COURSE CONTENT INFORMATION:

Computer Programming (1st Semester)	3.4.01.1
Obligatory	Hours per week: Theory:3 – Lab:2

Introduction to Computer Science. Algorithms and Data Structures, programs, programming languages. Pascal. Specification, design, coding, verification, documentation and maintenance of programs. Basic data structures, control structures, procedures, recursion, parameter passing.

Professors: Stathis Zachos , Nikolaos Papaspyrou

Logic Design of Digital Systems (2nd Semester)	3.5.01.2
Obligatory	Hours per week: Theory:3 – Lab:1

Boolean algebra, logical gates. Simplification of logical functions. Combinatorial circuits (analysis and design of adders, subtracters, code converters, comparators, multiplexers, decoders, ROMs, PLAs, etc.). Clocked sequential circuits (latches and flip-flops, analysis and synthesis of clocked sequential circuits). Registers, counters and memory circuits. Algorithmic state machines. Asynchronous sequential circuits.

Professors: Theodora Varvarigou , Elias Koukoutsis , Konstantinos Papaodyssefs

Textbook: Digital Design, by M. Morris Mano.

Programming Techniques (2nd Semester)	3.4.03.2
Obligatory	Hours per week: Theory:3 – Lab:2

Advanced data structures: pointers, linked lists, trees, stacks, queues. FORTRAN. Numerical analysis problems. Use of program libraries. Comparison with other programming languages: C, Prolog, Modula, Smalltalk. Axiomatic semantics for programs. Explanation and classification of branches and courses of computer science.

Professors: Yanis Maistros , Nikolaos Papaspyrou

Textbook: The C Programming Language (2nd Edition), by Brian W. Kernighan, Dennis M. Ritchie.

Laboratory and Industrial Electronics (5th Semester)	3.5.08.5
Obligatory	Hours per week: Theory:2 - Lab:2

Introduction to Laboratory and Industrial Electronics. Amplification stages using operational amplifiers and single-stage bipolar transistor circuits. Simple dc supplies using pn and zener diodes. Introduction to the software program SPICE for electrical and electronic circuits simulation. Design of PCBs. Power semiconductor devices. Relays and electrical power-control devices. Application of microprocessors and Digital Signal Processors to industrial equipment. Introduction to PLCs. Power electronics topologies for static loads and motor drive systems. This course includes eight laboratory exercises on operational amplifiers, power supplies, power electronics topologies and control of electrical machines.

Professors: Stefanos Manias , Yannis Papananos , George Cambourakis , Stavros Papathanassiou

Textbooks: Industrial Electronics, by Stefanos Manias, Athanasios Kaletsanos. Microelectronic Circuits, by Adel S. Sedra, Kenneth C. Smith

Stochastic Systems and Communications (5th Semester)	3.5.11.5
Obligatory	Hours per week: Theory:3 - Lab:0

Signal taxonomy. Fourier series expansion and Fourier transform of signals. Numerical computation of Fourier transform, Fast Fourier Transform. Transmission through linear systems.Ideal low-pass filters. Hilbert transform. Band-pass signals and systems. Stochastic processes. Stationary signals, moments, correlations and covariance functions. Time averages and ergodicity. Transmission through linear systems. Power density spectrum. Gaussian random process. Noise: Shot noise, thermal noise, white noise, equivalent noise bandwidth. Narrowband noise.

Professors: Emmanuel Protonotarios , Miltiades Anagnostou , Symeon Papavassiliou

Textbook: Communication Systems, by Simon Haykin.

Digital Systems Lab (6th Semester)	3.5.13.6
Obligatory by selection (of flow *Computer Systems*)	Hours per week: Theory:1 - Lab:2

This course includes theory and laboratory exercises on the following topics: use of gates for the synthesis of combinatorial logical circuits, coders/decoders, multiplexers, 7-segment displays, circuits for numerical operations, counters and timers, registers, design and implementation of sequential circuits, programmable logic devices and algorithmic state machines. Moreover, each student has to complete a project on the analysis, design and implementation of a more complex digital circuit.

Professors: Vassilis Loumos , Elias Koukoutsis , Konstantinos Papaodyssefs

Textbook: Digital Design, by M. Morris Mano.

