DESCRIPTION OF THE COURSE

Name of the course **Computer Networks**	Code: **BCS47**	Semester: 7
Type of teaching: Lectures and laboratory work	Lessons per week: L – 2 hours; LW – 2 hour;	Number of credits: **5**

LECTURER:

Prof. Grisha Spasov PhD (FEA), tel.: 659 724, email: gvs@tu-plovdiv.bg
Technical University of Sofia, branch Plovdiv

COURSE STATUS IN THE CURRICULUM: Compulsory for the students specialty "Computer Systems and Technologies" B.Sc. programme of the Faculty of Electronics and Automatics, Technical University of Sofia, branch Plovdiv.

AIMS AND OBJECTIVES OF THE COURSE: At the end of the course the students are expected to have knowledge for Open Systems' Architecture – ISO OSI model, Global network – Internet and TCP/IP client-server applications.

DESCRIPTION OF THE COURSE: The main topics concern: Open Systems' Architectures – ISO OSI model. Structure and functions of OSI layers. Communication media. Methods of data transfer. Hardware aspects of data transfer – standard interfaces. Communication protocols. Data transfer control. Data link layer. LAN – topology. Media access control. IEEE 802.X standard. WLAN – IEEE 802.11. Network layer. Protocols. Architecture of Internet. TCP/IP protocol stack. Internet applications. File transfer –FTP, e-mail, WWW. Network operation systems. Client-server architecture – applications. Intranet, Extranet. VLAN. Network Operating Systems. Network administration. Network management - SNMP.

PREREQUISITES: Microprocessor technique, Microprocessor Systems, Operating Systems, Computer Architectures, Programming Languages.

TEACHING METHODS: Lectures, using slides and multimedia presentations, laboratory work, using demo-programs, protocols preparation and defence.

METHOD OF ASSESSMENT: Written exam with test on the theory and written work on problems. The final grade is constructed on the exam results (totally 80%) and the protocols from the laboratory work(20%).

INSTRUCTION LANGUAGE: Bulgarian.

BIBLIOGRAPHY:
1. Гриша Спасов, Николай Каканаков, Митко Шопов, "Ръководство за лабораторни упражнения по Компютърни мрежи", ТУ София, 2011, ISBN: 978-964-438-790-7. 2. James F. Kurose, Keith W. Ross, "Computer Networking. A Top-Down Approach Featuring the Internet", Fifth edition, Pearson, 2010, ISBN-13: 978-0- 13-607967-5. 3. Andrew S. Tanenbaum , David J. Wetherall , "Computer Networks", 5th Edition, Prentice Hall, 2010, ISBN-10: 0132126958. 4. William Stallings, "Data and Computer Communications" ,10th Edition, Prentice Hall, 2013, ISBN-10: 0133506487.

ТЕХНИЧЕСКИ УНИВЕРСИТЕТ – СОФИЯ, ФИЛИАЛ ПЛОВДИВ
ФАКУЛТЕТ ПО ЕЛЕКТРОНИКА И АВТОМАТИКА

DESCRIPTION OF THE COURSE

Name of the course **Parallel Programming**	Code: **BCS48**	Semester: **7**
Type of teaching: Lectures, laboratory work	Lessons per week: L – **2** hours; LW – **2** hour	Number of credits: **6**

LECTURER:
Assoc. Prof. Ph.D. Maria Marinova (FEA), Dept. CST – tel.: 659 727,
Technical University of Sofia, branch Plovdiv,
e-mail: m_marinova@tu-plovdiv.bg

COURSE STATUS IN THE CURRICULUM: Compulsory course for the students in BSc program in Computer systems and technologies.
AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is to create knowledge about about parallel programming languages.
DESCRIPTION OF THE COURSE: : An abstractive view of different models for parallel computers; parallel pragmas and programming models; programming with message-passing method; programming of shared memory processors; hybrid programming using MPI-OpenMP model; point-to-point blocking functions, collective functions for communication between processors; fork-join model is used to parallel programming of multi-core processors and processors with shared memory; the architecture of execution of an application using OpenMP pragmas; different pragmas, critic sections, parallel the loops in programs; methods for resolving of "deadlocks"; Tools for evaluating and measuring of performance of parallel programs; "hot spots" and "cold spots" in parallel programs, optimizing with Intel VTune Analyser; CUDA architecture – parallel programming with Cuda C, OpenCL and ACC. Analyzing of parallel algorithms – Erostain, matrix multiply, Mandelbrot set, N-Body simulation.

PREREQUISITES: Good fundamental knowledge in the courses: Object-oriented programming, programming C/C++.

TEACHING METHODS: Lectures and laboratory work.

