DESCRIPTION OF THE COURSE

<table>
<thead>
<tr>
<th>Name of the course:</th>
<th>Computer Architectures</th>
<th>Code: BCSE33</th>
<th>Semester: 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of teaching:</td>
<td>Lectures, Laboratory Work</td>
<td>Hours per week:</td>
<td>Number of credits: 5</td>
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<tr>
<td></td>
<td></td>
<td>L – 2 hours, LW – 1 hour</td>
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</tbody>
</table>

**LECTURER:**
Prof. Dr. Plamenka Borovska (FCSC), tel.: 965 2152, email: pborovska@tu-sofia.bg
Technical University of Sofia

**COURSE STATUS IN THE CURRICULUM:** Compulsory for Bachelor degree students of the specialty “Computer and Software Engineering” of the Faculty of Computer Systems and Control at the Technical University of Sofia

**AIMS AND OBJECTIVES OF THE COURSE:** The goal of the course is to provide a solid background for students: to learn the concepts and mechanisms relating to the design of modern computer systems and be able to explain how these concepts and mechanisms interact; to acquire knowledge about the architecture of computer systems; to apply this knowledge to solve new problems of computer design.

**DESCRIPTION OF THE COURSE:** The acquired knowledge and skills in this course could be applied in traditional engineering and specialized, high-tech field of computer and information technology for modern computer systems and multi-core platforms. Upon completion of the course students will know the concepts, principles, models and technologies for design and implementation of effective computer architectures; understand and apply the theory in analysis and design of computer architectures in terms of finding the right balance between increasing demands for increasing performance on the one hand and the existing technological limitations on the other; be able to do a comparative analysis and assess the advantages and disadvantages between alternative solutions

**PREREQUISITES:** Knowledge of Programming, Operating Systems, Digital and microprocessor technology.

**TEACHING METHODS:** Lectures using video - presentation with beamer, laboratory works aimed at study, implementation and analyses of sample problems and case studies; course work aimed at implementation and analyses of solving certain problem by given Grid and Cloud Architecture.

**METHOD OF ASSESSMENT:** Exam during the exam session with duration two academic hours, students give written answers to 3 compulsory and 5 optional questions, problems or tasks (60%), laboratory works (40%).

**INSTRUCTION LANGUAGE:** Bulgarian

**BIBLIOGRAPHY:**
5. TPC: www.ipc.org
6. SPEC: www.spec.org
DESCRIPTION OF THE COURSE

<table>
<thead>
<tr>
<th>Name of the course:</th>
<th>Code: BCSE34</th>
<th>Semester: 5</th>
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<tbody>
<tr>
<td><strong>Computer Periphery</strong></td>
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**Type of teaching:** Lectures, Laboratory Work

<table>
<thead>
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<th>Hours per week:</th>
<th>Number of credits:</th>
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</thead>
<tbody>
<tr>
<td>L – 2 hours, LW – 2 hours</td>
<td>5</td>
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</tbody>
</table>

**LECTURER:**
Assoc. Prof. Dr. Sergey Nedev, Ph.D. (FCSC), tel.: 965 3525, email: s_nedev@tu-sofia.bg
Technical University of Sofia

**COURSE STATUS IN THE CURRICULUM:** This course is compulsory for the students from the speciality Computer and Software Engineering in the bachelor programme of the Faculty of Computer Systems and Control.

**AIMS AND OBJECTIVES OF THE COURSE:** The general aim of this course is to make students familiar with the logical structure and organization of the peripheral devices (printers, plotters, HDDs, CDs, DVDs, monitors, etc.) as a part of the state-of-the-art computer systems as well as with the information media carriers applied.

**DESCRIPTION OF THE COURSE:** The following topics are included in the course content: physical presentation of information over different physical carriers, faults detection and correction during the process of storage of information, organization of write/read operations in devices which use magnetic-media carriers, methods for registration of visual information, organization of write operation using indication, optical disks based memories, organization of the read process from the carriers of visual information, reliability of computer periphery, etc.

**PREREQUISITES:** The subject has the input links with the following disciplines: Physics, Chemistry, Machine Mechanics, Materials Science, Theoretical Electrical Engineering.

**TYPE OF TEACHING:** Lectures, presented using additional technical tools. The laboratory exercises output with protocols.

