Course Name:	Introduction to Informatics and Telecommunications
Course Type:	Compulsory
Course Level:	Undergraduate (1st cycle)
Year/Semester:	1st year / 1st semester
Number of ECTS credits:	6
Name of lecturer:	Kaloxylos Alexandros
Learning outcomes:	Students that succeed in this course should be able to: • Convert between decimal, binary and hexadecimal and perform basic arithmetic. • Use gates to design simple circuits • Demonstrate a fundamental understanding of system architecture and an ability to write simple programs in a low level programming language • Demonstrate a fundamental understanding of operating systems and be able to execute basic UNIX commands • Design algorithms to solve simple and complex problems using pseudo-code • Select and utilize appropriate data types and structures for specific problems • Demonstrate a fundamental understanding of basic concepts in the theory of computation and be able to use a Turing machine to solve simple problems • Be able to explain the main principles of operation in telecommunication networks and be able to use simple configuration and monitoring commands
Prerequisite courses:	
Teaching methods:	Lectures, 4 hours weekly.
Course contents:	Data Storage, Data Manipulation, Operating Systems, Networking and the Internet, Algorithms, Data Abstractions, Theory of Computation
Recommended or required readings:	Computer Science an Overview, J. Glenn Brookshear Foundations of Computer Science, B. Forouzan, F. Mosharraf
Assessment methods:	Written exams at the end of the semester. It is possible that home assignments will be given, which will contribute to the final grade with a percentage ranging between 15% and 30%.
Language of instruction:	Greek

Course Name:	Programming I
Course Type:	Compulsory
Course Level:	Undergraduate (1st cycle)
Year/Semester:	1st year / 1st semester
Number of ECTS credits:	6
Name of lecturer:	Tselikas Nikolaos
Learning outcomes:	Students that succeed in this course should be able to: • edit, compile and run a C program. • recognize and use C data types. • declare variables and assign values to them. • read input data from keyboard and display output data in screen by using scanf() and printf() functions, respectively. • write C statements by using arithmetic, relational, logical, compound, bitwise and shift operators. • control the flow of C programs by using either if-else and switch statements or the conditional (ternary) operator. • create and execute iterations (loops) by using for, while and do-while statements. • create and handle one-dimensional and two-dimensional arrays. • use pointers and handle arrays with pointer notation. • handle the char data type and create and use strings with either array or pointer notation. • declare and implement functions and use the most popular C library functions. • distinguish call-by-value and call-by-reference function calls and use them. • execute, use and implement basic searching (linear/binary search) and sorting (selection-sort, insertion-sort and bubble-sort) algorithms in arrays. • use the dynamic memory management functions, e.g., malloc(), free(), memcpy(), memmove(), memcmp(). • recognize the difference between structs and unions. • define and handle structs and unions. • create their own data types. • recognize the difference between text and binary files. • open, close, read, write and append both text and binary files.
Prerequisite courses:	-
Teaching methods:	Lectures (4 hours weekly) Laboratory (2 hours weekly)
Course contents:	Introduction, data types and variables in C, data input and output, operators, program flow control statements, iterations (loops), arrays, strings, pointers, functions, searching and sorting arrays algorithms, structures and unions, dynamic memory management, text and binary files.
Recommended or required readings:	• *C: from Theory to Practice*, G. S. Tselikis, N. D. Tselikas • *The C Programming Language*, B. Kernighan, D. Ritchie • *C How to Program*, P. Deitel, H. Deitel • *C: The Complete Reference*, H. Schildt
Assessment methods:	Written exams at the end of the semester. Lab assignments every week (or every second week) contributing to the final grade with a percentage ranging between 10% and 20%. It is possible that home assignments will be given and/or intermediate written exams will take place, while each of the above will contribute to the final grade with a percentage ranging between 10% and 20%.
Language of instruction:	Greek