METHOD OF ASSESSMENT: Final exam (80%) and laboratory work (20%).
INSTRUCTION LANGUAGE: Bulgarian
BIBLIOGRAPHY:

1. **Rauber T., Runger G.,** *Parallel Programming for Multicore and Cluster Systems*, Springer, 2013.
2. **Kirk D., Hwu W.,** Programming Massively Parallel Processors: A Hands-on Approach, 2012
3. **Sander J., Kandrot Ed.,** *CUDA by Example: An Introduction to General Purpose GPU Programming***,** Addison-Wesley, 2010
4. **Jost G., Pas R.**, Using OpenMP: Portable Shared Memory Parallel Programming, 2007
5. **Kendall W.,** *Beginning MPI(An Introduction in C)*, Adisson-Wesley, 2013
6. **Robert C.**, *An Introduction to Parallel Programming with OpenMP, PThreads and MPI(Cook's Books)*, 2011.
7. **Pacheco P.,** *An Introduction to Parallel Programming*, Elsevier Inc., 2011

WWW адреси:

- http://www.mcs.anl.gov/research/projects/mpi/
- http://openmp.org/wp/
- http://www.nvidia.com/object/cuda_home_new.html

DESCRIPTION OF THE COURSE

Name of the course: **Computer systems design**	Code: **BCS49**	Semester: **7**
Type of teaching: Lectures, laboratory work	Lessons per week: L – **2** hours; LW – **2** hours	Number of credits: **4**

LECTURER:
Assist. Prof. PhD Boris Ribov (FEA), Dept. CST. tel.: 659 757 , Email: ribov@developer.bg
Technical University of Sofia, branch Plovdiv

COURSE STATUS IN THE CURRICULUM: An compulsory elective subject for the Computer Systems and Technologies students admitted to the bachelor program. Computer Systems and Technologies Department belongs to the Electronics and Automation Faculty (EAF). EAF is a part of the Technical University – Sofia, Plovdiv branch.

AIMS AND OBJECTIVES OF THE COURSE: After finishing the course, the students will get knowledge about the fundamental principles and methodologies connected to the computer systems design.

DESCRIPTION OF THE COURSE: The main topics are listed bellow – Computer systems design – fundamentals principles; Design and tuning methods applicable to computer systems. Basic terms about simulation, emulation and resident tuning of computer systems. Different systems used for design, development and tuning; PCB (Printed Circuit board) design. Basic requirements and technologies used in PCB design. CAD (Computer-aided design) – CAM (Computer-aided manufacturing) systems for PCB design. Introduction to CAD Protel 99 SE; Cross compilers – architecture and programmer technologies. The storing of the software modules into the memory. Runtime module; Computer system busses design – modules and standards. Concrete examples of PC (Personal Computer) busses - ISA (Industry standard architecture), PCI (Peripheral Component Interconnect), AGP (Accelerated Graphics Port). Busses and standards in VMEbus (Versa Module Europa bus); Computer system engineering fundamentals. Live cycle – defining of the term and its duration. Microprocessor families from Intel and Motorola; The way of selection of the building components in microprocessor based controllers. Microprocessor families from Microchip, Intel and Atmel; Computer interfaces design – basic terms. Parallel and serial interfaces design. USB (Universal Serial Bus) and IrDA (Infrared Data Association) interfaces; Economical interfaces design using microprocessor based controllers; LAN (Local area network) connected microcontrollers design – basic principles; PLC (Programmable logic controllers) techniques; Computer systems PSU (Power supply unit) design – types and basic principles; Design of mechanical components which are parts of computer systems; Reconfigurable logic – historical path. Contemporary programmable integrated circuits (ICs) used in the computer systems design process; Hardware desrition languages – VHDL, Verilog, SystemC. Programmable ICs produced by Xilinx and Altera;

PREREQUISITES: BCS39: Digital Design and BCS35: Microprocessor Systems design

TEACHING METHODS: The lectures presented the above mentioned material using slides and multimedia projector. There is information on the slides about the basic principles and construction of the computer systems hardware including some circuits, drawings, formulas and figures.

METHOD OF ASSESSMENT: Written exam in the form of a test. The final mark consists of 90% - written exam and 10% - laboratory work.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:

1. Atanasov A., Microprocessors (in Bulgarian), Znanie, 2010.

2. White E., Making embedded systems, O'Reylli, 2011.
3. Vahid F., Digital design, with RTL design, VHDL and Verilog, second edition, John Wiley & Sons, 2011.
4. Chattopadhyay S., Embedded system design, PHI Learning Private Limited, 2010.
5. Vahid F. and Givargis T., Embedded System Design: A Unified Hardware/Software Introduction, John Wiley & Sons, 2011.
6. http://www.intel.com/content/www/us/en/homepage.html
7. www.microchip.com
8. http://www.freescale.com
9. http://www.atmel.com
10. http://www.maximintegrated.com

ТЕХНИЧЕСКИ УНИВЕРСИТЕТ – СОФИЯ, ФИЛИАЛ ПЛОВДИВ
ФАКУЛТЕТ ПО ЕЛЕКТРОНИКА И АВТОМАТИКА

DESCRIPTION OF THE COURSE

Name of the course **Test and Diagnostics of Computer Systems**	Code: **BCS50**	Semester: **7**
Type of teaching: Lectures, laboratory work	Lessons per week: L – **2** hours; LW – **2** hour	Number of credits: **4**

LECTURER:

Assistant Prof. Ph.D. Valentin Mollov (FEA), Dept. CST – tel.: 659 728,
Technical University of Sofia, branch Plovdiv,
e-mail: vmollov@tu-plovdiv.bg

COURSE STATUS IN THE CURRICULUM: Optional course for the students in BSc program in Computer systems and technologies.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is to give knowledge and create practical skills in the field of testing and diagnosing computer systems.