**METHOD OF ASSESSMENT:** Written exam.

**LANGUAGES OF INSTRUCTION:** Bulgarian.

**BIBLIOGRAPHY:**
1. Даковски Л. Компютърна периферия. Идея, 2005.
DESCRIPTION OF THE COURSE

<table>
<thead>
<tr>
<th>Name of the course: Operating Systems</th>
<th>Code: BCSE35</th>
<th>Semester: 5</th>
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<td>Type of teaching: Lectures, Laboratory Work</td>
<td>Hours per week: L – 2 hours, LW – 1 hour</td>
<td>Number of credits: 5</td>
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</table>

LECTURER:

Prof. Dr. Ognyan Nakov Nakov (FCSC), tel. 9653613, nakov@tu-sofia.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory for the students speciality Computer and Software Engineering – bachelor degree (Faculty of Computer Systems and Control, Technical University-Sofia).

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is to ensure that the students understand the extent of the use of an operating system prior to a detailed study of internals. The topics of the course address both the use of operating systems and their design and implementation. A lot of the principles involved in operating systems use have wider applicability across the field of computer science, such as concurrent programming. Studying internal design has relevance in such diverse areas as dependable programming, algorithm design and implementation, building secure and safe systems, etc.

DESCRIPTION OF THE COURSE: The discipline gives the fundamental concepts that are applicable to a variety of the operating systems. The emphasis is on solving problems encountered in designing the operating systems, regardless of the underlying hardware. The main topics are: overview of operating systems, operating systems principles, processes and concurrency, CPU scheduling and dispatching, file systems, memory management, device management, distributed systems, security and protection. UNIX, Linux, Windows, and others modern systems are included as examples of existing systems. Cloud architecture and embedded systems.

PREREQUISITES: Basic knowledge in structure and functionality of computer devices and system, programming languages (C++, C#, Java), software engineering.

TYPE OF TEACHING: Lectures (multimedia projector) and text materials; laboratory exercises (based on instructions) with a tutorial for every laboratory theme; project consulting; web site of the course.

METHOD OF ASSESSMENT: Written examination, based on two assessments during the semester. Every student has to demonstrate his own project. He is asked about problems encountered in the designing and implementation, and his decision.

LANGUAGES OF INSTRUCTION: Bulgarian.

BIBLIOGRAPHY:

- **Operating System Concepts** by Abraham Silberschatz, Peter B. Galvin and Greg Gagne (Dec 17, 2012)
- **Linux for Beginners**: An Introduction to the Linux Operating System and Command Line by Jason Cannon (Jan 2, 2014)
DESCRIPTION OF THE COURSE

<table>
<thead>
<tr>
<th>Name of the course</th>
<th>Code: BCSE36.2</th>
<th>Semester: 5</th>
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<tbody>
<tr>
<td>Managing High Technologies</td>
<td>Lessons per week: L – 2 hours; S – 1 hour</td>
<td>Number of credits: 3</td>
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<tr>
<td>Type of teaching: Lectures and Seminars</td>
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</tbody>
</table>

LECTURER:
Assoc. Prof. Dr Ognyan Andreev (Faculty of Management) tel.: 965 3529, email: oandre@tu-sofia.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Optional Managerial Discipline for the students’ specialty of Computer and Software Engineering – BEng programme of the Faculty of Computer Systems and Control.

AIMS AND OBJECTIVES OF THE COURSE: The goal of the discipline is to establish a basic managerial thinking and abilities. In the end of the semester, the students will be able to recognize and use management terminology and methods; analyze different management issues in the hi-tech field; competently use and apply the decision making approaches and processes.


PREREQUISITES: Technological Practice, Mathematics & Statistics.

TEACHING METHODS: Lectures, using laptop and multimedia projector, case studies, seminars and team work.

METHOD OF ASSESSMENT: Final Exam in the end of semester (80%), students’ work and performance during the semester (20%).

INSTRUCTION LANGUAGE: Bulgarian

DESCRIPTON OF THE COURSE

<table>
<thead>
<tr>
<th>Name of course:</th>
<th>Code: BCSE36.3</th>
<th>Semester: 5</th>
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<tr>
<td>Marketing of High Technologies</td>
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</table>

Type of training: Lectures and seminars

Hours per week: L - 2 hours, S - 1 hour

Number of credits: 3

LECTURER:
Assos. Prof. Marlena Terzijska (SF), tel: 965 2259, e-mail: terzis@tu-sofia.bg
Technical University – Sofia

STATUS OF THE DISCIPLINE IN THE CURRICULUM: Compulsory optional course for the students of specialty Computer and Software Engineering in the bachelor programme of the Faculty of Computer Systems and Control.

