

DESCRIPTION OF THE COURSE

Name of the course: Parallel programming	Code: BpCST15	Semester: 6
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 30 hours	Number of credits: 5

LECTURER(S):

assoc. prof. eng. Maria Marinova, PhD (FEA), tel.: 659 727, e-mail: m_marinova@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory facultative subject from the curriculum for training of students to obtain Bachelor's degree, specialty Computer Science and Technologies, Professional orientation 5.3 Communications and Computer Engineering.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is to create knowledge about different programming models for Parallel Computer Architectures with shared and distributed memories. Main subjects are message-passing programming, multithreading with pragmas of compiler with OpenMP, optimization algorithms with Java, profiling of parallel program, etc.

DESCRIPTION OF THE COURSE: The main topics concern: Programming model using to programming on different parallel architecture; MPI functions for point-to-point communication and collective communications; pragmas in OpenMP, fork-join model in hyperthreading programming; „hot spots” in multithreaded programs. Profiling of parallel programs – N-body simulations, Mandelbrot set, multiply of two matrix, and multiply of one matrix with one vectors. Multithreading with C#/Java, etc.

PREREQUISITES: Computer systems.

TEACHING METHODS: Lectures, using slides, case studies, laboratory protocols description preparation and defence.

METHOD OF ASSESSMENT: One exam at the end of semester (85%), laboratories (15%).

INSTRUCTION LANGUAGE: Bulgarian/English

BIBLIOGRAPHY: 1. Schmidt B., Parallel Programming: Concepts and Practice. 2017, 2. Rauber T., Runger G., Parallel Programming for Multicore and Cluster Systems, Springer, 2013, 3. Kirk D., Hwu W., Programming Massively Parallel Processors: A Hands-on Approach, 2012, 4. Robert C., An Introduction to Parallel Programming with OpenMP, PThreads and MPI(Cook's Books), 2011, 5. Pacheco P., An Introduction to Parallel Programming, Elsevier Inc., 2021.

DESCRIPTION OF THE COURSE

Name of the course: Applied network programming	Code: BpCST16	Semester: 7
Type of teaching: Lectures (L) Laboratory work (LW)/Seminars (S)	Hours per semester: L – 30 hours S – 0 hours LW – 30 hours	Number of credits: 5

LECTURER(S):

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COURSE STATUS IN THE CURRICULUM: Compulsory from the curriculum for training of students to obtain Bachelor's degree, specialty Computer Systems and Technologies, Professional orientation 5.3 Computer systems, complex and networks, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: At the end of the course the students are expected to be able to design and implement distributed network applications and to implement network protocols. They should get to know main paradigms of network security.

DESCRIPTION OF THE COURSE: The main topics concern: Inter-process communication (pipes, sockets, RPC); Network sockets - TCP / UDP (broadcast, multicast, non-blocking); Client-server network application; Web application programming (HTTP), Email programming (SMTP, POP, IMAP); Network security - authentication and encryption (SSL / TLS); Monitoring of network applications (raw sockets, ICMP); Multimedia network applications (RTP/RTCP, RTSP); Introduction to distributed information processing systems; Loosely coupled architectures; Distributed file systems (NFS, Hadoop, VMFS); Distributed network applications (XML-RPC, RMI, CORBA, SOAP); Stream processing (MQTT, Kafka); Blockchain applications.

PREREQUISITES: Introduction to Programming, Basic Programming Languages, Fundamentals of network technologies, Operating Systems, Programming Environments.

TEACHING METHODS: Lectures, using slides, case studies, laboratory work, work in teams, protocols preparation and defense.

METHOD OF ASSESSMENT: One assessment test at the end of semester (60%), laboratory work (40%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. W. Richard Stevens, B. Fenner, A. Rudoff, "UNIX Network Programming: The sockets networking API", Addison-Wesley Professional, 2004. 2. Michael Kerrisk. The Linux Programming Interface. No Starch Press 2010. 3. Varun Chopra, „WebSocket Essentials – Building Apps with HTML5 WebSockets“, Packt Publishing 2015, ISBN: 9781784396756. 4. Stephen Ludin, Javier Garza, „Learning HTTP/2“, O'Reilly Media, Inc. 2017, ISBN: 9781491962442. 5. Dr. Danny Coward, „Java WebSocket Programming“, McGraw Hill Computing 2013, ISBN: 9780071827188. 6. Paul Goransson, Chuck Black, Timothy Culver, “Software Defined Networks: A Comprehensive Approach, Morgan Kaufmann, 2016. 7. Brendan Choi , “Introduction to Python Network Automation Volume I”, Apress Berkeley, CA; 2024, DOI <https://doi.org/10.1007/979-8-8688-0146-4>.

DESCRIPTION OF THE COURSE

Name of the course: Reconfigurable logic	Code: BpCST17.1	Semester: 7
Type of teaching: Lectures (L)	Hours per semester: L – 30 hours	Number of credits: 5
Laboratory work (LW)	LW – 15 hours	

LECTURER(S):

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COURSE STATUS IN THE CURRICULUM: Compulsory elective course of the curriculum for training students for bachelor's degree, specialty "Computer Systems and Technologies", professional field 5.3 Communication and computer technology, area 5. Technical sciences.

AIMS AND OBJECTIVES OF THE COURSE: Upon completion of the course, students must acquire knowledge of the design of digital devices and systems using a language for describing the hardware - VHDL (Very High-Speed Integrated Circuit Description Language). They will be introduced to how to create (describe) the individual components of digital circuitry such as logic elements, multiplexers, decoders, adders, comparators, ALU (Arithmetic and logic device), multipliers, different types of triggers, registers, moving registers, counters and how to be interconnected so that more complex digital devices or systems are realized. In addition, based on the acquired knowledge and skills, students will:

- . - Understand how programmable logic is implemented;
- Know how to use VHDL in simulating and synthesizing the operation of the designed digital device;
- Can use software packages to simulate and synthesize the operation of the designed digital device.

DESCRIPTION OF THE COURSE: The main topics concern: Basic concepts in systems with programmable logic (SPL); Emergence and development of programmable logic (Reconfigurable logic); Behavioral, structural and dataflow description of the SPL, using the VHDL (Very high speed integrated circuits hardware description language); Simulation of the work of the created electronic modules through the ModelSim program; Languages for hardware description in SPL - VHDL, Verilog, SystemC; The use of IP (Intellectual Property, intellectual property) modules and their application in SoC (System on Chip). Configuring PLL (Phase - Locked Loop) IP module - important ports and parameters; Power consumption of CMOS devices and systems and measures to reduce them. Estimation of the power consumption of the SPL; Programmable modules Altera Cyclone II Starter Development Kit, Altera DE2 (Development and education board) and Nexys4 DDR board - device and action; Work with the software package Quartus II Web Edition / Quartus Prime Lite Edition and Vivado HL System Edition; Verification (testing) of microprocessor devices and systems implemented through programmable IC. Using the method of logic analysis and built-in logic analyzer; Work with translators (translators) from one hardware description language to another one. Verilog - main keywords; Embedded microprocessor systems (ES) - basic information. Main design methods.

PREREQUISITES: Digital Design, Analysis and Synthesis of Logic Circuits.

TEACHING METHODS: Lectures using a computer and a multimedia projector. Performing laboratory exercises with preparation of reports.