DESCRIPTION OF THE COURSE:

The course comprises theoretical issues and practical topics of testing and diagnosing digital circuits, microprocessor systems and computers. Wide area is covered ranging from embedded control tools to the external diagnostic appliances and testing software. A number of lectures and laboratory exercises are devoted to the test equipment such as troubleshooters, logic analyzers, emulators, etc. Many diagnostic tests and benchmarks are included in laboratory workshops.

PREREQUISITES: Good knowledge in courses: Computer organization, Computer architectures and Microprocessor systems.

TEACHING METHODS: Lectures and laboratory work.

METHOD OF ASSESSMENT: Knowledge assessment is based on two components – exam at the end of semester (70%) and laboratory work (30%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:

1. Тестване и диагностика на компютърни системи, В. Моллов, А.Костадинов, ТУ София, 2014 г.
(Testing and Diagnostics of Computer Systems, V. Mollov, A. Kostadinov, TU-Sofia, 2014)
2. Контрол и диагностика на компютърни системи, С. Моллова, София, 2006 г.
(Control and Diagnostics of Computer Systems, S. Mollova, Sofia, 2006).
3. Настройка и диагностика на микропроцесорни системи, Г. Михов, С., Техника, 2003 г.
(Troubleshooting and Diagnostics of Microprocessor Systems, G. Michov, S., Technika, 2003).
4. Надеждност и тестване на компютърни системи, С. Моллова, С., В.издат., 2002 г.
(Reliability and Testing of Computer Systems, S. Mollova, S., V.Izdat., 2002).
5. Computer Organization and Architecture: Designing for Performance, W. Stallings, 2008.
6. Microcomputer Fault-finding and Design, Robin Holland, Macmillan Press, 2005.
7. Проверка и настройка на цифрови устройства, К.Янев, А.Егоров и др., С., Техника, 1990 г.
(Control and troubleshooting of Digital Devices, K.Yanev, A.Egorov, S., Technika, 1990)
8. www.zonapld.com/category/диагностика/
9. www.pcworld.bg/21327_kratko_rakovodstvo_za_strestest_na_rs_harduera
10.www.kaldata.com/forums/topic/34723-инструменти-за-тестване-на-хардуера

DESCRIPTION OF THE COURSE

Name of the course **Computer graphics**	Code: **BCS51**	Semester: **7**
Type of teaching: Lectures, laboratory work	Lessons per week: L – **2** hours; LW – **2** hour	Number of credits: **5**

LECTURER:

Assoc. Prof. Ph.D. Petya Pavlova (FEA), Dept. CST – tel.: 659 705,

e-mail: p_pavlova@tu-plovdiv.bg, Technical University of Sofia, branch Plovdiv

COURSE STATUS IN THE CURRICULUM: Compulsory course for the students in BSc program in Computer systems and technologies, faculty of Electronics and automatics, TU Sofia, branch of Plovdiv

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is to create knowledge about the mathematics and basic methods and means used in raster and vector graphics, and to create practical skills in application of standard program libraries.

DESCRIPTION OF THE COURSE: Raster graphics, image presentation, formats color models, methods of rendering; Curves description; Projective geometry and geometrical space transformations. 2D and 3D description of graphical objects: wire models, solid block models, structure models, textured models. Lightening and coloring of computer generated objects in images.

PREREQUISITES: Good fundamental knowledge in the courses: Mathematics, Programming and computer utilization.

TEACHING METHODS: Lectures and laboratory work.

METHOD OF ASSESSMENT: Two assessments at mid and end of semester (50%) and laboratory work (20%-2D 30%-3D)

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:

1. Павлова П. „Основи на компютърната графика - учебник“, изд. ТУ София, 2016

2. Павлова П. „Основи на компютърната графика - учебник“, изд. ТУ София, 2016

3. Лукипудис Е. Компютърна графика и геометрично моделиране част I. В равнината, изд. СУ “Кл. Охридски”,София, 1996.

4. Foley J., A. van Dam, St. Feiner, J. Hughes. Computer Graphics Principles and practice, Second edition, Addison-Wesley Pub. 1990.

5. Александров А., А.Коралски, Б. Бинев. 3D ray tracing & animation. AlexSoft.София 1995.

6. Editor Nobuhiko Mukai, Computer Graphics, 2012 – open access book

7. Hughes J., A. van Dam M.McGuire, D. F. Sklar, J. Foley, St. Feiner, K. Akeley. Computer Graphics: Principles and Practice, 3rd edition, 2013 – e-book

8. Pratt M., G. Humphreys. Physically based rendering – From theory to implementation Second edition, Morgan Kaufmann, 2010

9. http://www.geometryalgorithms.com/Archive/algorithm_0108/algorithm_0108.htm

10. http://www.siggraph.org/education/materials/HyperGraph/raytrace/rtinter0.htm

11. https://www.courses.psu.edu/art/art201_jxm22/tutorials.html

COURSE ANNOTATION

Course Title: **AIS**	Code: **BCS52**	Semester: **7**
Teaching: Lectures Labs	Weekly hours: Lectures – **2** Labs – **2**	Credits: **4**

LECTURER:

Prof. G. Spasov, PhD, Department of Computer Systems and Technologies
tel. 032 659 724, Technical University - Sofia, branch Plovdiv

COURSE POSITION IN THE CURRICULUM: Optional course for fourth year students in Computer Systems and Technologies, B.Sc. programme of the Faculty of Electronics and Automatics, Technical University of Sofia, branch Plovdiv.