OBJECTIVES OF COURSE: Course "Marketing of High Technologies" is designed to acquaint students from Computer and Software Engineering with key issues of marketing, its role and importance of the economic activity system in order to increase its competitiveness, both on internal and international market and to develop them in the market aimed at high-tech thinking.

DESCRIPTION OF SUBJECTS: The main topics are: Marketing - nature, theory and practice, marketing process - mix and models, market research marketing of high technologies, marketing information system, marketing and strategic planning, product, pricing, sales and communications policy and behavior of users of high Technology and controlling of the marketing activities.

PREREQUISITES: The subject is based on knowledge of the studied economic discipline.

TEACHING METHODS: interactive methods using computer and multimedia bimer. In seminars provides work in groups of tasks and development of various case-studies.

METHODS OF TESTING AND ASSESSMENT: written examination, as the assessment is as follows: 80 percent of knowledge and displayed 20% of the work during the seminars.

LANGUAGE OF TEACHING: Bulgarian.

BIBLIOGRAPHY:
1. Ф. Котлър. Въведение в маркетинга. Класика и стил. 2013
2. Ф. Котлър, Управление на маркетинга, Класика и стил, 2011.
**DESCRIPTION OF THE COURSE**

<table>
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<tr>
<th>Name of the course:</th>
<th>Code: BCSE37</th>
<th>Semester: 5</th>
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<td>Programming Languages</td>
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<th>Type of teaching:</th>
<th>Hours per week:</th>
<th>Number of credits:</th>
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</thead>
<tbody>
<tr>
<td>Lectures, Laboratory Work, Course Work</td>
<td>L – 3 hours, LW – 1 hour</td>
<td>5</td>
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</tbody>
</table>

**LECTURER:**

Prof. Ph.D. Ognian Nakov (FCSC), tel.: 965 25 36, email: nakov@tu-sofia.bg
Technical University – Sofia

**COURSE STATUS IN THE CURRICULUM:** Compulsory for the students in Computer and software engineering in bachelor programme of the Department of Computer Systems.

**AIMS AND OBJECTIVES OF THE COURSE:** At the end of the course the students are expected to be able to understand object-oriented programming and design technology and practical skills – how to use class libraries, how to define a class of objects using concrete object-oriented programming language.

**DESCRIPTION OF THE COURSE:** The course objectives is to acquaint students with the object-oriented conception, basic ideas and their realization in different object-oriented programming languages; to teach object-oriented analysis and design; to give object-oriented programming training, using class libraries for an individual design which consists of number of classes.

**PREREQUISITES:** Programming languages and program algorithms.

**TYPE OF TEACHING:** Lectures, using slides, case studies, laboratory and course work, work in teams and course work description preparation and defence.

**METHOD OF ASSESSMENT:** Two assessments, laboratories, course work.

**LANGUAGES OF INSTRUCTION:** Bulgarian.

**BIBLIOGRAPHY:**

DESCRIPTION OF THE COURSE

<table>
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<tr>
<th>Name of the course: Digital Circuits</th>
<th>Code: BCSE38</th>
<th>Semester: 5</th>
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<td>Type of teaching: Lectures, Laboratory Work</td>
<td>Hours per week: L–2 hours, LW–2 hours</td>
<td>Number of credits: 5</td>
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</table>

LECTURERS:
Assoc. Prof. Ph.D. Peter Manoilov (FCSC), tel.: 0895 590 576, e-mail: p.manoilov@mail.bg
Assoc. Prof. Ph.D. Valentin Mollov (FCSC), tel.: 965 3523, 965 3254, e-mail: mollov@tu-sofia.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory course for the students of specialty “Computer and Software Engineering”, Bachelor program in Faculty of Computer Systems and Control, Technical University-Sofia.

AIMS AND OBJECTIVES OF THE COURSE: The aim of this course is to give knowledge and skills on the basic digital circuits and devices, as well as the methods of design, investigation, implementation of digital devices on integrated circuits and application.

DESCRIPTION OF THE COURSE: The syllabus considers the basic digital and pulse circuits, families of logic elements, flip-flop structures, buffers. Special attention is paid to LSI and VLSI circuits and systems – memories and ASIC. An introduction to programmable VLSI design by means of CAD – systems and language description is included as well.