METHOD OF ASSESSMENT: One one-hour written test in the middle of the semester (30%), two-hour written test at the end of the semester (60%) and evaluation of laboratory work (10%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. P. Manoilov. "Design of digital devices on ultra-large integrated circuits with the help of VHDL", TU-Sofia, Sofia, 2010, ISBN 954-438-436-7; 2. Petrov G., Design of digital electronic devices with VHDL and Quartus II, part 2 and part 3, Heron Press Ltd., Sofia, 2010/2011, ISBN 978-954-580-287-4 and ISBN 978-954-580-300-0; 3. Pedroni V., Circuit Design and Simulation with VHDL, third edition, The MIT Press, 2020, ISBN: 978-026-204-264-2.
4. Unsalan C. and Tar B., Digital system design with FPGA: Implementation using Verilog and VHDL, first edition, McGraw-Hill Education, 2017, ISBN: 978-125-983-790-6.

DESCRIPTION OF THE COURSE

Name of the course: Web Programming	Code: BpCST 17.2	Semester: 7
Type of teaching: Lectures (L) Laboratory work (LW) Course work (CW)	Hours per semester: L – 30 hours LW –15 hours	Number of credits: 5

LECTURER(S):

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Technical University of Sofia, Plovdiv Branch

COURSE STATUS IN THE CURRICULUM: Compulsory elective subject from the curriculum for training of students to obtain Bachelor's degree, specialty Computer Systems and Technologies, Professional orientation 5.3 Communication and Computer Engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: Students have to gain knowledge and skills in the area of Internet programming technologies. At the end of the course the students are expected to have experience in design and development of Web database applications, using HTML5, CSS3, Javascript, PHP and MySQL..

DESCRIPTION OF THE COURSE: The main topics concern: Internet programming basics. HTML – structure of HTML document and HTML element, tags, attributes and events; metadata in HTML; visible HTML elements. CSS – selectors, CSS box model, styling frames, background, text and tables; overfloating. JavaScript programming basics – data types, operators, functions, arrays. HTML Document Object Model and HTML Browser Object Model. PHP programming basics – data types, operators, functions. PHP Superglobals. Web database applications – PHP and MySQL. Cookies and sessions; Regular expressions.

PREREQUISITES: Good fundamental knowledge in Programming Projects, Programming Environments, Database Managements Systems.

TEACHING METHODS: Lectures, using multimedia presentations, laboratory work on main topics with individual and group tasks, course work preparation and defence.

METHOD OF ASSESSMENT: Two ongoing assessments at mid and end of semester (60%), course work (40%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. J. Duckett, "PHP & MySQL: Server-side Web Development", Wiley, 1st Edition, April 2022, ISBN: 978-1119149217; 2. R. Nixon, "Learning PHP, MySQL & JavaScript", O'Reilly Media; 5th edition, 2018, ISBN: 978-1491978917; 3. D. DuRocher, "HTML and CSS QuickStart Guide", Clydebank Media LLC, 2021, ISBN: 978-1636100015; 4. J. Duckett, "HTML and CSS: Design and Build Websites," John Wiley & Sons, 2011, ISBN:9781118008188; 5. J. C. Melodi, "HTML, CSS and JavaScript All in One, Sams Teach Yourself", Sams Publishing, 2014, ISBN-13: 978-0672337147; 6. M. Fitzgerald, "Introducing Regular Expressions," "O'Reilly Media, Inc.", 2012, ISBN:9781449392680; 7. <https://www.w3.org/standards>; 8. <http://php.net/>

DESCRIPTION OF THE COURSE

Name of the course: Testing and diagnostics of computer systems	Code: BpCST18.1	Semester: 7
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 15 hours	Number of credits: 5

LECTURER(S):

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COURSE STATUS IN THE CURRICULUM: Compulsory elective course of the curriculum for training students for bachelor's degree, specialty "Computer Systems and Technologies", professional field 5.3 Communication and computer technology, area 5. Technical sciences.

AIMS AND OBJECTIVES OF THE COURSE: After completing the course students must acquire knowledge related to the approaches, methods and software tools for testing and diagnostics of personal computers and in accordance with their needs and interests to acquire new knowledge and opportunities in this very closely related to the subject area.

At the end of their studies, students will:

- master the conceptual apparatus related to diagnostics of computer systems;
- know the modern methods, tools, test programs and modules needed for specialized diagnostics of personal computers;
- can apply the latest types of diagnostic programs, in case of problems in the computer systems they use.

DESCRIPTION OF THE COURSE: The main topics concern: Basic concepts in testing and diagnostics of computer systems; Testing and diagnostics of microprocessors and memories; SMART (Self-monitoring, analysis and reporting technology) technology. RAID (Redundant array of independent disks) arrays. Testing and diagnostics of disk drives; Testing and diagnostics of a video subsystem on a personal computer; Testing and diagnostics of keyboard and mouse for personal computer; Benchmarks. Synthetic and applied performance tests; Linear and switching power supplies for computer systems. Testing of power supply unit for personal computer; Self-diagnostics of computers and microprocessor systems (POST - Power-on self-test); Method of logical analysis in diagnostics of computer systems. Logic analyzers - functional diagram, parameters, application; Hand tools - logic probes, logic pulsators, current indicators; Recovery of a computer system after complete loss of ability to work; Testing and diagnostics of laptops.

PREREQUISITES: Computer systems, Computer peripherals.

TEACHING METHODS: Lectures using a computer and a multimedia projector. Performing laboratory exercises with preparation of reports.

METHOD OF ASSESSMENT: One one-hour written test in the middle of the semester (30%), two-hour written test at the end of the semester (60%) and evaluation of laboratory work (10%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Mollova S., Control and diagnostics of computer systems, Sofia, 2006; 2. Mihov G., Setup and diagnostics of microprocessor systems, Sofia, Technika, 2003; 3. Mollov V., Kostadinov A., Testing and diagnostics of computer systems. Manual for laboratory exercises,

TU-Sofia, 2014; 4. Mueller S., Upgrading and repairing PCs, 22nd edition, Que, 2015; 5. <https://www.passmark.com/>; 6. <https://uxd.com/>

DESCRIPTION OF THE COURSE

Name of the course: Building application software with C#	Code: BpCST18.2	Semester: 7
Type of teaching: Lectures (L) Laboratory work (LW)/Seminars (S) Course work (CW)	Hours per semester: L – 30 hours LW – 15 hours	Number of credits: 5

LECTURER(S):

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COURSE STATUS IN THE CURRICULUM: Compulsory elective facultative subject from the curriculum for training of students to obtain Bachelor's degree, specialty Computer Science and Technologies, Professional orientation 5.3 Communications and Computer Engineering.

AIMS AND OBJECTIVES OF THE COURSE: At the end of the course the students are expected to be able to build applications on C# and .NET.

DESCRIPTION OF THE COURSE: The main topics concern: Description of the basic principles of C # operation. Data types, variables, constants, operations; arrays, lists. Loop operators and conditional operators. Lists and linked lists in C #. Introduction to the basic concepts of working with collections. Object-oriented programming in C#. Inheritance and polymorphism; use of abstract classes and interfaces; UML diagrams. Multithreaded programming. Making a connection to a database. Lambda expressed. Delegates. Tasks. LINQ operands. Creating REST services with .NET, etc.

PREREQUISITES: Introduction to programming, Platform-independent program languages, Database, OOP.

TEACHING METHODS: Lectures, using slides, case studies, laboratory and course work, work in teams, protocols and course work description preparation and defence.

METHOD OF ASSESSMENT: Two one-hour assessments at mid and end of semester (62%), laboratories (18%), course work - two off assignments (20%).