COURSE AIMS AND OBJECTIVES: After course completion students should : know the mathematical basis of the probabilistic information theory ; be able to identify and solve complex applied problems in the area of data storage and communications ; be able to design and implement programming solutions for relatively complex algorithmic problems.

COURSE DESCRIPTION: Main topics : Information definition. Modeling and coding. Data compression. Shannon-Fano and Huffman methods. Arithmetic coding. Dictionary methods – LZ class. Lossy data compression. Cryptography. Substitution and transposition schema. Combined schema – DES. Key generation - pseudorandom sequences generation. Asymmetric encryption schema – RSA. Elements of cryptanalysis. Error correction and detection – information-theoretic approach. Block codes. Convolution codes.

PREREQUISITES: Mathematics. Signals and systems. Data structures. Synthesis and analysis of algorithms. Programming languages. Programming environments.

METHODS OF TEACHING: Lectures using printed and multimedia materials. Tutorials using demo programs. Coursework for coding-decoding scheme implementation.

METHODS OF EXAMINATION AND ASSESSMENT: Written test on theory and coursework defence. The overall grade is an aggregation of the test grades (50%) and the defense grade of the coursework (50%).

LANGUAGE: Bulgarian

BIBLIOGRAPHY:

1. Salomon, David, Data Compression – The Complete Reference, Springer-Verlag London, 2007. ISBN 1-84628-602-6

2. 2. Oded, Goldreigh, Foundations of Cryptography, Cambridge University Press, 2007, ISBN 9780521035361

ТЕХНИЧЕСКИ УНИВЕРСИТЕТ – СОФИЯ, ФИЛИАЛ ПЛОВДИВ
ФАКУЛТЕТ ПО ЕЛЕКТРОНИКА И АВТОМАТИКА

DESCRIPTION OF THE COURSE

Name of the course **High-Performance Computer Systems**	Code: **BCS54-1**	Semester: **8**
Type of teaching: Lectures, laboratory work	Lessons per week: L – **3** hours; LW – **2** hour	Number of credits: **4**

LECTURER:
Assoc. Prof. PhD Maria Marinova (FEA), Dept. CST – tel.: 659 727,
Technical University of Sofia, branch Plovdiv,
e-mail: m_marinova@tu-plovdiv.bg

COURSE STATUS IN THE CURRICULUM: Selected course for the students in BSc program in Computer systems and technologies.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is to create knowledge about about high-performance computers and practical skills in high-performance networks with OMNET+.

DESCRIPTION OF THE COURSE: High-performance computers with different arrangement of processor elements – array processors, vector processors, cube. Associative Processors; INP using perfect-shuffle method; Multithreading hybrid architectures, Tera MTA; Dataflow Architectures; Parallel computers with distributed memory. Parallel Computers with non-unified memory access - UMA, NUMA, CC-NUMA, COMA. SIMD connectivity of processor nodes in supercomputers. TERA T3D, T3E; Omega networks. Parallel Processor Architectures with PetaFLOPS performance. IBM Blue Gene P/ Q. High-performance processors with GPUs – Titan/Cray XK7/.

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PREREQUISITES: Good fundamental knowledge in the courses: Computer Architecture, Parallel Programming.

TEACHING METHODS: Lectures and laboratory work.

METHOD OF ASSESSMENT: Final exam (80%) and laboratory work (20%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:

1. **Schneck P.,** *Supercomputer Architecture*, Kluwer Academic Publisher, 2013
2. **Kirk D., Hwu W.,** *Programming Massively Parallel Processors: A Hands-on Approach*, 2012
3. **Culler D., Singh J.,** *Parallel Computer Architecture: A Hardware/Software Approach*. Elsevier, 2009
4. **Sima D., Fountain T., Kacsuk P.,** *Advanced Computer Architectures*, Adisson-Wesley, 1997
5. **K. Hwang**, *Advanced Computer Architecture*, McGraw-Hill, NY, 1993.
6. **Stone H**., *High-performance Computer Architecture*, Aisson-Wesley, MA, 1993
7. *www.top500.org*

DESCRIPTION OF THE COURSE

Name of the course **Functional Programming**	Code: **BCS54-2**	Semester: 8
Type of teaching: Lectures and laboratory work	Lessons per week: L – 3 hours; LW – 2 hours	Number of credits: **4**

LECTURER:
Prof. PhD Veselka Boeva (FEA), tel.: 659 723, email: vboeva@tu-plovdiv.bg Technical University of Sofia, branch Plovdiv

COURSE STATUS IN THE CURRICULUM: Optional course for fourth year students in Computer Systems and Technologies, B.Sc. programme of the Faculty of Electronics and Automatics, Technical University of Sofia, branch Plovdiv.
AIMS AND OBJECTIVES OF THE COURSE: Introduction to the main principles of functional programming and creation of a theoretical base to compare and distinguish between different language paradigms.
DESCRIPTION OF THE COURSE: The main topics concern: Comparing of imperative and declarative paradigms. Introduction to the distinguishing features of functional programs. Mathematical foundations of functional programming – λ-calculus. Review of functional languages – Lisp, Miranda, ML, FP, Haskell, APL. Introduction to Standard ML. Functional definitions. Recursion and iteration. Recursive list functions. Polymorphism and overloaded functions. Higher-order functions. Data type declarations. Abstract data types. Lazy lists and delayed evaluations. Exceptions. Imperative programming in ML. Modules system in practice. Some principles of mathematical proof. Program specification and verification.
PREREQUISITES: Programming and Computer Applications II and III, Discrete Structures, Synthesis and Analysis of Algorithms, Programming Languages.
TEACHING METHODS: Lectures, information visualization by a laptop and a multimedia projector, and laboratory work based on a particular functional programming language, namely SML.