Course Name:	Digital design
Course Type:	Compulsory (Core)
Course Level:	Undergraduate (1st cycle)
Year/Semester:	1st year /1st semester
Number of ECTS credits:	6
Name of lecturer:	Wallace Manolis
Learning outcomes:	Students that succeed in this course should be able to: • Describe the basic principles of binary numbers, Boolean Algebra and logic gates • Explain the basic principles of binary functions and simplify binary functions • Design and reduce combinatioal circuits given specific requirements • Explain the notion of memory in the context of logic circuits, • List the characteristic tables of flip flop types D,T and JK • Read and reduce state diagrams • Design sequential circuits
Prerequisite courses:	None
Teaching methods:	Lectures, 4 hours weekly Laboratory, 2 hours weekly
Course contents:	Numeral systems and codes, digital circuits, principles and practices for combinatorial logic design, basic combinatorial digital circuits, PLAs, decoders, coders, multiplexers, comparators, adders, subtractors, ALUs, principles and practices for sequential digital design, latches, flip flops, counters, shift registers, memory.
Recommended or required readings:	Digital design (4th edition, in Greek), Morris M. Mano, Papasotiriou press 2010
Assessment methods:	At least a dozen individual laboratory assignments with a total weight of 30%, intermediate theory examination with a weight of 20%, final theory examination with a weight of 50%. Success in both laboratory and final exam is a requirement for the successful completion of the course Additional optional practical design and implementation assignments will be made available, which will contribute to the final grade to a percentage up to 40%, in the case that they result in a fully functional actual logic circuit according to the set specifications.
Language of instruction:	Greek

Course Name:	Mathematics I
Course Type:	Compulsory
Course Level:	Undergraduate (1st cycle)
Year/Semester:	1st year / 1st semester
Number of ECTS credits:	6
Name of lecturer:	Theodore E. Simos
Learning outcomes:	Students that succeed in this course should be able to: • describe the basic principles of calculus of single variable functions and work with them. • able to work with the concepts of continuity, sequences and series, differentiation and integration of functions • describe the equivalent concepts of functions of multiple variables and work with them.
Prerequisite courses:	
Teaching methods:	Lectures, 4 hours weekly.
Course contents:	Part A: Basic topology concepts, Real numbers, Sequences, Series, Functions of one variable (limit, continuity etc), Derivatives, Definite and indefinite integral, Power series, Taylor expansions. Part B: Functions of multiple variables, Partial derivatives, Extreme values (local minima and maxima), Differentiability, Taylor series of functions of multiple variables, Multiple integrals and polar coordinate integrals, Differential equations and Systems of differential equations.
Recommended or required readings:	• FINNEY R.L., WEIR M.D., GIORDANO F.R., Calculus, Volume I. • Calculus and algebra, Sakkalis Panagiotis G.
Assessment methods:	Written exams at the end of the semester. It is possible that home assignments will be given, which will contribute to the final grade with a percentage ranging between 25% and 30%.
Language of instruction:	Greek

Course Name:	Physics
Course Type:	Compulsory
Course Level:	Undergraduate (1st cycle)
Year/Semester:	1st year / 1st semester
Number of ECTS credits:	6
Name of lecturer:	Yiannopoulos Konstantinos
Learning outcomes:	Students that succeed in this course should be able to: • Describe and explain the basic principles of mechanics and wave physics • Correlate physical and mathematical models for the description of physical phenomena • Analyze and solve basic problems in physics by applying suitable techniques • Apply description models to real-world problems of Informatics and telecommunications
Prerequisite courses:	-
Teaching methods:	Lectures, 4 hours weekly.
Course contents:	Mechanics: introduction, measurements, vectors, one and two dimensional motion, laws of motion, energy and work, circular motion, oscillation. Wave physics: wave motion, wave definition, transverse and longitudinal waves, travelling harmonic waves, harmonic wave energy/intensity/velocity, acoustics, wave superposition, standing waves. Optics: refractive index, reflection, refraction, interference, diffraction. Modern physics - applications to telecommunications (optical fibers, lenses, semiconductors, antennas, interferometers).
Recommended or required readings:	• R.A. Serway and J.W. Jewett, "Physics for Scientists and Engineers," Vol. 1, Cengage Learning • R.A. Serway and J.W. Jewett, "Physics for Scientists and Engineers," Vol. 2, Cengage Learning • H.D. Young " University Physics," Addison-Wesley • D. Halliday, R. Resnick και J. Walker, "Fundamentals of Physics," Wiley
Assessment methods:	Written exams at the end of the semester.
Language of instruction:	Greek