Microprocessors Systems (as it appears in the translation: Microcomputer Systems) (6th Semester)	3.4.23.6
Obligatory (main flow of *Computer Systems*)	Hours per week: Theory:3 - Lab:0

Number Systems Codes. Digital circuits useful in Microcomputer Systems. Microcomputers. Microprocessors Architecture. The 8085 Microprocessor. Programming. Assembly Language. Assemblers - Macros-Subroutines. I/O Techniques. Interrupts. The 80x86 Microprocessors. PC Hardware and Software.

Professor: Kiamal Pekmestzi

Textbook: Microprocessors Systems, by Kiamal Pekmastzi

Communication Networks (6th Semester)	3.5.18.6
Obligatory (half flow of *Communications and Computer Networks*)	Hours per week: Theory:2 - Lab:2

Introduction to communication networks. Network evolution. Network design issues: layered architecture, services, circuit and packet switching, multiplexing, management, reference models. Physical layer: theoretical basis of data communications, communication links and their characteristics, error correction and detection. Data link layer: retransmission protocols, protocol specification and verification. Medium access sublayer: multiple access protocols, local area networks, Ethernet, rings, IEEE standard 802 for LANs (802.3, 802.4, 802.5, and 802.2), FDDI, WLANs, WiFi (802.11), Bluetooth (802.15), WiMax (802.16). Network layer: design issues, routing algorithms, congestion control. Laboratory part: Practical training of students on issues concerning network configuration, data link protocols, MAC protocols and routing algorithms based on the NS2 simulator.

Professors: Miltiades Anagnostou , Michael Theologou

Textbook: Computer Networks, by Andrew S. Tanenbaum

Introduction to VLSI Design (7th Semester)	3.5.29.7
Obligatory (main flow of *Electronics - Circuits - Materials*)	Hours per week: Theory:2 - Lab:2

Introduction to CMOS VLSI circuits (logical switch, inverter, NAND and NOR gates, more complex gates, transmission gates, multiplexers, registers). Introduction to the representation of circuits and systems, hardware description languages (HDL). IC technology and CMOS and VLSI manufacturing procedures. Parameter and performance estimation (resistance, capacitance, delay, power consumption). Logic design with CMOS VLSI circuits (design and testing methods). CMOS VLSI subsystem design (adders, multipliers, shift registers, Algorithmic State Machines). Laboratory: CMOS VLSI circuits are studied and designed, ranging from simple gates to complete subsystems. The laboratory exercises include layout design, functional simulation, timing analysis and use of hardware description languages.

Professors: Kiamal Pekmestzi , Elias Koukoutsis

Textbook: Principles of CMOS VLSI Design: A systems Perspective, by Neil Weste, Kamran Eshraghian.

Computer Operating Systems (7th Semester)	3.4.22.7
Obligatory (half flow of *Computer Systems*)	Hours per week: Theory:2 - Lab:2

Overview, process concept, critical section, process synchronization, interprocess communication, cpu scheduling, deadlocks, memory management, I/O systems. The course includes also 5 laboratory projects for building a toy scale operating system on top of LINUX.

Professors: George Papakonstantinou , Panayiotis Tsanakas

Textbook: Operating Systems, by George Papakonstantinou , Panayiotis Tsanakas, N.A.Mpilalis

Microprocessors Laboratory (as it appears in the translation: Microcomputers Lab) (7th Semester)	3.4.34.7
Obligatory (main flow of *Computer Systems*)	Hours per week: Theory:0 - Lab:3

This course includes laboratory exercises on the following topics: Assembly language programming on the 8085 and 80x86 Microprocessors. Use of assemblers and debuggers. I/O Techniques, Subroutines and Interrupts. Interconnection of microprocessor systems with peripheral units (interfacing). A project for the design and implementation of a microcontroller-based system.

Professor: Kiamal Pekmestzi

Textbook: Microprocessors Systems, by Kiamal Pekmastzi

Computer Networks (7th Semester)	3.5.30.7
Obligatory (half flow of *Communications and Computer Networks*)	Hours per week: Theory:2 - Lab:2

This course covers the technologies and protocols of the Internet. We start with the fundamental underlying transmission technologies and protocols and continue with the design principles of the Internet protocols, including the Internet Protocol (IP), Address Resolution Protocol (ARP), Internet Control Message Protocol (ICMP), User Datagram Protocol (UDP) and Transmission Control Protocol (TCP), the Domain Name System (DNS), routing protocols (RIP, OSPF, BGP), network management protocols (SNMP), and application-level protocols (FTP, TFTP, TELENET, SSH, HTTP, HTTPS, DNS, DHCP, SMTP). A set of laboratory experiments will provide hands-on experience so as to comprehend fundamental design principles of Internet Protocols, IP addresses, and IP networks, including routing and forwarding, domain name system, network address translation, network management, and multicasting by capturing and analyzing traffic generated by applications.