METHOD OF ASSESSMENT: Written test consisting of problem solving in SML.

INSTRUCTION LANGUAGE: Bulgarian.
BIBLIOGRAPHY:
1. В Боева. *Програмиране във функционален стил*, Издателство на Технически университет-София, 2012; 2. Robert Harper, *Programming in Standard ML*, Carnegie Mellon University, Spring Semester, 2011; 3. Stephen Gilmore, *Programming in Standard ML'97: A Tutorial Introduction*, Laboratory for Foundations of Computer Science, The University of Edinburgh, 1997 (Revised: 2003); 4. В. Боева, Ръководство за лабораторни упражнения по функционално програмиране: *Въведение в стандарта ML*, Технически Университет-София, филиал Пловдив, 2003; 5. L. Pauson, *ML for the Working Programmer*, Cambrige University Press, 1992; 6. R. Milner, M. Tofte and R. Harper, *The Definition of Standard ML*, The MIT Press, 1990; 7. J.D. Ulman, *Elements of ML Programming*, Prentice-Hall, 1993; 8. R. Bird and P. Wadler, *Introduction to Functional Programming*, Prentice-Hall, 1988; 9. C. Myers, C Clack and E. Poon, *Programming in Standard ML*, Prentice-Hall, 1993; 10. Standard ML of New Jersey: http://www.smlnj.org/; 11. Moscow ML: http://www.itu.dk/~sestoft/mosml.html

DESCRIPTION OF THE COURSE

Name of the course **3D models and printing**	Code: **BCS54.3**	Semester: **8**
Type of teaching: Lectures, laboratory work	Lessons per week: L – **3** hours; LW – **2** hour	Number of credits: **4**

LECTURER:

Assoc. Prof. Ph.D. Petya Pavlova (FEA), Dept. CST – tel.: 659 705,
Technical University of Sofia, branch Plovdiv,
e-mail: p_pavlova@tu-plovdiv.bg

COURSE STATUS IN THE CURRICULUM: Optional course for the students in BSc program in Computer systems and technologies.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is to create knowledges and skills on the basic methods for 3d object design and their printing.

DESCRIPTION OF THE COURSE: The course includes: 3d models design, software for modeling, description of 3d printing technologies, materials and peculiarities of such type of printing.

PREREQUISITES: Good fundamental knowledge in the courses: Mathematics and Computer graphics.

TEACHING METHODS: Lectures and laboratory work.

METHOD OF ASSESSMENT: Final exam (50%) and laboratory work (50%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:

1. Мърдок Кели Л. 3D Studio MAX R3 библия, АлексСофт, 2000.
2. USP 4575330/1986. Apparatus for production of three-dimensional objects by stereolithography.
3. USP 5340656/1994 Three-dimensional printing techniques.
4. USP 5387380/1995 Three-dimensional printing techniques.
5. Гълъбов М, Съвременни технологии за обработка и визуалиция на 3D изображения, издателство "Фабер", ISBN: 978-619-00-0130-0, 2014, DOI:10.13140/RG.2.1.2317.8088
6. Jie Sun,Weibiao Zhou, Dejian Huang, Jerry Y. H. Fuh, Geok Soon Hong. An Overview of 3D Printing Technologies for Food Fabrication. Food Bioprocess Technol, 2015.
7. http://b2n.bg/3d-инфо/

DESCRIPTION OF THE COURSE

Name of the course **Reconfigurable logic**	Code: **BCS55-1**	Semester: **8**
Type of teaching: Lectures and laboratory work	Lessons per week: L – 3 hours; LW – 2 hour	Number of credits: **4**

LECTURER:
Assoc. Prof. PhD Atanas Kostadinov, Computer systems and Technologies Department, Technical University – Sofia, branch Plovdiv, Phone: + 359 32 659 726, email: kostadat@tu-plovdiv.bg.

COURSE STATUS IN THE CURRICULUM: A compulsory elective subject for the Computer Systems and Technologies students admitted to the bachelor program. Computer Systems and Technologies Department belongs to the Electronics and Automation Faculty (EAF). EAF is a part of the Technical University – Sofia, Plovdiv branch.

AIMS AND OBJECTIVES OF THE COURSE: This course is about the design of digital systems using a hardware description language especially VHDL (Very High Speed Integrated Circuit Description Language). It will be presented to the students the realizing of the digital logic individual components such as logic gates, multiplexers, decoders, adders, comparators, ALUs (Arithmetic Logic Units), multipliers, different types of flip-flops, registers, shift registers, counters, ROM (Read Only Memory) and RAM (Random Access Memory), and how to put them together in a digital device or system based on FPGA (Field Programmable Gate Array).