Course Name:	Probability and Statistics
Course Type:	Compulsory
Course Level:	Undergraduate (1st cycle)
Year/Semester:	1st year / 2nd semester
Number of ECTS credits:	6
Name of lecturer:	Kolokotronis Nicholas, Moscholios Ioannis
Learning outcomes:	Students that succeed in this course should be able to describe the basic principles of probabilities and statistics, and use them in order to solve problems in the areas of computer science and telecommunications, and in general.
Prerequisite courses:	-
Teaching methods:	Lectures, 4 hours weekly.
Course contents:	Sample Space and Probability. Sets. Conditional Probability. Total Probability Theorem. Bayes' Rule. Independence. Counting. Discrete Random Variables. Probability Mass Functions. Functions of Random Variables. Expectation, Mean and Variance. General Random Variables. Cumulative Distribution Functions. Normal Random Variables. Limit Theorems. Markov and Chebyshev Inequalities. The Weak Law and the Strong Law of Large Numbers. The Central Limit Theorem. The Bernoulli and Poisson Processes. Bayesian Statistical Inference. Classical Statistical Inference.
Recommended or required readings:	D. Bertsekas and J. Tsitsiklis, Introduction to Probability, 2nd ed., Athena Scientific, 2008.
Assessment methods:	Written exams at the end of the semester.
Language of instruction:	Greek

Course Name:	Programming II
Course Type:	Compulsory (Core)
Course Level:	Undergraduate (1st cycle)
Year/Semester:	1st year / 2nd semester
Number of ECTS credits:	6
Name of lecturer:	Tryfonopoulos Christos
Learning outcomes:	Students that succeed in this course should be able to: • design algorithmic solutions for demanding problems • solve problems by utilizing advanced features of the C language (e.g., complex data types, input and output streams, direct access to main memory through pointers, modular programming, bit manipulation) • implement and test solutions to medium-sized real-world problems using C, • describe algorithmic alternatives (present algorithmic thinking and modular software design skills) that will be useful in solving large-sized problems in other programming languages.
Prerequisite courses:	None
Teaching methods:	Lectures 4 hours weekly, and laboratory exercises 2 hours weekly.
Course contents:	Pointers and pointer arithmetic. Call by value/reference. Pointers to functions. Dynamic memory allocation. Structs and arrays of structs. Simple data structures (single and double linked lists, circular lists, stacks, queues) and associated functions. Debugging. Recursion. Handling of characters and strings. Random number generation. Command line arguments. Bitwise operations. File I/O (text and binary). Modular programming. The C preprocessor. Useful programs (makefile, profiling, etc).
Recommended or required readings:	• The Art and Science of C, E. Roberts • The C Programming Language (2nd Edition), B. Kernighan, D. Ritchie
Assessment methods:	The course grade will be based on programming projects (possibly involving a personal examination) and/or programming exercises that will jointly account for 50% of the final grade, and a 3-hour written examination that will account for the remaining 50% of the final grade. These percentages may vary (+/-10%) each year.
Language of instruction:	Greek

Course Name:	Computer Architecture
Course Type:	Compulsory
Course Level:	Undergraduate (1st cycle)
Year/Semester:	1st year / 2nd semester
Number of ECTS credits:	6
Name of lecturer:	Dimitroulakos Grigoris
Learning outcomes:	Students that succeed in this course should be able to: • describe the basic methods for assessing computer systems performance • evaluate computer systems performance with Amdahl's law • describe the basic principles of pipelining • apply the pipelining design techniques that convert conventional digital units to optimized pipelined versions • assess the performance of pipelined units • describe the principles and functionality of memory hierarchy ○ Cache ○ Scratch-Pad • describe and assess the different design options of cache memory hierarchy • describe the functionality and characteristics of dynamic and static memory technologies • describe the principles and design options of I/O computer system interface • describe the basic characteristics and structure of X86 architecture family • design, compile, debug and execute programs in X86 assembly language
Prerequisite courses:	Digital Design ???
Teaching methods:	Lectures 2 hours weekly + Laboratory 2 hours weekly.
Course contents:	Introduction, Computer Systems Performance Assessment, Amdahl Law, Pipelining, Data Control and Structural Hazards, Data Forwarding, Memory Hierarchies: Cache Scratch-Pad, Memory Technologies: SRAM and SDRAM, Computer IO Interface, Buses Assembly x86
Recommended or required readings:	• Computer Organization and Design. The Hardware/Software Interface 5th Edition (Translated in Greek 3rd edition) • Assembly Language for x86 Processors, 6th edition
Assessment methods:	The result grade will be the mean (50% written exams + 50% laboratory) of written exams and laboratory grades. Student's performance in the laboratory will be assessed by two means 1) Students' performance first time attending the laboratory will be assessed by in-the-class exams (oral or written) during each laboratory's duration 2) Students' performance failed to pass the course regularly, will have to give separate exams for the laboratory in the regular exam period. To pass successfully the course the following prerequisites should be met: 1) the written exams grade should be no less than 50/100 and 2) The student should attend at least the 80% of the laboratory courses and 3) Written and laboratory grades must derive from the same academic year.
Language of instruction:	Greek