PREREQUISITES: Basic knowledge on circuit analysis, logic circuits and electronic components.

TYPE OF TEACHING: Lectures using video-presentation with beamer, laboratory works.

METHOD OF ASSESSMENT: Exam during the exam session with duration two academic hours, students give written answers. Final mark is calculated based on the written exam (80%), laboratory work (20%).

LANGUAGES OF INSTRUCTION: Bulgarian.

BIBLIOGRAPHY:
2. Маноилов П., Проектиране на цифрови устройства върху свръхголеми интегрални схеми с помощта на VHDL, ТУ-София, 2006.
DESCRIPTION OF THE COURSE

<table>
<thead>
<tr>
<th>Name of the course: Programming for Mobile Devices</th>
<th>Code: BCSE40</th>
<th>Semester: 6</th>
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<tr>
<td>Type of teaching: Lectures, Laboratory Work</td>
<td>Hours per week: L – 2 hours, LW – 1 hour</td>
<td>Number of credits: 4</td>
</tr>
</tbody>
</table>

LECTURER:

Prof. Ognyan Nakov Nakov, PhD, tel: 965 3613, email: nakov@tu-sofia.bg  
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Mandatory for the bachelor’s degree students specialty “Computer and Software Engineering” of the Faculty of Computer Systems and Control.

AIMS AND OBJECTIVES OF THE COURSE: The course is aimed to teach the students in applying contemporary software tools and technologies for design and development of phone applications as well as to give them a basic knowledge about the cross-platform applications and web-based applications for mobile devices.


PREREQUISITES: Operating Systems, Program Languages, Object Oriented Programming, Program Environments.

TYPE OF TEACHING: All lectures are developed as PowerPoint slides and are taught by means of computer and multimedia projector. During the laboratory exercises particular applications that illustrate main topics of the course are designed and implemented. Additional course materials are published on Internet.

METHOD OF ASSESSMENT: The assessment is made by an exam.

LANGUAGES OF INSTRUCTION: Bulgarian.

BIBLIOGRAPHY:
1. Charles Petzold, Programming Windows Phone 7, Microsoft Press, 2010
DESCRIPTION OF THE COURSE

<table>
<thead>
<tr>
<th>Name of the course:</th>
<th>Code: BCSE41</th>
<th>Semester: 6</th>
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<tr>
<td>Programming Frameworks</td>
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</table>

Type of teaching: Lecture, Laboratory Work, Course Work

Hours per week:
L – 2 hours, LW – 2 hours

Number of credits: 6

LECTURER:
Prof. Ognian Nakov Nakov Ph.D. (FCSC), – tel.: 965 3513, email: nakov@tu-sofia.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory course for the students of specialty Computer and Software Engineering in the bachelor programme of the Faculty of Computer Systems and Control.

AIMS AND OBJECTIVES OF THE COURSE: The course introduces traditional and modern means for Windows programming in VISUAL or .NET Frameworks; graphical interface programming; multilayer architecture; multitasking basics and memory management; object construction/destruction and usability in classical/visual/.NET environments; fundamentals of serialization; internet programming basics – API functions, basic classes and class hierarchies; exception handling mechanisms, writing code complete and code prone to hacker attacks.


PREREQUISITES: Basic knowledge in operation systems, universal program languages, software engineering, such as and knowledge about special features, structure and functionality of computer devices and system.

TYPE OF TEACHING: Lectures in multimedia variant; developed web site with all lecture and practical materials of the course; practical work in laboratory. Published tutorial for every laboratory theme.

METHOD OF ASSESSMENT: Exam during the exam session with duration two academic hours, students are given to developed individual program.

LANGUAGES OF INSTRUCTION: Bulgarian.

BIBLIOGRAPHY:
**DESCRIPTION OF THE COURSE**

<table>
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<th>Name of the course:</th>
<th>Code: BCSE42</th>
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<td>High-Performance Computer Systems</td>
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<th>Type of teaching:</th>
<th>Hours per week:</th>
<th>Number of credits:</th>
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<tr>
<td>Lectures, Laboratory Work, Course work</td>
<td>L – 2 hours, LW – 2 hours</td>
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</table>

**LECTURER:**
Prof. Ph.D. Plamenka Borovska (FCSC) – tel.: 965 2524, email: pborovska@tu-sofia.bg
Technical University of Sofia

**COURSE STATUS IN THE CURRICULUM:** Compulsory for the students of specialty Computer and Software Engineering in the bachelor programme of the Faculty of Computer Systems and Control.