INSTRUCTION LANGUAGE: Bulgarian/English

BIBLIOGRAPHY: 1. John Sharp Microsoft Visual C# Step by Step, 2018, 2. Bruce Johnson, "Professional Visual Studio 2017", 3. Светлин Наков и колектив, Принципи на програмирането със C#, Национална академия по разработка на софтуер, София, 2018, 4. Jose Luis Latorre Millas, "Microsoft .Net Framework 4.5 Quickstart Cookbook", 5. Stephen Cleary, Concurrency in C# Cookbook: Asynchronous, Parallel, and Multithreaded Programming, 2019..

DESCRIPTION OF THE COURSE

Name of the course: System programming	Code: BpCST19.1	Semester: 7
Type of teaching: Lectures(L) Laboratory work (LW)	Hours per semester: L – 30hours S – none LW – 15 hours	Number of credits: 5

LECTURER(S):

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COURSE STATUS IN THE CURRICULUM: Compulsory elective subject from the curriculum for training of students to obtain Bachelor's degree, specialty Computer systems and technologies, Professional orientation 5.3 Communication and computer technique, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The “System programming” course aims to train students to the more sophisticated algorithms and data structures used in low-level programming. Topics of the course are reader/writer solutions for simultaneous access from multiple threads, more complex hashing techniques and data structures, some often used tree structures. Also the programming models of some processor families are discussed and examples for assembly programming are given.

DESCRIPTION OF THE COURSE: Main topics: Operating systems review. Implementation of reader/writer for simultaneous access from multiple threads. Hashing techniques and data structures – Extendible hashing. Special tree structures used in computer systems. Programming model of some processor families. Assembly programming for some processor families.

PREREQUISITES: Base programming languages, Synthesis and analysis of algorithms, Operating systems, Computer architecture.

TEACHING METHODS: Lectures, using slides, case studies, laboratory work

METHOD OF ASSESSMENT: Written exam (65%), laboratories (35%)

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Tanenbaum, A., Modern Operating Systems, 3rd Ed, Prentice Hall, 2007; 2. Sedgewick, R., K. Wayne, Algorithms, 4th Ed., 2011; 3. Silberschatz, A., P. Galvin, G. Gagne, Operating Systems Concepts, 9th Ed, John Wiley & Sons, 2012

DESCRIPTION OF THE COURSE

Name of the course: Learning and self-learning in programming	Code: BpCST19.2	Semester: 7
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 15 hours	Number of credits: 5

LECTURER(S):

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Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Elective subject from the curriculum for training of students to obtain Bachelor's degree, specialty “Computer systems and technologies”, Professional orientation 5.3 Communication and computer equipment, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is to introduce students with the theory, approaches, methods, algorithms and models that are applied in one of the most modern and fast-growing sub-areas of the scientific field of artificial intelligence, known as machine learning. Upon completion of the course, the students will be able to design systems that can be trained and that can be learned from their own experience; will be able to realize and apply algorithms for training by building identification trees; for learning by simulating evolution and Genetic algorithms; for Reinforcement learning; for Imitation learning; for Deep learning; etc.

DESCRIPTION OF THE COURSE: The main topics concern: Learning by analyzing differences, learning by explaining experience, learning by recording cases, learning by managing multiple models, learning by building identification trees, learning by training neural nets, Deep learning, LLM; Fine-tuning transformer models; learning by simulating evolution and Genetic algorithms; Training by applying of Conditional probability, Bayes rule, Bayesian networks, Probabilistic Graphical Models, Markov models, Hidden Markov Models, Reinforcement learning, Imitation learning, etc.

PREREQUISITES: Basic programming languages.

TEACHING METHODS: Lectures delivered using multimedia tools, presentations provided on the Moodle electronic platform, and laboratory exercises on the main lecture topics.

METHOD OF ASSESSMENT: Assessment of the exam and student work during laboratory exercises and tests.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Kevin Murphy, ML Machine Learning - A Probabilistic Perspective, 2012, MIT Press, Cambridge; 2. Sutton S. Richard, Barto A. Andrew, Reinforcement Learning: An Introduction, Second Edition, (2017), The MIT Press, Cambridge, Massachusetts, London, England.; 3. Russell S., Norvig P., Artificial Intelligence A Modern Approach, Prentice Hall, Third Edition, (2010), ISBN-13 978-0-13-604259-4, ISBN-10 0-13-604259-7; 4. Teahan W. J., Artificial Intelligence – Agent Behaviour I, (2010) William John Teahan & Ventus Publishing ApS, ISBN 978-87-7681-559-2; 5. Winston P.H. Artificial intelligence, Third edition, (1992), MIT Press, ISBN-13: 978-0201533774, ISBN-10: 0201533774, 6. Michael Nielsen, <http://neuralnetworksanddeeplearning.com> 7. What are Transformer models and how do they work, <https://www.youtube.com/watch?v=qaWMOYf4ri8>.

DESCRIPTION OF THE COURSE

Course Title: Management	Code: BpCST20.1	Semester: 7
Type of Teaching: Lecturers(L), Seminar work(SW)	Contact hours per semester: L – 30 hours SW– 15 hours	Number of credits: 3

LECTURERS:

Assoc. Prof. Georgi Georgiev Ph.D. (FME), Tel: 659 706, email: georgi@tu-plovdiv.bg
Technical University – Sofia, Plovdiv Branch

COURSE STATUS IN THE CURRICULUM: Elective course for the full-time Computer Systems and Technologies Bachelor Degree students at the Faculty of Electronics and Automation. Professional qualification 5.3 Communications and Computer Technologies, Professional field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: Upon completion students will have basic knowledge of the main managerial functions and processes in the contemporary organization. This knowledge is fundamental for the functional managerial courses taught later.

COURSE DESCRIPTION: Within the Basics of Management the main topics discussed are: The organization and its environment; Evolution of the managerial thought and practice; The management process and the work of managers – main managerial functions, roles, skills and dilemma; Managerial decisions – process and methods; Planning – essence, process and strategic aspects; Organizing - essence, process and organizational structures; Motivation – essence, general model of motivation, process and content theories of motivation, motivation approaches; Leadership – basic model of leadership, basic leadership theories and approaches; Groups in the organization – types of groups, characteristics of the groups, management of conflicts; Controlling-essence, types of control, controlling methods; Management effectiveness - essence, time-management, management of stress.

PREREQUISITES: no

TEACHING METHODS: Lectures with multi-media presentations and seminars with case studies, business situation simulations, test exercises.

METHOD OF ASSESSMENT: Control Pre-test during the semester (20%) and Final Exam Test (80%).

LANGUAGE OF INSTRUCTION: Bulgarian

LITERATURE RECOMMENDED: 1. Иванов, И., Основи на мениджмънта, Макрос 2000, Пловдив, 2003 г; 2. Ганчев, П Основи на мениджмънта, София, 2005 г. ; 3. Иванов, И. и Г. Георгиев, Основи на мениджмънта, Университетска фондация, Пловдив, 1995г. ; 4. Иванов, И. П. Ганчев, Г. Георгиев, В. Пенчев, П. Пенчев и И. Пенчева, Основи на мениджмънта, Абагар, Велико Търново, 1999 г. ; 5. Ангелов, А., Основи на управлението, “Полина комерс”, София, 2009; 6. Stephen P. Robbins, David A. DeCenzo, Mary Coulter; Fundamentals of management: essential concepts and applications; Pearson Education, Inc., 2013; 7. Tony Morden, Principles of Management, Routledge, 2021 ; 8. Olha Mezentseva, Maksym Bezpartochnyi and Valentina Marchenko, Fundamentals of Management for Enterprises. Textbook for beginners, VUZF University of Finance, Business and Entrepreneurship Publishing House —St. Grigorii Bogoslov, 2020

DESCRIPTION OF THE COURSE

Name of the course: Marketing	Code: BpCST20.2	Semester: 7
Type of teaching: Lectures (L) Seminars (S)	Hours per semester: L – 30 hours S – 15 hours	Number of credits: 3

LECTURER(S):

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Assist. Prof. Elena Zlatanova-Pazheva, PhD (FME), tel: +359 32 659 712, email:

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COURSE STATUS IN THE CURRICULUM: Compulsory elective subject from the curriculum for training of students to obtain Bachelor's degree, specialty Computer Systems and Technologies, Professional orientation 5.3 Communication and computer technologies.

