjects: Programming Fundamentals I and II, Algorithms and Data Structures and Object-Oriented Programming I and II part. Based on the basic concepts and principles of Object-Oriented Programming (PLO), students learn about the basics of Android mobile operating system programming and get practical programming habits in this area.

Laboratory exercises are designed to provide practical programming habits in programming of mobile devices for students.

Main issues of the syllabus content:

- Organization of user interaction
- Building and organizing the user interface (UI) with XML and Java
- Key components of UI
- Activities and Fragments
- Tasks, processes and threads
- Asynchronous operation and processing of information in the background
- Communication between processes. Services
- Exchange of data between applications
- Content providers
- Data storage. Files in internal and external memory

Discipline “Internet Technologies”, code (37)

The subject “Internet Technologies” is based on the previous disciplines like Web design, Object-oriented programming 1&2 and Computer networks and Internet. The purpose is to present the

knowledge of different “client” side technologies like HTML, CSS, JavaScript (AJAX, AQuery). Server side technology Java EE and Java Web container – Apache Tomcat. The students will learn how to build advanced web applications with modern technologies and approaches.
Main issues of the syllabus content:

- HTML
- CSS
- JavaScript
- Server side technology Java EE
- Java Web container

Discipline “Software Production Technology - project”, code (38c)

The course project on Software Production Technology aims at deepening the knowledge of the students in the field of modern Software Technologies. The main idea of the project is the practical application of the knowledge about the software life cycle models, the modern software technologies and the organization of the team in the development of a real software product and teamwork.
The students have to develop and document a task assigned by the leading lecturer, related with the realization of a Windows Forms application (using Visual Studio.Net environment and language C# or VB), going through the stages of product specification, product design and coding.
Main issues of the syllabus content:

- Software Specification
- Software Design
- Software Development

Discipline “Systems with Data Bases - project”, code (38d)

The “Systems with Data Bases, Project” aims to deepen students' knowledge of the main structures of up to date databases and systems for their management, based on the common ideology for real-world modelling based on the E-R model and the realization using the relational data model as a real database via SQL. Students independently perform a task related to creating a DB project, user interface and testing on a DBMS, such as ORACLE. The course project is based on the previous courses "Data Management" and “Systems with Databases”.
Main issues of the syllabus content:

- Description of subject area
- Design and implementation of database
- Implementation of a programming system
- Testing the project
- Project defense

Discipline “Specialized Practice”, code (39)

Discipline “Network Administration”, code (40)

The course aims to introduce students’ knowledge for the methods of administration and protection of local and global computer networks. Questions related to the use of network features, protocols, and tools of Linux, Windows Server and Cisco IOS operating systems to build, configure, and maintain local and Internet networks are presented. Particular attention is paid to the problems associated with network attacks and the protection of network communications. Cloud computing, service, and security issues are also considered.
Main issues of the syllabus content:

- Network infrastructures and administration. Stages of design, construction, commissioning and evaluation of network performance.
- Remote administration of computer networks. Protocol SNMPv2 and SNMPv3.

- Control of access to services.
- Access rights to files and directories (Linux, Windows Server).
- Authentication, Authorization and Accounting (AAA). RADIUS and TACACS protocols.
- Network security. Network Attacks. Types of attacks. Traffic monitoring and analysis.
- Intrusion Detection Systems and Intrusion Prevention Systems.
- Traffic control. Firewall architectures.
- Firewall building tools (iptables under Linux, Cisco ACL, Windows Server ACL).
- Sharing network resources. Protocols LDA, NBT, SMB.
- Active Directory architecture. Domain Controllers. Authentication strategies.
- Integrating Linux and MS Active Directory. Samba.
- Administration of cloud services.
- Cloud Computing Security. Windows Azure Access Control Service.

Discipline “Language Processors”, code (41)

The subject "Language Processors" aims at acquainting the students of "Software and Internet Technologies" specialty with the principles of functioning and the methods for creation of basic language processors - compilers and interpreters. The methods of realization of the basic phases of the compilers - lexical, syntactic, semantic analysis, generation and optimization of the source code are discussed. In addition, the principles of interpretation of different levels of intermediate code are considered. There is also a place for interpreting high-level languages as well as systems for assemblers, compilers and interpreters. The key role of programming languages in defining requirements to the architecture of computers is emphasized. In the laboratory exercises a high-level language compiler is developed.