Students will acquire practical knowledge of creating digital circuits using computer aided design (CAD) tools. The objectives of this course are:

- To understand the concept of reconfigurable logic;
- To know how CPLD (Complex Programmable Logic Device) and FPGA are designed;
- To learn how to use the VHDL in simulation and synthesis of a digital system;
- Be able to use CAD tools to design and simulate digital circuits.

DESCRIPTION OF THE COURSE: The main topics are listed bellow – Basic terms in reconfigurable logic. CMOS (Complementary metal–oxide–semiconductor) logic gates – inverter, 2 - input AND and OR gates; Historical path of the Reconfigurable Logic. Types of integrated circuits (ICs) used in project realization; Behavioral, structural and dataflow styles using VHDL (Very high speed integrated circuits hardware description language). Simulating of designed electronic components with the help of ModelSim; Hardware description languages (HDLs) – VHDL, Verilog, SystemC. Programmable ICs – types, design and programming; Using of IP (Intellectual Property modules and their application in SoC (System on Chip). Configuring of PLL (Phase – Locked Loop) IP produced by Intel (Altera) Corporation (ALTPLL Megafunction) – main ports and parameters; Power and energy consumption of CMOS devices and systems and techniques for reducing both. Power estimation; DE1, DE2 (Development and Education Board) and Nexys4 DDR – major components and their characteristics. Using Quartus Prime Lite Edition and Vivado HL System Edition; Testing of microprocessor devices and systems realized with programmable IC. Method of logic analysis and using of embedded logic analyzer; V2V

translators. Verilog – basic keywords; Embedded Systems – fundamentals. Sequential and hardware/software codesign methods – advantages and disadvantages;

PREREQUISITES: The prerequisite subject is BCS39 Digital Design.

TEACHING METHODS: The lectures presented the above material using slides and multimedia projector. In the laboratory exercises are used CAD tools to design and simulate digital circuits described in VHDL as well as FPGA boards for their implementation.

METHOD OF ASSESSMENT: Written exam is in the form of a test. The final mark consists of 90% - written exam and 10% - laboratory work.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:

1. P. Manoilov., Digital design using VLSI IC with help of VHDL (in Bulgarian), TU-Sofia, Sofia, 2010.
2. Petrov G., Design of digital devices with VHDL and Quartus II (in Bulgarian), parts 2 and 3, Heron Press Ltd., Sofia, 2010.
3. Singh R., VLSI Design (With VHDL) Analog & Digital, S. K. Kataria & Sons, 2012.
4. Pedroni V., Circuit Design and Simulation with VHDL, second edition, The MIT Press, 2010.
5. http://www.altera.com
6. http://www.xilinx.com

ТЕХНИЧЕСКИ УНИВЕРСИТЕТ – СОФИЯ, ФИЛИАЛ ПЛОВДИВ
ФАКУЛТЕТ ПО ЕЛЕКТРОНИКА И АВТОМАТИКА

DESCRIPTION OF THE COURSE

Name of the course **Language processors**	Code: **BCS55-2**	Semester: **8**
Type of teaching: Lectures Laboratory work	Lessons per week: Lectures – **3** hours Laboratory work – **2** hour	Number of credits: **4**

LECTURER:
Assoc. Prof. Ph.D. Velko Ivanov Iltchev, Department of Computer Systems and Technologies,
Technical University of Sofia, branch Plovdiv,
e-mail: iltchev@tu-plovdiv.bg, GSM: 0895-587475

COURSE STATUS IN THE CURRICULUM: Eligible for the students specialty "Computer Systems and Technologies" B.Sc. programme of the Faculty of Electronics and Automatics, Technical University of Sofia, branch Plovdiv.

AIMS AND OBJECTIVES OF THE COURSE: To introduce the students into the theory of formal languages and grammars, and in the methods for parsing and compiling of programming languages.

DESCRIPTION OF THE COURSE: Main topics: Classification of formal languages and their processors, according to Chomsky. Regular languages and grammars. Using finite automata as processors for regular languages and grammars. Descriptor tables. Context-free languages and grammars. Parsing methods classification. Recursive descent method. Transforming a left-recursive grammar into Greibach Normal Form. Parsing by using LL(k)-grammars. Method for generation the LL(1)-parsing table. Interpretation via preliminary translation into RPN. Parsing methods build on precedence grammars. Algorithm for generation the parsing table for simple-precedence grammars. Parsing by using LR(k)-grammars. The SLR(1)-method for generation the parsing tables for LR(k)-grammars. Modifications of this method. Semantic analysis and code generation. Optimization methods. Memory management methods. Syntax-directed compilation. Compiler generators (YACC & LEX).

PREREQUISITES: Object-oriented programming, Discrete Structures, Synthesis and Analysis of Algorithms.

TEACHING METHODS: Lectures - using multimedia presentations. Laboratory work - work with software applications(lectors own development), which implement diffrent parsing methods.

METHOD OF ASSESSMENT: Written exam. Students generate, per hand, parsing tables for context-free grammars given, using different parsing methods.