AIMS AND OBJECTIVES OF THE COURSE: The objective of the discipline "Marketing" is the students to be able to apply the marketing tools to impact the market, to know the marketing principles and strategies and to use them to gain a market competitive advantage.

DESCRIPTION OF THE COURSE: The course covers the basic marketing concepts and principles, the elements of the marketing environment, market segmentation and positioning. The marketing concepts and the most frequently used marketing strategies in practice are considered. The applicable methods for planning and organizing marketing research, as well as the model of consumer behavior are studied. The marketing tools, expressed through product, pricing, promotion and communication policy, are considered in details. The scope of product policy includes the study of the product in the field of the electrical engineering and the main product attributes, as well as the concept and strategies for the product life cycle. Attention is paid to the implementation of the cutting-edge technologies in the marketing practice. The section on pricing policy studies the main methods for pricing and basic pricing strategies. The promotion policy is presented in relation to the distribution channels and the marketing strategies for the realization of the product. The communication policy considers the communication mix of advertising and non-advertising means for influencing the market. Detailed attention is paid to Digital Marketing and the main technologies used in Internet marketing.

PREREQUISITES: Management, Economics.

TEACHING METHODS: Lectures and seminar exercises with multimedia presentation.

METHOD OF ASSESSMENT: current assessment, which is formed from a test.

INSTRUCTION LANGUAGE: Bulgarian

- BIBLIOGRAPHY:**
1. Grove, A, Highly effective management, izd. Zhanua, 2017,
 2. Donchev, D., Management: Operational management, izd. Martilen, 2015,
 3. Kotler, F., Kartadzhaya, H., Setiauan, I., Marketing 5.0 Technology for Humanity, Locus Publishing, Sofia, 2022,
 4. Kotler, F., Dzhayn, K., Mesinsi, S., Marketing moves, izd. Iztok-Zapad, 2015,
 5. Branson, R., Screw business as usual, AMG Publishingr 2017,
 6. Kaftandzhiev, H., Mythological archetypes in communications, University Publisher "St. Kliment Ohridski", Sofia, 2015,
 7. Krasteva, N., Modern marketing, Vol. 1, Avangard Prima, Sofia, 2013,

- 8.** Krasteva N., Modern marketing, Vol. 2, Avangard Prima, Sofia, 2013,
- 9.** Kiberman, T., Rank #1 on Google 2017, izd. „Franchayzing BG“ Ltd., 2016,
- 10.** Marinova, N., International marketing, NBU, 2017,
- 11.** Shterev, N., Marketing-part1, izd. Martilen, 2016
- 12.** Trendafilov, D., The mobile user, NBU, 2023,
- 13.** Andonov, S., Marketing positioning, ed. "East-West", Sofia, 2014,
- 14.** Valkanova, A., Corporate Branding 4.0, ed. "East-West", Sofia, 2020 .

DESCRIPTION OF THE COURSE

Name of the course: Small Firm Management	Code: BpCST20.3	Semester: 7
Type of teaching: Lectures (L) Laboratory work (LW)/Seminars (S)	Hours per semester: L – 30 hours S – 15 hours LW – 0 hours	Number of credits: 3

LECTURERS:

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COURSE STATUS IN THE CURRICULUM: Elective course for the Specialty “Computer Systems and Technologies” Bachelor Degree students at the Faculty of Electronics and Automation. Professional qualification 5.3 “Communications and Computer Technologies”, Professional field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE:“Management of a Small Business” aims to familiarize students with the opportunities for creating and successfully managing an independent business (Startup) in the form of a small company in the field of the studied specialty.

DESCRIPTION OF THE COURSE:The course examines the main problems in the creation and management of a small business; its relationship with the fiscal system; the problems of financing a small business; basic principles of marketing a small business; problems related to the office and equipment of a small business, its current finances; issues related to commercial transactions and contracts; creating a basic business plan; processes related to leaving the business.

PREREQUISITES: Computer systems, Fundamentals of network technologies, Databases, Statistical methods for information processing, Computer peripherals, Programs and projects, Practicum

TEACHING METHODS: Lectures using slides and multimedia, seminar exercises, development of a basic business plan,.

METHOD OF ASSESSMENT: One one-hour written mid-semester assessment (10%), seminar exercises - developed business plan (30%), test exam (60%)

INSTRUCTION LANGUAGE:Bulgarian

BIBLIOGRAPHY: 1. Илиев И., Д. Дончев, М. Велев, Икономика и мениджмънт, изд. Мартилен, 2008 г 2. Иванов, В. Ръководство за подготвяне на бизнес план. 2010. 3. Маринов, Г., Мл. Велев и О. Гераскова. Икономика и конкурентоспособност на предприемаческата дейност. С. Информа интелект, 2009, 4. Конарев, А., Сн. Константинова. Бизнес предприемачество. Пловдив: КСИ.

DESCRIPTION OF THE COURSE

Name of the course: Project (by choice from subjects № 42, 43, 46)	Code: BpCST21	Semester: 7
Type of teaching: Course project	Hours per semester: L – 0 hours S – 0 hours LW – 0 hours	Number of credits: 2

LECTURER(S):

Assoc. Prof. Eng. Nikolay Kakanakov, PhD (FEET), tel.: 659 765, e-mail: kakanak@tu-plovdiv.bg

Technical University of Sofia Plovdiv branch

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curriculum for training of students to obtain Bachelor's degree, specialty Computer systems and technologies, Professional orientation 5.3 Communications and computer engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: Development of the skill of the students to use the knowledge from the studied ICT subjects.

DESCRIPTION OF THE COURSE: Practical implementation of a project in a subject from the current semester (by choice from № 42, 43, 46).

PREREQUISITES: The selected subject must be elected if its elective.

TEACHING METHODS: Independent practical task implementation with documentation/description and defense.

METHOD OF ASSESSMENT: Course project.

INSTRUCTION LANGUAGE: Bulgarian

DESCRIPTION OF THE COURSE

Name of the course: Sports	Code: FaSPR07	Semester: 7
Type of teaching: Lectures (L) Laboratory work (LW)/Seminars (S) Self-Study (SS)	Hours per semester: L – 0 hours S – 0 hours SS – 30 hours	Number of credits: 1

LECTURER(S):

Sen. Lect. Daniel Vladimirov, PhD (FEA), tel.: 032 659 646, e-mail: danielv@tu-plovdiv.bg

Sen.Lect. Petar Doganov, PhD (FEA), tel.: 032 659 648, e-mail: pdoganov@tu-plovdiv.bg

Sen.Lect. Boris Spasov, PhD (FEA), tel.: 032 659 647, e-mail: boris_spasov@tu-plovdiv.bg

Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Facultative subject from the curriculum for training of students to obtain Bachelor's degree, specialties "Computer Systems and Technologies", 5.3 Computer and communication technique, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: Targeted at further developing of students' physical activities, skills and hygiene habits through effective methods of physical education, improving their mental and physical performance.