Professors: Efstathios Sykas , Michael Theologou

Textbook: Computer Networking: A Top-Down Approach Featuring the Internet, by James F. Kurose, Keith W. Ross

Design of Analog Electronic systems (8th Semester)	3.5.44.8
Obligatory (half flow of *Electronics - Circuits - Materials*)	Hours per week: Theory:1 - Lab:3

Analysis and design a 10W audio amplifier. Current sources and mirrors, differential amplifiers, input-output stages, level shifters, voltage regulation, temperature drift problems. Study of Operational Amplifiers (OA), inverting and non-inverting configuration, integrators, differentiators, comparators, oscillators. Characteristics and specifications, offset errors, slew rate, measurements of OA parameters, frequency response. Linear analog systems design.

Professors: Eleftherios Kayafas , Elias Koukoutsis

Textbook: Microelectronic Circuits, by Adel S. Sedra, Kenneth C. Smith

Operating Systems Laboratory (8th Semester)	3.4.35.8
Obligatory by selection (of flow *Computer Systems*)	Hours per week: Theory:0 - Lab:3

Laboratory projects for: * The modification and extension of the operating system EMPIX. * The design and implementation of special purpose operating systems (for embedded systems applications). * The design and implementation of LINUX drivers.

Professors: George Papakonstantinou , Panayiotis Tsanakas

Internet Programming (as it appears in the translation: Network Programming) (8th Semester)	3.5.43.8
Obligatory by selection (of flow *Computer Software*)	Hours per week: Theory:3 - Lab:0

The course of Internet Programming covers the following topics: *-- Presentation of the state-of-the-art of Internet technologies, with emphasis to the structure and operation of TCP/IP protocol as well as datagrams και socket oriented communications. *-- Structure attributes of the HTTP communications protocol, including HTML programming lanuage on the web, programming of HTTP servers, HTML-based applications development of dynamic web pages CGI scripts coded in PERL language. *-- State-of-the-art INTERNET Applications, with emphasis to security issues and the future of Internet. *-- Intoduction in Java covers differences between Java and C++, advantages of Java language, Java structures, programming Java in Unix environments *-- Object oriented programming: classes, objects, messages, methods, constructors, access control and overloading. Basic classes and packages, vectors και hash tables, inheritance, polymorphism, variables and methods, abstract basic classes. *-- Object Oreiented Programming code and interfaces design covers execution type recognition, class objects, nested classes, packages, exceptions, error handling, threads, concurrency, synchronization. Input/output and net classe, sockets, streams, tokenizing, client/server, URLs. Abstract window toolkit (AWT), component/container, graphics, applets, fonts, colours, widgets, layout, text, event handling, windows, menus, images, beans. *-- Advanced topics on: security, verification, native methods, garbage collection, images and sounds.

Professor: Theodora Varvarigou

Textbook: Sams Teach Yourself Java 2 in 21 days, by Rogers Cadenhead, Laura Lemay

Advanced Computer Architecture (as it appears in the translation: Advanced Topics of Computer Management) (8th Semester)	3.4.37.8
Obligatory by selection (of flow *Computer Systems*)	Hours per week: Theory:3 - Lab:0

Categories of Instruction Set Architectures (ISA), modern CPU organization: control unit and datapath, pipelined architectures, memory hierarchy organization (cache memories, virtual address translation, TLB), multistage pipelines with variable latencies, branch prediction, Very large Instruction Word (VLIW) architectures, Instruction Level Parallelism (ILP), superscalar pipelines, out of order (OOO) execution. Examples of modern processors, hyperthreading (HT), Simultaneous Multithreading (SMT), Multicore chips (Chip Multiprocessing).

Professor: Nectarios Koziris

Textbook: Computer Architect: A Quantitative Approach, 3rd Edition, by John L. Henessy, David A. Patterson