INSTRUCTION LANGUAGE: bulgarian

BIBLIOGRAPHY:
1. Илчев В., "*Ръководство за лабораторни упражнения по езикови процесори"*, ТУ-София, ISBN: 978-619-167-043-7, 2013. **2.** Grune D., van Reeuwijk K., Bal H.E., Jacobs C.J.H. & Langendoen K., *Modern Compiler Design*, Springer Verlag, ISBN: 1-461-44698-8, 2012 **3.** Aho A.V. & Ullman J.D., *The Theory of Parsing, Translation and Compiling (Volumes 1-2)*, Prentice Hall, ISBN: 0-139-14556-7, 1972 **4.** Donnelly C. & Stallman R., *Bison - The Yacc-compatible Parser Generator*, Free Software Foundation, ISBN: 1-882-11444-2, 2012 **5.** http://www.jflap.org /tutorial/fa/createfa/fa.html **6.** http://www.asethome.org/pda/PDA_htm.html **7.** http://www.jflap.org /tutorial/pda/construct/

DESCRIPTION OF THE COURSE

Name of the course: **System programming**	Code: **BCS56-1**	Semester: 8
Type of teaching: Lectures, Laboratory work	Lessons per week: L – 3 hours, E – 2 hours	Credits: **4**

LECTURER:

Assoc. Prof. PhD Ivaylo Atanassov (FEA) – tel.: 659 729, email: ivo_atan@tu-plovdiv.bg ,
Technical University of Sofia, branch Plovdiv

COURSE STATUS IN THE CURRICULUM: Non-mandatory discipline for "Computer systems and technologies", faculty of "Electronics and automatics", Technical University – Sofia, branch Plovdiv, bachelor degree.

AIMS AND OBJECTIVES OF THE COURSE: The "System programming" course aims to give students the more advanced topics of operating systems and system programming. The main topics of studying are advanced process and thread management, synchronization, memory management, network communication. Considerable part of the course are Real-time operating systems topics. At the end of the course the students should be able to freely manipulate with the main OS primitives and implement more advanced concepts.

DESCRIPTION OF THE COURSE: Main topics: Operating systems – review of some topics. Managing multithreaded applications. Various solutions reader/writer problem. Detailed studying of the memory management algorithms. Advanced file systems. Socket communication with C. Building client – server systems with C. Implementation of some RTOS scheduling algorithms.

PREREQUISITES: Programming of computers – part I, II, III, Discrete structures, Synthesis and analysis of algorithms, Operating systems, Programming languages, Computer networks.

TEACHING METHODS: Lectures, exercises on the main topics, solving assignments related to the system programming.

METHOD OF ASSESMENT: The final mark is composed from the: students participation in the exercises, the examination test

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:

1. Tanenbaum, A., Modern Operating Systems, 4th Ed, Prentice Hall, 2015
2. Liu, C., J. Layland. Scheduling Algorithms for Multiprogramming in a Hard-Real-Time Environment, Journal of the ACM, 20(1):46-61, 1973
3. Sedgewick, R., K. Wayne, Algorithms, 4th Ed., 2011
4. Silberschatz, A., P. Galvin, G. Gagne, Operating Systems Concepts, 9th Ed, John Wiley & Sons, 2012
5. Stallings, W., Operating Systems: Internals and Design Principles, 7th Ed, Prentice Hall, 2011
6. Love, R., Linux Kernel Development, 3rd Edition, Addison-Wesley, 2010

ТЕХНИЧЕСКИ УНИВЕРСИТЕТ – СОФИЯ, ФИЛИАЛ ПЛОВДИВ
ФАКУЛТЕТ ПО ЕЛЕКТРОНИКА И АВТОМАТИКА

DESCRIPTION OF THE COURSE

Name of the course **Component programming**	Code: **BCS56-2**	Semester: **8**
Type of teaching: Lectures Laboratory work	Lessons per week: Lectures – **3** hours Laboratory work – **2** hour	Number of credits: **4**

LECTURER:
Assoc. Prof. Ph.D. Velko Ivanov Iltchev, Department of Computer Systems and Technologies,
Technical University of Sofia, branch Plovdiv,
e-mail: iltchev@tu-plovdiv.bg, GSM: 0895-587475

COURSE STATUS IN THE CURRICULUM: Eligible for the students specialty "Computer Systems and Technologies" B.Sc. programme of the Faculty of Electronics and Automatics, Technical University of Sofia, branch Plovdiv.

AIMS AND OBJECTIVES OF THE COURSE: The students acquire experience in: developing software applications for operating systems based on events; designing libraries of components; developing IntraNet and InterNet applications by using component-oriented programming environments.

DESCRIPTION OF THE COURSE: Main topics: Events: definition; catching events; extracting information from an event; handling events directly. Exceptions: definition; syntax of a try…catch block; VCL exception classes; throwing exceptions; creating and raising exceptions; rethrowing an exception. VCL ideology. Using polymorphism in creating the structure of VCL. Using <static_cast> and <dynamic_cast> over polymorphic objects, passed as arguments to events. Creating components: creating descedants of existing components, building components from scratch; creating and installing component packages. Developing IntraNet and InterNet client-server database applications. Using CORBA in development of distributed InterNet applications.

PREREQUISITES: Object-oriented programming, Synthesis and Analysis of Algorithms, Databases.

TEACHING METHODS: Lectures - using multimedia presentations. Laboratory work, where the students develop client-server and distributed applications using component-oriented programming environments.

METHOD OF ASSESSMENT: Written exam. Students must develop a client-server database application using an component-oriented programming environment. Evaluated will be the C++ code written.