**AIMS AND OBJECTIVES OF THE COURSE:** At the end of the course the students are expected to know the concepts, principles, models and architectural styles of high-performance computer systems and to apply them in the design and development of effective infrastructure of high-performance computer systems, to make comparative analyses and to evaluate the advantages and disadvantages of the alternative decisions.

**DESCRIPTION OF THE COURSE:** The main topics concern: Taxonomy. Architectural styles. Technological specifics; Scalable high-performance computer systems; Vector processors; Massively parallel processors; Clusters of servers and workstations; Parallel input-output; Resource management and scheduling of computer clusters; Symmetric and CC-NUMA multiprocessors; System communication networks for high-performance computer platforms; Parameters of communication performance of system communication networks; Performance parameters of high-performance computer systems; Supercomputers; Metacomputers. Virtual supercomputers; Resource brokers of computational resources; Infrastructure for management of computational resources.

**PREREQUISITES:** Computers Organization, Computer Architecture.

**TYPE OF TEACHING:** Lectures using video-presentation with beamer, laboratory works end with presentation of the results, parallelism profiles and estimation of the performance parameters of the parallel system for the certain task.

**METHOD OF ASSESSMENT:** Exam during the exam session with duration two academic hours, students give written answers to 3 compulsory and 5 optional questions, problems or tasks (60%), laboratory works (25%), course work (15%).

**LANGUAGES OF INSTRUCTION:** Bulgarian.

**BIBLIOGRAPHY:**
DESCRIPTION OF THE COURSE

<table>
<thead>
<tr>
<th>Name of the course</th>
<th>Code: BCSE43-1</th>
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<tr>
<td>Multimedia systems and technologies</td>
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Type of teaching: Lectures and Laboratory work, Course project
Lessons per week: L – 2 hours, LW – 2 hours
Number of credits: 4

LECTURER:
Assoc. Prof. Ph.D. Milena Lazarova (FCSC), tel. 965-3285, email: milaz@tu-sofia.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Optional course for the “bachelor” degree students in specialty “Computer and software engineering” in Faculty “Computer systems and control”, TU-Sofia.

AIMS AND OBJECTIVES OF THE COURSE: The course aims to introduce students to the approaches, methods and tools for the creation and processing of various types of media information, including images, sound and video.

DESCRIPTION OF THE COURSE: The main topics concern: overview of computer multimedia – introduction, definitions, classification; of multimedia computer system structure; devices for input of multimedia information; devices for output of multimedia content; multimedia projects – development principles; stages of creating a multimedia product; presentation of multimedia information – images, audio and video data; images – file formats, vector and raster images, compression, means for processing graphics images; audio information – file formats, compression; means for audio processing; video data – file formats, compression; means for video processing; synchronization of multimedia flows.

PREREQUISITES: Mathematics; Computer Periphery; Programming Languages and Programming Environments.

TEACHING METHODS: Lectures, using slides, case studies, demo programs and multimedia presentations, course works assignments

METHOD OF ASSESSMENT: final exam.

INSTRUCTION LANGUAGE: Bulgarian.

DESCRIPTION OF THE COURSE

Name of the course
Software Design and Testing

Code: BCSE43.2
Semester: 6

Type of teaching:
Lectures and Laboratory work

Lessons per week:
L – 2 hours, LW – 2 hours

Number of credits: 4

LECTURER:
Assoc. Prof. Dr. Adelina Aleksieva (FCSC), tel.: 965 2652, email: aaleksieva@tu-sofia.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory for the students speciality “Computer and software engineering”, profile “Program Systems” – bachelor degree (Faculty of Computer Systems and Control of TU-Sofia).

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is to teach the students with the practice concepts of software engineering – design, implementation, debugging and maintenance of software products.

DESCRIPTION OF THE COURSE: The course includes problems concerning models and stages of software life cycle - software development method including design, development, testing and debugging, support and maintenance. Various programming styles are under discussion – imperative (procedure oriented) using C,C++,C# as implementation language, logic programming using Prolog and functional programming using Lisp.