DESCRIPTION OF THE COURSE: The knowledge and skills in Physical Education and Sports develop a wide range of motor skills and habits, help the hardening of the body and contribute to the moral development of students. The enhancement of physical skills is carried out through:

1. General Physical Preparedness (GPP) – in these seminars the students develop a wide range of motor skill and habits; work to improve strength, speed, endurance, flexibility, structure and skill; increase resistance to unfavourable environmental factors; develop their physical qualities and experience.
2. Sports-Specific Physical Preparedness (SPP) – students improve their sport skills and habits in a specific sport and gain experience through participation in competitions; work to improve strength, speed, endurance, flexibility, structure and skill; increase resistance to unfavourable environmental factors; develop their physical qualities and experience.

PREREQUISITES: The curriculum presumes the minimum of knowledge and skills acquired at secondary school.

TEACHING METHODS: Seminars in accordance with the curriculum in PE and Sport.

METHOD OF ASSESSMENT: Evaluation is based on functional tests at the end of semester. Lecturer's signature is required at the end of semester.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Владимиров В. Туризм и ориентиране. Методическо ръководство за студентите от ТУ София, филиал Пловдив. Издателство на ТУ - София. 2010.

DESCRIPTION OF THE COURSE

Name of the course: Real-time Operating systems	Code: BpCST22.1	Semester: 8
Type of teaching: Lectures(L) Laboratory work (LW)	Hours per semester: L – 30hours LW – 20 hours	Number of credits: 5

LECTURER(S):

Assoc. Prof. Eng. Ivaylo Atanasov, PhD (FEA), tel.: 659 729, e-mail: ivo_atan@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory elective subject from the curriculum for training of students to obtain Bachelor's degree, specialty Computer systems and technologies, Professional orientation 5.3 Communication and computer technique, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The “Real-time operating systems” course aims to train students about the structure and functioning of the real-time operating systems. The similarities and differences with general-purpose OS are discussed, the task model, scheduling algorithms, synchronization and resource access protocols, as for single and multiprocessor systems. At the end of the course the students should be able to calculate the timing diagrams of particular task set and work with some RTOS’s APIs.

DESCRIPTION OF THE COURSE: Main topics: Basic notions and terms for Real-time Operating systems. RTOS – structure and main modules. Task and task set terms and parameters. Uniprocessor scheduling algorithms. Multiprocessor scheduling algorithms. Synchronization and resource access protocols. Case studies – some RTOS’s APIs.

PREREQUISITES: Base programming languages, Synthesis and analysis of algorithms, Operating systems.

TEACHING METHODS: Lectures, using slides, case studies, laboratory work

METHOD OF ASSESSMENT: Two assessments at mid and end of semester (65%), laboratories (35%)

INSTRUCTION LANGUAGE:Bulgarian

BIBLIOGRAPHY:1. Tanenbaum, A., Modern Operating Systems, 3rd Ed, Prentice Hall, 2007; 2. Silberschatz, A., P. Galvin, G. Gagne, Operating Systems Concepts, 9th Ed, John Wiley & Sons, 2012; 3. Stallings, W., Operating Systems: Internals and Design Principles, 7th Ed, Prentice Hall, 2011; 4. Sedgewick, R., K. Wayne, Algorithms, 4th Ed., 2011

DESCRIPTION OF THE COURSE

Name of the course: XML-Technologies	Code: BpCST22.2	Semester: 8
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 20 hours	Number of credits: 5

LECTURER(S):

Assoc. Prof. Eng. Velko Iltchev, PhD (FEA), tel.: 659 726, e-mail: iltchev@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory-elective subject from the curriculum for training of students to obtain Bachelor's degree, specialty Computer Systems and Technologies, Professional orientation 5.3 Communication and Computer Technique, Field 5 Technical Sciences.

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: Platform-Independent Programming Languages, Object-Oriented Programming, Databases.

TEACHING METHODS: Lectures, using slides, case studies, laboratory and course work, work in teams, protocols.

METHOD OF ASSESSMENT: Two written assessments at middle and end of semester, with a duration of 2 school hours (72%), laboratories (28%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Fawcett J., Ayers D. & Quin L. R. E., Beginning XML (5-th Edition), Wrox, ISBN: 978-1118162132, 2021. 2. Duckett J., PHP & MySQL: Server-side Web Development, Wiley, ISBN: 978-1119149224, 2021. 3. Altova, Altova XMLSpy 2018 User & Reference Manual, Altova, ASIN: B009RUW20U, 2018. 4. <http://www.w3.org/standards/xml/core> 5. <http://www.w3.org/standards/dtd/core> 6. <http://www.w3.org/TR/2012/REC-xmlschema11-1-20120405/> 7. [http:// json-schema.org/latest/json-schema-core.html](http://json-schema.org/latest/json-schema-core.html).

DESCRIPTION OF THE COURSE

Name of the course: Android programming	Code: BpCST23.1	Semester: 8
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 20 hours	Number of credits: 5

LECTURER(S):

assoc. prof. eng. Mitko Shopov, PhD (FEA), tel.: 695 765, e-mail: mshopov@tu-plovdiv.bg
Technical University of Sofia, branch Plovdiv

COURSE STATUS IN THE CURRICULUM: Elective subject from the curriculum for training of students to obtain Bachelor's degree, specialty Computer Systems and Technologies, Professional orientation 5.3 Computer systems, complex and networks, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: After completing the course, students are expected to be able to create applications for the Android mobile operating system, know the architectural components and their life cycle, know and use local databases, know the methods for reading sensor data (GPS, camera, proximity and etc.), to know and use methods for asynchronous communication with external services via the Internet.

DESCRIPTION OF THE COURSE: The main topics concern: Android Studio development environment and Gradle automation tool; Android architectural components; Android components life cycle; Debugging, logging; Communication between the individual components; Structured programming model - MVVM; GUI components; Animations and gestures; Storage - key-value and SQL databases; Working with sensors (GPS, Camera, Proximity, etc.); Asynchronous code execution (ReactX); Networking, communication with remote services (REST API);

PREREQUISITES: Introduction to Programming, Basic Programming Languages, Operating Systems, Databases, Object Oriented Programming, Programming Environments, Applied Network Programming.

TEACHING METHODS: Lectures, using slides, case studies, laboratory work, work in teams, protocols preparation and defense.

METHOD OF ASSESSMENT: One assessment test at the end of semester (70%), laboratory work (30%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:

1. E-learning course in Moodle (<https://fea.tu-plovdiv.bg/moodle>);
2. Joseph Annucci, Lauren Darcey, Shane Conder “Advanced Android Application Development” AddisonWesley, 4th edition, 2014, ISBN: 0-13-389238-3;
3. Bill Phillips, Chris Steward, Kristin Marsicano, Brian Gardner, „Android Programming: The Big Nerd Ranch Guide, Big Nerd Ranch, 4th edition, 2019, ISBN: 0-13-659007-1;
4. <https://developer.android.com/docs>

DESCRIPTION OF THE COURSE

Name of the course: 3D modeling and printing	Code: BpCST23.2	Semester: 8
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 20 hours	Number of credits: 5

LECTURER(S):

Prof. Ph.D. Petya Pavlova (FEA), tel.: 0895587444, e-mail: p_pavlova@tu-plovdiv.bg

Assist. Prof. Ivan Maradzhiev (FEA), tel.: 0899370486 e-mail: iv_mar@tu-plovdiv.bg

Technical University of Sofia, branch Plovdiv,

COURSE STATUS IN THE CURRICULUM: Elective subject from the curriculum for training of students to obtain Bachelor's degree, specialty Computer systems and technologies, Professional orientation 5.3 Communications and computer engineering, Field 5 Technical Sciences.