Main issues of the syllabus content:

- Introduction to language processors. Formally defining programming languages
- Lexical analysis. Organization of lexical analysis tables
- Syntax analysis. Methods for syntactic analysis
- Semantic analysis. Synthesis and analysis of semantic tables
- Organization of memory during program execution
- Generate and interpret code

Discipline “Distributed Processing in Internet”, code (42)

The course aims to develop the students' knowledge for the development of distributed applications. The main concepts and problems in the development of distributed programming systems are discussed. There are presented basic approaches and up-to-date technologies for building distributed applications, as well as specific programming tools for their implementation. The discipline covers topics in middleware, server technologies, remote access communication protocols. Special attention is paid to object-oriented distributed decision technologies.

Main issues of the syllabus content:

- Distributed systems. Principles and functioning. Characteristics of distributed systems.
- Processes and threads. Principles and implementation of threads. Threaded libraries. Pthread library for Linux. Models of multi-threaded programs. Thread communication and Sync. Windows threads implementation.
- Classes for working with threads in object-oriented languages Java, C #.
- Basic programming models for distributed systems. Client-server model. Client-server model implementation. Features. Server architecture.
- Instrumental environments for realization of the client-server model. Medium layer.
- Sockets. Interaction through sockets. Socket types. System calls for sockets. Setting the address information.
- Multiplexed service via sockets. Sockets for group communication.
- Socket classes in object-oriented programming languages. Java sockets. Features of implementation. Sockets in .Net.

- Remote Procedure Call - RPC. Program model. Sending parameters. Error semantics. Dynamic binding. Formal specification of RPC server.
- Implementation of RPC in Linux. Sun RPC. Server specification. Stub generator. RPC server and client development technology.
- Distributed objects. Remote Calling Methods. Middleware systems based on remote call methods. Example – CORBA, DCOM.
- Remote Calling (Java RMI). Remote interfaces. Create stub and skeletons. Using Java RMI to develop distributed applications.
- Messaging-based systems. MPI. Features of implementation

Discipline “User Interface Design”, code (43)

The main objective of discipline is to introduce students to principles, methods and quality in designing interfaces. The User Interface Performance Criteria are specified. Various conceptual models of interfaces design, their peculiarities and behaviors are examined.

The program covers the various technical tools in designing interfaces as well as the influence of the human factor. Applying them to the design, creation and testing of prototype systems will enhance students' knowledge and skills in building graphical interfaces for Desktop, Web and mobile applications. Practical labs include: setting goals and customizing the user interface; the process of making the interface; designing designs for different application types; testing and assessing the built-in interfaces.

Main issues of the syllabus content:

- Theoretical aspects in the design and creation of user interfaces. Basic Design Factors, Principles and Styles
- Technology in designing the user interface. Languages for graphical interface. Basic User Interface Components
- Designing a user interface according to the environment in which the product will be used: Desktop applications, Web applications, mobile applications
- User Interface Rating. User Interface Testing Technologies

Discipline “Internet Information Retrieval”, code (44a)

The course aims to introduce the students to the principles of information retrieval in the Internet. The basic concepts and methods of document retrieval are explored, focusing on contemporary approaches and search algorithms in Web space. Attention is paid to questions related to indexing information, information retrieval models, ratings and queries. The principles of Web search engine building, as well as the features of modern information retrieval systems on the Internet, are explored

Main issues of the syllabus content:

- Basic principles of information retrieval.
- Search Engine Architecture. Main components. Functioning.
- Extracting the web pages. Crawling Web. RSS feeds. Storing retrieved documents.
- Text processing. Evaluation of resultant set.
- Parsing a document. Link analysis.
- Ratings and indexing. Index building. Investment indices. Compression.
- Queries. Transformation and refinement of inquiries. Delivering results.
- Data retrieval models.
- Assessment of search engines.
- Classification and clustering. Spam detection.
- Social demand. Tags. Filtering documents.
- Extracting XML documents. Features.
- Information retrieval systems. LEXIS / NEXIS, SMART, Dialogue, Dow Jones News / Retrieval, INQUERY.
- Google search engine architecture.
- Retrieving multi-media information

Discipline “Information Protection and Security”, code (44b)

The main objective of the course is to provide students with knowledge and skills to assess the security risk of a computer network. The types of attacks and malicious code that cause inaccessibility or degradation of the quality of network services are considered. Students are acquainted with the current standards for security of the data transmitted through the Internet. Modern networking solutions and information security solutions to achieve optimal modularity, robustness, flexibility, security and ease of management are analyzed. The typical potential vulnerabilities of the network protocols, infrastructures, models and services are presented.