Course Name:	Mathematics II
Course Type:	Compulsory
Course Level:	Undergraduate (1st cycle)
Year/Semester:	1st year / 2nd semester
Number of ECTS credits:	6
Name of lecturer:	Vlachos Dimitrios
Learning outcomes:	Students that succeed in this course should be able to: • Work with real functions of many variables and calculate their derivatives • Work with vector functions • Calculate line, surface and volume integrals • Work with complex functions • Calculate Taylor and Laurent series • Calculate line integrals using the Cauchy residue theorem • Work with complex transforms • Calculate the Laplace and Fourier transforms (and inverse)
Prerequisite courses:	
Teaching methods:	Lectures, 4 hours weekly.
Course contents:	Vectors and polar functions in 2 and 3 dimensions, Functions of many variables, Derivations, Multiple integrals, Integration of vector fields, Complex numbers and elementary functions, Analytic functions and integration, Linear integrals and the residue theorem, Complex transforms, Asymptotic integration, Riemann-Hilbert problems, Integral transforms
Recommended or required readings:	• Lecture notes • Complex variables, M.J. Ablowitz, A.S. Fokas • Calculus, R.L. Finney, M.D. Weir, F.R. Giordano
Assessment methods:	3 hours written exams. Mid-exams are possible with weight 40%.
Language of instruction:	Greek

Course Name:	Data Structures
Course Type:	Compulsory
Course Level:	Undergraduate (1st cycle)
Year/Semester:	2nd year / 3rd semester
Number of ECTS credits:	6
Name of lecturer:	Lepouras George
Learning outcomes:	At the end of the course the student should (1) know basic data structures and their functionalities (2) know algorithms for a series of classical computational problems and their computational complexity (3) be able to implement data structures in C (4) be able to select proper data structures depending on the problem
Prerequisite courses:	Programming I or Programming II
Teaching methods:	Lectures, 4 hours weekly and laboratory or supportive teaching hours, depending on the weekly progress of the lectures. και ώρες εργαστηρίου ή φροντιστηρίων ανάλογα με την πρόοδο στη θεωρία κάθε εβδομάδα.
Course contents:	Introduction. Lists. Tables. Queues. Trees. Tree traversals. Priority queues. Binary search trees. AVL trees. Hashing. Sorting. Graphs.
Recommended or required readings:	• Data structures – concepts, techniques and algorithms. Georgios Georgakopoulos. Crete University Press, 2011. (in Greek) • Introduction to algorithms, vol I, CORMEN T.H., LEISERSON CH.E., RIVEST R.L., STEIN C., Crete University Press, 2010 • Algorithms in C, vol. 1-4, Robert Sedgewick, Kleidarithmos, 2005, Athens.
Assessment methods:	Assignments, weight = 40% and written exam, weight = 60% (can vary ± 10 per year).
Language of instruction:	Greek

Course Name:	Signals and Systems
Course Type:	Compulsory
Course Level:	Undergraduate (1st cycle)
Year/Semester:	2nd year / 3rd semester
Number of ECTS credits:	6
Name of lecturer:	Andreas Maras
Learning outcomes:	Students that have successfully completed this course should be able to: • understand and describe the structure and interpretation of signals and of (mainly, linear) systems. In particular, • understand and describe the mathematical modeling of systems and also learn their basic properties such as linearity, causality, stability and time-invariance with particular emphasis given on linear and time–invariant (LTI) systems. • describe the various signal categories, their main properties and also the fundamental classes of signals such real and complex exponentials, the Heaviside unit step pulse, the unit impulse functional and also the unit ramp function in both continuous-time and discrete-time form. • understand and describe the convolution sum representation for discrete time LTI systems and also the convolution integral representation for continuous time (analog) systems. • interpret LTI continuous-time and discrete-time systems through their impulse response and also their step response. • understand and describe the Fourier integral analysis for continuous-time signals and LTI systems, and also analyze LTI continuous-time LTI systems through their Fourier integral representation. • understand and describe the Fourier series (both in complex exponential form and real trigonometric form) analysis for discrete-time periodic signals. • apply Fourier transform analysis to the modelling of simple communication systems such as an AM radio system and the AC/DC conversion. • comprehend and describe the importance of Laplace transform and Z-transform methods in the analysis of more general signals and systems in continuous time for the former case and discrete time for the latter case.
Prerequisite courses:	Mathematics I
Teaching methods:	Lectures, 4 hours weekly. Laboratory exercises, 1 hoursper week.
Course contents:	Introduction. Overview of signals and systems concepts.
Recommended or required readings:	• **An Introduction to the theory of Signals and Systems**, S. Theodoridis, K. Berberidis and E. Kofidis. • **Signals and Systems**, S. Karabogias
Assessment methods:	Written exam at the end of the semester. Laboratory exercises count for 20% of the overall final examination mark.
Language of instruction:	Greek