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: Discipline is practically directed. Included are themes for creating three-dimensional models, the programming means through which they are implemented; a description of the technologies for three-dimensional printing; materials and some specific features of the printing process.

PREREQUISITES: Good knowledge in: Mathematics I, II and III, Bases of computer graphics, Fundamentals of Engineering Design

TEACHING METHODS: Lectures using slides and multimedia presentations; laboratory exercises using the available software; 3D scanner and 3D printer.

METHOD OF ASSESSMENT: Control tests during the semester (50%) 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 визуализация 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. <https://www.3dhubs.com/knowledge-base/3d-printing-stl-files-step-step-guide/>
8. <http://b2n.bg/3d-инфо/>
9. <https://www.3dnatives.com/en/3d-technologies/>
10. <https://www.3dhubs.com/guides/3d-printing/>
11. <http://weareprintlab.com/blog/10-steps-to-getting-started-with-meshmixer-for-3d-printing>
12. <https://i.materialise.com/en/3d-printing-technologie>
13. <https://conceptartempire.com/3d-software/>
14. <https://conceptartempire.com/free-sculptris-tutorials>

DESCRIPTION OF THE COURSE

Name of the course: Програмиране на програмни системи с Python	Code: BpCST23.3	Semester: 1
Type of teaching: Lectures (L) Laboratory work (LW) Course work (CW)	Hours per semester: L – 30 hours LW – 15 hours	Number of credits: 5
Course project (CP)	Code: BpCST23.3	Number of credits: 2

LECTURER(S):

assoc. prof. eng. Maria Marinova, PhD (FEA), tel.: 965 727, e-mail: m_marinova@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory elective curricula for training of students to obtain Master's degree, specialty Computer System and Technologies, Professional orientation 5.3 Computer systems, complex and networks, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The purpose of the course "Programming Software Systems with Python" is to introduce students to Python for developing software systems by studying the language's syntax, the principles of object-oriented programming, and the use of the standard library to create efficient programs. During the course, students will acquire knowledge on structuring and modularity in software systems by building well-organized code using various technologies, which facilitates code reuse, maintenance, and application scalability. They will learn methods for automated testing and CI/CD practices by applying testing strategies such as unit and integration testing using pytest and unittest, as well as utilizing tools for continuous integration and delivery like GitHub Actions, GitLab CI/CD, and Docker. Additionally, students will become familiar with Big Data processing using libraries such as Pandas, Dask, and Apache Spark, which enable working with large datasets and efficient resource management during data analysis and processing.

DESCRIPTION OF THE COURSE: Main topics: Introduction to Python and Software Engineering: Introduction to software engineering principles and best practices in software system development; object-oriented programming and code structuring; using design patterns and principles for modularity and code reuse. Working with Files, Databases and ORM: Working with JSON and XML; using ORM libraries like SQLAlchemy. Web Application and REST API Development: Building REST APIs with Flask and FastAPI; routing, middleware and database integration. Automated Testing and Code Quality Management: API testing and test automation in CI/CD; unit and integration testing with pytest and unittest. Asynchronous and Multithreaded Programming: Multithreading in Python. Big Data Processing: Using Pandas and Dask; distributed data processing with Apache Spark; memory optimization and resource management. Containerization and Orchestration: Docker Compose; Kubernetes fundamentals for microservices; CI/CD automation. CI/CD Tools: GitHub Actions and GitLab CI/CD; automating deployment, monitoring and logging. Security and Scalability: Python security best practices; API protection; access management and data encryption and etc.

PREREQUISITES: OOP, Fundamentals of network technologies, Computer Architectures, applied network programming, Programming of Software Systems with Python.

TEACHING METHODS: Lectures, using slides, case studies, laboratory and course work, work in teams, protocols and course work description preparation and defence.

METHOD OF ASSESSMENT: Two one-hour assessments at mid and end of semester (62%), laboratories (18%), course work - two off assignments (20%).

INSTRUCTION LANGUAGE: Bulgarian/English

BIBLIOGRAPHY: 1. Internet course into the resource's platform moodle (<https://fea.tu-plovdiv.bg/moodle>); 2. Luciano Ramalho – Fluent Python: Clear, Concise, and Effective Programming (2nd Edition) – O'Reilly Media, ISBN: 978-1492056355, 2022. 3. Al Sweigart – Automate the Boring Stuff with Python (2nd Edition) – No Starch Press, ISBN: 978-1593279929, 2019. 4. Martin Fowler – Refactoring: Improving the Design of Existing Code (2nd Edition) – Addison-Wesley, ISBN: 978-0134757599, 2018. 5. Robert C. Martin – Clean Code: A Handbook of Agile Software Craftsmanship – Prentice Hall, ISBN: 978-0132350884, 2008. 6. Brett Slatkin – Effective Python: 90 Specific Ways to Write Better Python (2nd Edition) – Addison-Wesley, ISBN: 978-0134853987, 2019. 7. Miguel Grinberg – Flask Web Development: Developing Web Applications with Python (2nd Edition) – O'Reilly Media, ISBN: 978-1491991732, 2018. 8. Noah Gift – Python for DevOps: Monitoring, Testing, and Security – O'Reilly Media, ISBN: 978-1492057680, 2019. 9. Wes McKinney – Python for Data Analysis: Data Wrangling with Pandas, NumPy, and Jupyter (3rd Edition) – O'Reilly Media, ISBN: 978-1098104030, 2022. 10. Justin Gummelt – Mastering Python for Networking and Security – Packt Publishing, ISBN: 978-1788992510, 2018. 11. Bhat, S. (2021). Practical Docker with Python: Build, Release, and Distribute Your Python App with Docker (2nd ed.). Apress. ISBN: 978-1484278147. 12. Triguero, I., & Galar, M. (2023). Large-Scale Data Analytics with Python and Spark. Cambridge University Press. ISBN: 978-1009318259.

DESCRIPTION OF THE COURSE

Name of the course: High-performance computer systems	Code: BpCST24.1	Semester: 8
Type of teaching: Lectures (L) Laboratory work (LW) Seminars (S)	Hours per semester: L – 30 hours S – 10 hours LW – 10 hours	Number of credits: 5

LECTURER(S):

assoc. prof. eng. Maria Marinova, PhD (FEA), tel.: 659 727, e-mail: m_marinova@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory elective facultative subject from the curriculum for training of students to obtain Bachelor's degree, specialty Computer Science and Technologies, Professional orientation 5.3 Communications and Computer Engineering.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is to create knowledge about different about modern performance computer architectures. In this course students study supercomputers taken from Top500, their components and parameters for high-performance.

DESCRIPTION OF THE COURSE: The main topics concern with description of terms like supercomputing, high performance computing. What is the need of high performance computer systems. Classification of different classes of supercomputers, based on different parameters. This subject are giving to the students another view of parallel computer architecture with highest speed of computer networks. Students study in detail modern supercomputers – Avitohol, BlueGene L, Sequonia, Avitohol, MYRA, LASSEN, Tianhe-3, FERMI, etc.

PREREQUISITES: Computer architectures, Computer networks.

TEACHING METHODS: Lectures, using slides, case studies, laboratory and course work, work in teams, protocols and course work description preparation and defence.

METHOD OF ASSESSMENT: One one-hour assessment at the end of semester (60%), laboratories (20%), defense of protocols (20%).