Main issues of the syllabus content:

- International standards concerning computer network security. Standards BSS, ISO / IEC. Stages and activities to build a network security management system.
- Security of classified information networks - basic principles and requirements. Major vulnerabilities. Risk - nature, detection, risk assessment, risk minimization mechanisms. Information and network security policies. Requirements for security policies.
- Security of the OS. Linux security model. Windows server security model. Protecting files and directories. Controlling access to objects.
- Security of the OS. Malware - viruses, worms, Trojans. Detection and protection. Buffer overflow attack.
- TCP / IP protocol suite vulnerabilities. IP spoofing and Denial of Service attacks (DoS).
- DNS attacks. Vulnerabilities of zone transfer and dynamic updates. DNS Cache Poisoning Attack.
- Port scanning - Nmap. Vulnerability scanning - Nessus. Passive packet monitoring.
- Corporate information security solutions. Firewalls – purpose, functionality, classification.
- Authentication vulnerabilities. Dictionary attacks. Breaking passwords with Rainbow Tables. Password-by-pass schemes.
- Bots and Botnets. Distributed DoS attacks.
- Security issues in Peer-to-Peer networks (P2P).
- Security on wireless networks.
- Web security. SQL injection attack. Web spoofing (fishing). Clickjacking.
- Security in virtualization and

Discipline “Practice, part 3”, code (45)

Discipline “Office Technologies”, code (46/47/48 - 1)

The course strives to create knowledge and skills in the fields of office technologies.

Student will be competent in the concepts of office systems methodologies and capable of applying these concepts in structured and non-structured problems in an office environment. Students will also integrate technical skills to computer hardware and software applications.

Upon successful completion of the course, the student should be able to apply knowledge of various software packages to a variety of work settings and to solve practical engineering problems arising in the today’s office.

Main issues of the syllabus content:

- Word processing
- Desk publishing
- Creation of graphical objects using graphic libraries
- Creating forms, tables and structured documents
- Exchange documents with external system (Dynamic Data Exchange – DDE / Object Linking and Embedding – OLE)
- Multimedia: audio comments, video clips
- Automated synthesis of documents

Discipline “Multimedia Systems and Technologies”, code (46/47/48 - 5)

The subject Multimedia Systems and Technologies (MMST) aims to presents of the students the theory and practice of the processes of creating and using different media elements - sound, video, animation, etc. In the theoretical course of the subject are discussed problems such as presentation of sound and video in computer and industrial systems. Different multimedia standards - MPEG-1, MPEG-2, MPEG-4 and others. The course also deals with principles and concepts related to modern computer animation and 3D modelling. Students are also introduced to various techniques and technologies for creating computer animation and special effects. Topics on modern technology tools for creating and working with animation - OpenGL and DirectX are also presented in the course.

Main issues of the syllabus content:

- Multimedia standards – MPEG-1, MPEG-2, MPEG-4, etc.
- Principles of computer animation
- Principles of 3D modeling
- OpenGL and DirectX

Discipline “E-Commerce”, code (46/47/48 - 11)

The aims of the E-Commerce course are to give basic practical knowledge on the principles of functioning, methods of building, managing and protecting of the e-commerce systems. The tasks related to the legal framework and the e-business strategies are being considered. Particular attention is paid to the technical aspects of the issues related to the methodology of organizing e-commerce sites, organization and payment technology on the Internet (EasyPay, B-Pay, ePayVoice, Pay.egov.bg, eBG.bg, epay.bg,etc.). The subject is based on the previous courses: "Web Design", "Software Technologies", "Computer Networks", "Software Technologies on the Internet" and others. The subject gives possibilities to prepare the diploma project.

Main issues of the syllabus content:

- E-Business Strategies. Methodological issues. Strategic planning. Strategic alternatives. Elaboration of an e-business strategy
- Legal aspects of e-commerce. Bulgarian legislation on electronic commerce, electronic payments and contracts on the Internet. Risks and ways to overcome them. Digital copyrights
- Architecture of e-commerce systems. Types – B2B, B2C, B2G, C2C, m-commerce
- Organization and Technology of Payments on the Internet. Requirements for electronic payments. Security systems
- National payment systems with electronic cards – ePay.bg, EasyPay, B-Pay, ePayVoice, Pay.egoc.bg, eBG.bg and others
- Planning and Designing of Online Business. Methodological issues and solutions in the e-business. Indicators for e-Object Assessment
- Software for e-commerce systems. WEB-technologies for e-commerce. Application platforms for organizing e-sites
- Technical support of an e-commerce system. E-commerce servers. Communication networks for e-commerce
- E-marketing. The role of social networks as a means of marketing and PR tools on the Internet. Blogs. Email Marketing
- Features of Internet Advertising. Types of advertising formats. Measure advertising performance on the Internet

Discipline “Preliminary Graduation Project”, code (49)