PREREQUISITES: Basic knowledge, practical skills and experience in universal procedure oriented programming languages like C, C++, Java. Material covered is to be useful for software engineers – designers, managers, developers and quality assurance engineers.

TEACHING METHODS: Lectures (with slides, multimedia projector) and additional text materials; web site of the course; laboratory work (based on instructions) with a tutorial for every laboratory theme.

METHOD OF ASSESSMENT: Written examination (test work for fixed time).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:
1. Бонев С., Технология на Програмирането, София, СИЕЛА, 2000;
5. A. Hunt, D. Thomas, Pragmatic Unit Testing in C# with NUnit, The Pragmatic Bookshelf, 3e, 2010
DESCRIPTION OF THE COURSE

<table>
<thead>
<tr>
<th>Name of the course:</th>
<th>Code: BCSE43.3</th>
<th>Semester: 6</th>
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<tr>
<td>Discrete Structures</td>
<td>Hours per week:</td>
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<td>Type of teaching:</td>
<td>L – 2 hours, LW – 2 hours</td>
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<tr>
<td>Lectures, Laboratory Work</td>
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</table>

LECTURER:
Full Prof. Dr. Valeri Mladenov (FA), tel./fax. +359 2 9652386, e-mail: valerim@tu-sofia.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Elective for the students specialty Computer and software engineering, BEng program of the Department of Computer Science.

AIMS AND OBJECTIVES OF THE COURSE: To introduce students to the basic concepts of some essential areas which are important for the computer science and to acquire some skills for application of some methods and effective algorithms for solving different computer science and and combinatorial problems. At the end of the course the students will acquire the basic discrete structures that are used for mathematical modeling in the different areas of the applied mathematics and computer science: formal logic and logic functions, sets, operations on sets and relations on finite sets and presentation as structured data, graphs, trees and relations between graphs, binary relations and Boolean matrixes, algorithms and complexity of the algorithms; combinatorics; finite automata.

DESCRIPTION OF THE COURSE: The main topics concern: formal logic and logical operations and functions; predicate and predicate functions; set theory; mathematical reasoning, relations and their representation as data structures, functions, Boolean algebra and Boolean functions, graphs and trees, combinatorics, mathematical induction and testing the program correctness by use of the mathematical induction, recursion and recursive functions and algorithms, finite automata.

PREREQUISITES: Mathematics I and II and Programming I and II.

TYPE OF TEACHING: Lectures and laboratory work in a computer training class. The teaching contents is presented on a black board and by using digital projector.

METHOD OF ASSESSMENT: Two test papers during the semester (2*42%) + home works(16%).

LANGUAGES OF INSTRUCTION: Bulgarian.

BIBLIOGRAPHY:
DESCRIPTION OF THE COURSE

<table>
<thead>
<tr>
<th>Name of the course:</th>
<th>Code: BCSE44.1</th>
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<tr>
<td>Neural Networks</td>
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</table>

Type of teaching: Lectures, Laboratory Work

Hours per week: L – 2 hours, LW – 2 hours

Number of credits: 4

LECTURER:
Prof. Dr. Valeri Mladenov (FA), tel./fax. +359 2 9652386, e-mail: valerim@tu-sofia.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: A compulsory-selected course for the students speciality “Computer and software engineering” – bachelor degree (Faculty of Computer Systems and Control of TU-Sofia).

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is to teach the students with the main neural network types and the associated neural network training procedures.

DESCRIPTION OF THE COURSE: During the course these main topics are presented: History of neural networks and neurocomputing, The McCulloch-Pitt neuron, Adaptive linear element (ADALINE) and delta method (least square) for network training, Perceptron and perceptron training rule, Auto-associative neural networks and Hebb rule, Discrete and continuous Hopfield neural networks, Multilayer feed forward error back propagation neural networks, Neural networks with radial basis functions, Competitive neural networks with fixed weights, Neural networks based on competition and Self organizing neural networks based on Kohonen learning rule, Neural networks with usage of the Grossberg adaptive resonance theory, Principal Component Analysis. During the course in the lab exercises the students are using MATLAB and the toolbox Neural Networks from MATLAB.

PREREQUISITES: Mathematics part I, II and III; Programming and computer knowledge; Analysis and synthesis of logic circuits.

TYPE OF TEACHING: Lectures (with slides, multimedia projector) and additional text materials. Laboratory work (based on instructions) with a tutorial for every laboratory theme.