INSTRUCTION LANGUAGE: Bulgarian/English

BIBLIOGRAPHY: 1.Parker P.,The 2020-2025 World Outlook for High Performance Computing (HPC) Systems, 2019, 2 Kirk D., Hwu W., Programming Massively Parallel Processors: A Hands-on Approach, 2012, 3. Siewiorek D., Koopman P., *The Architecture of Supercomputers. TITAN. A case study.* Academic Press, Harcourt Brace Jovanovich, 2011, 4. Schneck P., Supercomputer Architecture, Kluwer Academic Publisher, 2013, 5. Sima D., Fountain T., Kacsuk P., *Advanced Computer Architectures*, Adisson-Wesley, 1997, 6. Culler D., Singh J., *Parallel Computer Architecture: A Hardware/Software Approach.* Elsevier, 2009.

DESCRIPTION OF THE COURSE

Name of the course: Computer-aided design systems	Code: BpCST24.2	Semester: 7
Type of teaching: Lectures(L) Laboratory work (LW)/Seminars (S)	Hours per semester: L – 30 hours S – 10 hours LW – 10 hours	Number of credits: 5

LECTURER(S):

Assoc. prof. eng. Maria Marinova, PhD (FEA), tel.: 659 765, e-mail: m_marinova@tu-plovdiv.bg
 Msc.eng. Stefan Stoyanov, PhD (FEA), e-mail: s.stoyanov@std.tu-plovdiv.bg
 Technical University of Sofia, branch Plovdiv

COURSE STATUS IN THE CURRICULUM: Compulsory from the curriculum for training of students to obtain Bachelor's degree, specialty Computer Systems and Technologies, Professional orientation 5.3 Computer systems, complex and networks, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: At the end of the course the students are expected to be able to design and implement base digital circuits in Verilog and be familiar with this HDL. They should also be able to run simulations and verify these circuits at a basic level.

DESCRIPTION OF THE COURSE:The main topics concern: Logic gates and functions, binary arithmetic; Hardware development process; Base digital circuits; Synchronous and asynchronous logic; Designing base digital circuits; FSM design; Pipeline design of all its components – data path, control path; Verilog HDL; Simulations; Verification.

PREREQUISITES: Introduction to Programming, Basic Programming Languages, Fundamentals of network technologies, Operating Systems, Programming Environments.

TEACHING METHODS: Lectures, using slides, case studies, laboratory work, work in teams, protocols preparation and defense.

METHOD OF ASSESSMENT: One assessment test at the end of semester (33%), laboratory work (33%), final project (33%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Lecture presentations. 2. David Patterson, John Hennessy, Computer Organization and Design, 2018. 3. Samir Palnitkar, Verilog HDL 2nd Edition, 2003.

DESCRIPTION OF THE COURSE

Name of the course: Writing of security code	Code: MpCST24.3	Semester: 8
Type of teaching: Lectures(L) Seminar work (SW) Laboratory work (LW) Course work (CW)	Hours per semester: L – 30hours SW - 10 LW – 10 hours	Number of credits: 5
Course project (CP)	Code: BCST21	Number of credits: 2

LECTURER(S):

assoc. prof. eng.Maria Marinova, PhD (FEA), tel.: 965727, e-mail: m_marinova@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory elective curricula for training of students to obtain Bachelor's degree, specialty Computer System and Technologies, Professional orientation 5.3 Computer systems, complex and networks, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE:After successful completion of the course, students will acquire essential knowledge and practical skills in secure software development. They will learn to detect common vulnerabilities such as buffer overflows, injection attacks (SQLi, XSS), insecure authentication, and inadequate cryptographic implementations. Additionally, they will analyze security risks throughout the Software Development Life Cycle(SDLC) and implement best practices from OWASP, NIST, and ISO 27001 to ensure robust security.Students will develop proficiency in using static and dynamic analysis tools, automated security testing frameworks, and runtime protection mechanisms. They will integrate security controls into CI/CD pipelines, enforce secure coding standards in multiple programming languages (e.g., Python, Java, C++), and implement encryption, access control, and secure authentication protocols (OAuth, JWT, TLS, etc.). Furthermore, they will design software architectures that mitigate attack vectors and ensure data confidentiality, integrity, and availability (CIA triad) while complying with security regulations.

DESCRIPTION OF THE COURSE:Fundamental concepts: security, vulnerabilities, threats, and attacks. Principles of secure programming and their significance in application development. Best practices for writing secure code. Using Python for data processing and preventing errors leading to vulnerabilities. Common attacks: SQL Injection, XSS. Input validation and filtering. Working with secure libraries such as SQLAlchemy. REST API vulnerabilities: CSRF, unauthorized access. Protection methods: token-based authentication and encrypted connections (HTTPS). Password hashing with bcrypt and hashlib. Examples of secure data storage. Static analysis tools. Dynamic testing and vulnerability detection in Python applications. Network encoding concepts and their applications. Threat types: data tampering, eavesdropping, DoS. Protection through cryptographic approaches and Python-based security analysis. Risks associated with third-party libraries. Security auditing tools: pip-audit, Safety. Creating secure logging mechanisms with the logging module. Anomaly detection using machine learning algorithms. AI for log analysis and attack prediction. Adversarial attacks against machine learning models. Privacy issues in AI systems.

PREREQUISITES:Computer Architectures, ModernJavatechnologies, Applied network programming.

TEACHING METHODS: Lectures, using slides, case studies, laboratory and course work, work in teams, protocols and course work description preparation and defence.

METHOD OF ASSESSMENT:Two one-hour assessments at mid and end of semester (62%), laboratories (18%), course work - two off assignments (20%).

INSTRUCTION LANGUAGE:Bulgarian/English

BIBLIOGRAPHY:1. Michael Howard, David LeBlanc, "Writing Secure Code, Second Edition", Microsoft Press, 2023, ISBN-13: 978-0735617223. 2. Laszlo Bocso, "Mastering Secure Python: Writing Resilient and Safe Code", 2024, ISBN-13979-8344411385. 3. Diana Kelley, Ed Moyle, "Practical Cybersecurity Architecture - Second Edition: A guide to creating and implementing robust designs for cybersecurity architects", Second Edition, 2023, ISBN: 978-1837637164. 4. Ian Loe "Cybersecurity Architecture Fundamentals", 2024, ISBN 13: 979-8321651681. 5. Dan Marinescu "Cloud Computing. "Theory and practice", Elsevier, 2013, ISBN: 979-8321651681. 6. James Kurose, Keith Ross "Modern Approach to a secured Distributed Network", 2024, ISBN: 979-8320007366..

DESCRIPTION OF THE COURSE

Name of the course: Statistical methods for data processing	Code: BpCST25.1	Semester: 8
Type of teaching: Lectures (L) Laboratory work (LW)/Seminars (S) Course work (CW)	Hours per semester: L – 30 hours S – 20 hours LW – 0 hours	Number of credits: 4

LECTURER(S):

Assoc.Prof. Eng. Margarita Deneva, PhD (FA), tel.: 659 759, e-mail: deneva@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Elective subject from the curriculum for training of students to obtain Bachelor's degree, specialty Computer Systems and Technologies, Professional orientation 5.3 Communication and computer engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The course introduces students to the art of collecting, presenting, analyzing, and interpreting information.

DESCRIPTION OF THE COURSE: Main topics: Descriptive statistics, Probability and probability distributions; Statistical Inferences, Analysis of Variance, Regression Analysis, Cluster Analysis.

PREREQUISITES: Linear Algebra, Analytical Geometry, Mathematical Analysis, Spreadsheets.