INSTRUCTION LANGUAGE: bulgarian

BIBLIOGRAPHY:
1. Stroustrup B., The C++ Programming Language (4-th Edition), Addison-Wesley, ISBN: 0-321-56384-0, 2013. **2.** Calvert Ch. - Borland C++ Builder 3 Unleashed, Sams Publishing, ISBN: 0-672-31265-4, 1998. **3.** Reisdorph K., Henderson K. - Teach Yourself Borland C++ Builder in 21 Days, Sams Publishing, ISBN: 0-672-31020-1, 1997. **4.** Buckett C., Web Components in Action, Manning Publications, ISBN: 1-617-29194-3, 2014. **5.** Stahl H., Cross-Platform Development mit Delphi XE4 / XE5 & Firemonkey für Windows & MAC OS X, [Kindle Edition], Amazon Digital Services Inc., ASIN: B00GLVJRK6, 2013. **6.** Richter K. & Keeley J., iOS Components and Frameworks: Understanding the Advanced Features of the iOS SDK, Addison-Wesley Professional, ISBN: 0-321-85671-6, 2013. **7.** Hazem Saleh H., Christensen A. L. & Wadia Z., Pro JSF and HTML5: Building Rich Internet Components, Apress, ISBN: 1-430-25010-0, 2013. **8.** Prata S., C++ Primer Plus, Addison-Wesley Professional, ISBN: 0-321-77640-2, 2011. **9.** http://docs.embarcadero.com/products/rad_studio/ **10.**http://docs.embarcadero.com/products/interbase/

ТЕХНИЧЕСКИ УНИВЕРСИТЕТ – СОФИЯ, ФИЛИАЛ ПЛОВДИВ
ФАКУЛТЕТ ПО ЕЛЕКТРОНИКА И АВТОМАТИКА

DESCRIPTION OF THE COURSE

Name of the course **XML-Technologies**	Code: **BCS57**	Semester: **8**
Type of teaching: Lectures Laboratory work	Lessons per week: Lectures – **3** hours Laboratory work – **2** hour	Number of credits: **5**

LECTURER:

Assoc. Prof. Ph.D. Velko Ivanov Iltchev, Department of Computer Systems and Technologies, Technical University of Sofia, branch Plovdiv,
e-mail: iltchev@tu-plovdiv.bg, GSM: 0895-587475

COURSE STATUS IN THE CURRICULUM: Obligatory for the students specialty "Computer Systems and Technologies" B.Sc. programme of the Faculty of Electronics and Automatics, Technical University of Sofia, branch Plovdiv.

AIMS AND OBJECTIVES OF THE COURSE: To give the students knowledge and experience in design and development of client-server and of distributed applications, which use XML as means of communication.

DESCRIPTION OF THE COURSE: Main topics: eXtensible Markup Language (XML) - a language for description of semi-structured data. Defining the data structure of XML-documents through Document Type Definition (DTD) and through eXtensible Stylesheet Definition (XSD). Namespaces. XPath - a language for describing paths in XML-documents. XQuery - a query language for XML-documents. eXtensible Stylesheet Language for Transformations (XSLT) - a language for describing of transformations over XML-documents. JSON, BSON и YAML - languages for compressed representation of XML-data. HTML5 Document Object Model features. WEB-technologies on the client-side: HTML, CSS, jQuery, AJAX. Asynchronous update of the client application content via simple JavaScript and via jQuery and AJAX. WEB-technologies on the server-side: CGI, API-based, script-based, component-oriented. Generation of JSON and of partial HTML on the server-side. Parsing and processing of JSON and of partial HTML on the client-side. WEB-services: SOAP, XML-RPC, JSON-RPC, WSDL, UDDI, BPEL4WS.

PREREQUISITES: Object-oriented programming, Databases, Programming Languages, Programming Environments.

TEACHING METHODS: Lectures - using multimedia presentations. Laboratory work, where the students develop client-server and distributed applications, which use XML as means of communication.

METHOD OF ASSESSMENT: Written exam. Students must develop a client-server Rich Internet Application, which manages a database, using: JavaScript, jQuery, AJAX, HTML5 and CSS3 as client-side technologies and HTTP and JSON as communication protocols. Evaluated will be the programming code written.

INSTRUCTION LANGUAGE: bulgarian

BIBLIOGRAPHY: **1.** Fawcett J., Ayers D. & Quin L. R. E., Beginning XML, Wrox, ISBN: 1-118-16213-7, 2012. **2.** Anderson P. & Anderson G., JavaFX Rich Client Programming on the NetBeans Platform, Addison-Wesley Professional, ISBN: 0-321-92771-0, 2014. **3.** Altova, Altova XMLSpy 2013 User & Reference Manual, Altova, ASIN: B009RUW20U, 2012. **4.** Boeck H., The Definitive Guide to NetBeans Platform 7, Apress, ISBN: 1-430-24101-2, 2011. **5.** Cameron D., A Software Engineer Learns HTML5, JavaScript and jQuery, CreateSpace Independent Publishing Platform, ISBN: 1-493-69261-5, 2013. **6.** http://www.w3.org/standards/xml/core **7.** http://www.w3.org /standards/dtd/core **8.**

http://www.w3.org/TR/2012/REC-xmlschema11-1-20120405/ **9.** http://json-schema.org/latest/json-schema-core.html