METHOD OF ASSESSMENT: The examination is done with continuous assessment (two test works for fixed time). The final mark is calculated based on the written exam (80%) and laboratory work (20%).

LANGUAGES OF INSTRUCTION: Bulgarian.

BIBLIOGRAPHY:
DESCRIPTION OF THE COURSE

<table>
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<td>Formal Languages and Language Processors</td>
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Type of teaching: Lectures and Laboratory work

Lessons per week: L – 2 hours, LW – 2 hours

Number of credits: 4

LECTURER:
Asist. Prof. PhD Yavor Tomov (FCSC), e-mail: yavor_tomov@tu-sofia.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory for the students speciality “Computer and software engineering”, profile “Program Systems” – bachelor degree (Faculty of Computer Systems and Control of TU-Sofia).

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is to teach the students on methods to design and implement language processors – compilers, interpreters, assemblers, loading and linking programs

DESCRIPTION OF THE COURSE: The course introduces the concept of a formal grammar as a tool to describe a formal language. The set of regular, linear, automata and context free grammars as well as their corresponding language recognizers (finite state automata and stack automata) are in details commented. This theory gives basic knowledge to present methods and algorithms for lexical analysis (scanning), intuitive and formal methods for syntax analysis (parsing), translation (syntax directed translating schemes, attribute grammars) etc. Other topics included in the course are: assemblers, interpreters, loaders, linkers and their algorithms and principles of operation; storage allocation, code optimization, error detection and error recovery procedures; object code structure etc. Typical utilities for computer aided generation of language processors as scanners and parsers are presented.

PREREQUISITES: Students are supposed to have practical skills in procedure oriented programming languages, and basic knowledge in discrete mathematics, theory of sets, theory of algorithms, finite state automata theory.

TEACHING METHODS: Lectures (with slides, multimedia projector) and additional text materials; web site of the course; laboratory work (based on instructions) with a tutorial for every laboratory theme.

METHOD OF ASSESSMENT: Continuous assessment (test work for fixed time).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:
1. Николов Л., С.Бонев, Формални Езици и Езикокови Процесори, С.Изд ТУ, 2005.
DESCRIPTION OF THE COURSE

<table>
<thead>
<tr>
<th>Name of the course</th>
<th>Code: BCES44.3</th>
<th>Semester: 6</th>
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<tbody>
<tr>
<td>Cryptographic Methods for Information Security in Databases</td>
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**LECTURER:**
Assoc. Professor Irina Noninska, Ph.D. (FCSC), tel.: 965 3471, email: irno@tu-sofia.bg
Technical University of Sofia

**COURSE STATUS IN THE CURRICULUM:** Compulsory for the students speciality „Computer and software engineering“ – bachelor degree (Faculty of Computer Systems and Control), Technical University-of Sofia.

**AIMS AND OBJECTIVES OF THE COURSE:** The purpose of the course is to present the cryptography in such a way, that after the course the students could deal with basic cryptographic methods and algorithms which are at the root of contemporary data security systems.

**DESCRIPTION OF THE COURSE:** The course deals with basic theoretical and practical aspects of cryptography and cryptanalysis. The functional structure of a cryptographic system and characteristics of all components are described. The lectures explain the theory behind symmetric and asymmetric cryptographic algorithms, block ciphers and modes of operations. They present a technical overview of chosen cryptographic algorithms, standards for block encryption, protocols and digital signature generation and verification. Give a treatment of hash functions, elliptic curves and contemporary technologies for authentication.

**PREREQUISITES:** Basic knowledge in mathematics (algebra, number theory, combinatorial-algebraic systems), Computer organization and practical skills in programming.

**TEACHING METHODS:** Lectures (with slides, multimedia projector), supplemented with security product range of companies. Computer classes employ program modules with cryptographic procedures – encryption, key generation and authentication.

**METHOD OF ASSESSMENT:** Two assessments at mid and end of semester.

**INSTRUCTION LANGUAGE:** Bulgarian, English.

**BIBLIOGRAPHY:**
1. Нонинска, И. Криптография. София, Издателство на ТУ-София, 2005 (180 с.).
2. Нонинска, И., Криптографски методи за защита на информацията (Ръководство). София,Издателство на ТУ-София, 2007 (120 с.).
DESCRIPTION OF THE COURSE

<table>
<thead>
<tr>
<th>Name of the course:</th>
<th>Code: BCSE45.1</th>
<th>Semester: 6</th>
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<tbody>
<tr>
<td>Specialized Computer Electronics/ SCE /</td>
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LECTURER: Assoc. Prof. Dr. Georgi Popov, email: popovg@tu-sofia.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory course for the students of specialization Computer and Software Engineering in the bachelor programme of the Faculty of Computer Systems and Control.