TEACHING METHODS: The lecture course uses both the multimedia approach and the classical scheme, the former being dominant. Labs are conducted in a computer room using the Excel spreadsheet and the Data Analysis application.

METHOD OF ASSESSMENT: Five current assessments in each section studied (total 33.33%), laboratory work (33.33%), course work (33.33%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Колев Н. Приложна статистика I – Университетско издателство „Стопанство“, 1993; 2. Проданова Кр. – Въведение в статистическите методи – Ciela, 1998; 3. Everitt, B., Hothorn, T. – A handbook of statistical analysis using R, Chapman&Hall, London, 2010; 4. Neter J., Wasserman W., Whitmore G., - Applied statistics, Allyn and Bakon, 1998.

DESCRIPTION OF THE COURSE

Name of the course: Technical safety	Code: BpCST25.2	Semester: 8
Type of teaching: Lectures (L) Laboratory work (LW)/Seminars (S) Course work (CW)	Hours per semester: L – 30 hours S – 20 hours LW – 0 hours	Number of credits: 4

LECTURER(S):

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Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Elective subject from the curriculum for training of students to obtain Bachelor's degree, specialty Computer Systems and Technologies, Professional orientation 5.3 Communication and computer engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: Acquisition of knowledge in requirements, methods and sources for ensuring work safety at the conditions of modern practical technological processes. Basic competencies for knowledge of the conceptual apparatus for technical safety; knowledge of specific safety requirements for different working conditions and for analysis and risk assessment for the workplace, as well as knowledge of basic methods and tools for safe work.

DESCRIPTION OF THE COURSE: Main topics: Standards and organization of activities to ensure healthy and safe working conditions; Directives, regulations, standards; Ergonomics. ergonomic systems, principles, standards; Factors of the production environment; Lighting and light climate; Microclimate, factors, standardization; Classification approaches for workplaces and technical devices in accordance with electrical, fire and explosion hazards; Electrical safety, analysis and assessment of danger in normal mode and mode with disturbances of electrical devices and equipment; Analysis of electrical networks according to their safety; Effects and processes related to the flow of electric current into the ground; Technical measures for protection against short circuit injury and electrical faults; Electromagnetic fields of different frequency and protection from them; Health protection at work with computer systems; Safety at work with precision electronic equipment; Lightning protection from direct and secondary action of lightning, lightning protection zones, components; Electromagnetic compatibility; Requirements and evaluation; Noise and vibration at workplace; Harmonized standards; Requirements for design and manufacture of personal protective equipment.

PREREQUISITES: Basic knowledge in the fields of Physics, Mathematics, Electrical Engineering, Materials Science, Electronic Components, Computer Systems, Electrical Measurements.

TEACHING METHODS: Lectures using a multimedia projector, seminars with case studies for discussion and defense.

METHOD OF ASSESSMENT: Two current assessments in the middle and at the end of the semester (60% in total), seminars (25%), a case report (15%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: I. Ivanov, P. Petrov, G. Velev, N. Vitkov, Technical Safety, KING Publishing House, Sofia, 2011; Regulations, directives and standards in accordance with the topics, lecture notes in printed and electronic form.

DESCRIPTION OF THE COURSE

Name of the course: Quantum computer systems	Code: BpCST25.3	Semester: 8
Type of teaching: Lectures(L) Seminars (S)	Hours per semester: L – 30 hours S – 20 hours	Number of credits: 5

LECTURER(S):

Prof. eng. Petya Pavlova, PhD (FEA), tel.: 659 705, e-mail: p_pavlova@tu-plovdiv.bg

Eng. Jordan Genoff, MSc. (FEA), e-mail: jgenoff@tu-plovdiv.bg

Technical University of Sofia, branch Plovdiv

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curriculum for training of students to obtain Bachelor's degree, specialty Computer System and Technologies, Professional orientation 5.3 Communication and Computer Equipment, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: At the end of the course the students are expected: to know the principles of operation of the quantum computer system, the physical foundations and mathematical apparatus, as well as the structure of various currently existing architectures; to know the categories of problems and tasks solved on a quantum computer; to know the ways to access the resources of existing systems; to be able to formulate an idea for a solution to a problem of low complexity, as well as to bring the solution to implementation.

DESCRIPTION OF THE COURSE: Classical and quantum information; Mathematics and physics of information representation and processing; Quantum states, quantum logic elements and circuits; Architecture and technologies of the quantum computer; Quantum operations and algorithms; Quantum computer programming model; Programs, compilation and execution; Languages and platforms.

PREREQUISITES: PHY03, MAT13, MAT22, CCE01, CCE04, BpCST01, BpCST12.2.

TEACHING METHODS: Lectures with traditional and electronic tools for teaching; seminars with reports. All teaching forms are adapted for attended and distant teaching.

METHOD OF ASSESSMENT: This course includes ongoing assessment during the semester. The overall grade is an aggregation of the tests (30%+35%) and the seminars grades (35%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Nielsen, Michael A., and Isaac L. Chuang. Quantum Computation and Quantum Information. Cambridge, UK: Cambridge University Press, September 2010. ISBN: 978-1-107-00217-3; 2. N. D. Mermin, Quantum Computer Science, Cambridge University Press, 2012, ISBN: 978-0-511-81387-0; 3. Preskill, J. Lecture Notes on Quantum Computation, 1999, https://www.researchgate.net/publication/238451035_Lecture_Notes_for_Physics_219_Quantum_Computation.

DESCRIPTION OF THE COURSE

Name of the course: Sport	Code: FaSPR08	Semester: 8
Type of teaching: Lectures (L) Laboratory work (LW)/Seminars (S) Self-Study (SS)	Hours per semester: L – 0 hours S – 0 hours SS – 30 hours	Number of credits: 1

LECTURER(S):

Sen. Lect. Daniel Vladimirov, PhD (FEA), tel.: 032 659 646, e-mail: danielv@tu-plovdiv.bg

Sen.Lect. Petar Doganov, PhD (FEA), tel.: 032 659 648, e-mail: pdoganov@tu-plovdiv.bg

Sen.Lect. Boris Spasov, PhD (FEA), tel.: 032 659 647, e-mail: boris_spasov@tu-plovdiv.bg

Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Facultative subject from the curriculum for training of students to obtain Bachelor's degree, specialties “Computer Systems and Technologies”, 5.3 Computer and communication technique, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: Targeted at further developing of students' physical activities, skills and hygiene habits through effective methods of physical education, improving their mental and physical performance.

DESCRIPTION OF THE COURSE: The knowledge and skills in Physical Education and Sports develop a wide range of motor skills and habits, help the hardening of the body and contribute to the moral development of students. The enhancement of physical skills is carried out through:

1. General Physical Preparedness (GPP) – in these seminars the students develop a wide range of motor skill and habits; work to improve strength, speed, endurance, flexibility, structure and skill; increase resistance to unfavourable environmental factors; develop their physical qualities and experience.

2. Sports-Specific Physical Preparedness (SPP) – students improve their sport skills and habits in a specific sport and gain experience through participation in competitions; work to improve strength, speed, endurance, flexibility, structure and skill; increase resistance to unfavourable environmental factors; develop their physical qualities and experience.

PREREQUISITES: The curriculum presumes the minimum of knowledge and skills acquired at secondary school.

TEACHING METHODS: Seminars in accordance with the curriculum in PE and Sport.

METHOD OF ASSESSMENT: Evaluation is based on functional tests at the end of semester. Lecturer's signature is required at the end of semester.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Владимиров В. Туризм и ориентиране. Методическо ръководство за студентите от ТУ София, филиал Пловдив. Издателство на ТУ - София. 2010.