AIMS AND OBJECTIVES OF THE COURSE: The learning goals of this hardware course are: students to be able to solve problems in the area of Specialized Computer Electronics /SCE/ described in the project and to apply the acquired knowledge in the area of computer systems.

DESCRIPTION OF THE COURSE: The course gives basic knowledge about electronic circuits used in the computer and microcomputer systems. At the end of the course students will know the basic principles of analog, digital and mixed circuits used in the modern embedded systems as sensors, analog and digital converters, amplifiers, generators, analog multiplexers, sample and hold circuits, etc. The laboratory exercises include investigation of various circuit solutions, described above.

PREREQUISITES: The knowledge obtained in the courses of electricity, semiconductors and signals.

TYPE OF TEACHING: Lectures are implemented on the whiteboard and by a multimedia projector. The laboratory works are conducted by computer based laboratory setups.

METHOD OF ASSESSMENT: Exam during the exam session with duration two academic hours, students give written answers to four questions. Final mark is calculated based on the written exam (80%), laboratory work (20%).

LANGUAGES OF INSTRUCTION: Bulgarian

BIBLIOGRAPHY:
3. Клайтън, Д. Операционни усилватели. 1982, С., Техника
DESCRIPTION OF THE COURSE

<table>
<thead>
<tr>
<th>Name of the course:</th>
<th>Code: BCSE45.2</th>
<th>Semester: 6</th>
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<tbody>
<tr>
<td>Systems Programming</td>
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LECTURER:
Assoc. Prof. Dr. Daniela Gotseva, tel. 965 23 38; dgoteva@tu-sofia.bg
Technical University of Sofia, Computer Systems Department

COURSE STATUS IN THE CURRICULUM: Compulsory-selected for the students specialty „Computer and Software Engineering“ – bachelor degree (Faculty of Computer Systems and Control of Technical University-Sofia).

AIMS AND OBJECTIVES OF THE COURSE: The course aims to give students basic knowledge and skills to apply the approaches, methods and tools for programming in real time as teach the basics of construction and realization of basic mechanisms in programming with a low level in UNIX like systems, the characteristics of the establishment of processes and threads in the language C.


PREREQUISITES: Basic knowledge in structure and functionality of computer devices and system, programming language C/C++, software engineering.

TEACHING METHODS: Lectures (using slides, multimedia projector) and text materials.

METHOD OF ASSESSMENT: One assessment at the end of the semester (80%) and exercises (20%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:
NAME OF THE COURSE

**Expert Systems**

**Code:** BCSE45.3

**Semester:** 6

**Type of teaching:**
Lectures and Laboratory work

**Lessons per week:**
L – 2 hours, LW – 2 hours

**Number of credits:** 4

**LECTURER:**
Assoc. Prof. PhD Diana Grigorova (FCSC) – tel.: 965 3523 e-mail: dgrigorova@tu-sofia.bg
Technical University of Sofia

**COURSE STATUS IN THE CURRICULUM:** Compulsory-selected for the students specialty “Computer and software engineering”, FCSC, Bachelor degree.

**AIMS AND OBJECTIVES OF THE COURSE:** The goal of the course is to introduce to basic problems and their solving in the area of design and implementation of expert systems.

**DESCRIPTION OF THE COURSE:** The main topics concern; phases in the process of problem solving; using the expert systems in the phases of problem solving; structure, basic characteristics and special features of expert systems; knowledge representation by the point of view of their implementation in the expert systems; knowledge acquisition methods; inference methods; forward and backward chaining algorithm; sources of uncertainty; approaches to uncertainty; life cycle of expert systems.

**PREREQUISITES:** "Introduction to the artificial intelligence"

**TEACHING METHODS:** Lectures, using slides. Laboratory work by using expert system shell.

**METHOD OF ASSESSMENT:** Exam by use of test (80%) and assessment of the laboratory work (20%).

**INSTRUCTION LANGUAGE:** Bulgarian.

**BIBLIOGRAPHY:**