Course Name:	Electromagnetic Fields
Course Type:	Compulsory
Course Level:	Undergraduate (1st cycle)
Year/Semester:	2nd year / 3rd semester
Number of ECTS credits:	6
Name of lecturer:	Georgia Athanasiadou
Learning outcomes:	Students that succeed in this course should be able to: • Verify the feasibility of an electromagnetic field. • Determine the electromagnetic field produced by simple charge and current distributions. • Calculate the charge and current distributions given the electromagnetic field. • Solve boundary problems. • Analyze time variant electromagnetic problems by employing phasors and/or time domain equations. • Determine electromagnetic energy and power • Calculate the electromagnetic field from its potential.
Prerequisite courses:	Physics or Calculus I or Calculus II
Teaching methods:	Lectures, 4 hours weekly Tutorials, 2 hours weekly (optional)
Course contents:	Maxwell's equations (integral equations, differential equations, Boundary conditions). State equations. Charge distribution, current distribution, charge conservation law. Electrostatic Field. Magnetostatic Field. Wave equation. Time harmonic waves. Phasors. Electromagnetic potentials. Plane Waves. Electromagnetic Energy and Power (Poynting Vector, Energy conservation law). Wave Polarization. Reflection and Transmission of Plane Waves. Standing waves. Introduction to transmission lines.
Recommended or required readings:	• Electromagnetic Fields – Part I, J. L. Vomvoridis, (in greek) • Electromagnetic Fields, J. Roumeliotis, J. Tsalamegkas, (in greek)
Assessment methods:	Written exams at the end of the semester. It is possible that home assignments will be given and/or a written interim examination will be held, which will contribute to the final grade with a percentage ranging between 10% and 20%.
Language of instruction:	Greek

Course Name:	Mathematics III
Course Type:	Compulsory
Course Level:	Undergraduate (1st cycle)
Year/Semester:	2nd year / 3rd semester
Number of ECTS credits:	6
Name of lecturer:	Vlachos Dimitrios
Learning outcomes:	Students that succeed in this course should be able to: • Solve ordinary differential equations of the 1st degree using separation of variables • Solve ordinary differential equations with constant coefficients using the method of characteristic polynomial or the Laplace transform • Solve second order ordinary differential equations using power series • Solve linear systems of ordinary differential equations • Analyze the stability of the solutions of ordinary differential • Solve partial differential equations using the method of separation of variables • Solve boundary value problems using the Fourier transform
Prerequisite courses:	Mathematics I
Teaching methods:	Lectures, 4 hours weekly.
Course contents:	Ordinary differential equations (ODE), modeling physical phenomena using ODE, ODE's of the 1st order, ODE's with constant coefficients, the method of power series for the solution of ODE's, linear systems of ODE's, bifurcation theory, partial differential equations (PDE), solution of PDE's using separation of variables, solution of boundary value problems, Fourier transform
Recommended or required readings:	• Lecture notes • Differential equations Part 1, Kiventides T.A.
Assessment methods:	3 hours written exams. Mid-exams are possible with weight 40%.
Language of instruction:	Greek

Course Name:	Principles of Telecommunication Systems
Course Type:	Compulsory
Course Level:	Undergraduate (1st cycle)
Year/Semester:	2nd year / 4th semester
Number of ECTS credits:	6
Name of lecturer:	Georgia Athanasiadou– George Tsoulos
Learning outcomes:	Students that succeed in this course should be able to: • Calculate the spectrum of simple analogue signals. • Analyze and describe simple block diagrams of communication systems. • Apply analogue modulations for signal transmission and select the appropriate detector according to the modulation. • Analyze bandpass signals into orthogonal lowpass components. • Calculate the Signal to Noise Ratio at the end of simple analogue systems. • Implement the PCM technique for signal transmission. • Simulate analogue modulations using Simulink-Matlab. • Modulate and demodulate signals (e.g. voice) using laboratory equipment. • Implement sampling and reconstruction of signals using Simuling-Matlab.
Prerequisite courses:	-
Teaching methods:	Lectures, 4 hours weekly. Laboratory, 2 hours weekly.
Course contents:	Fourier transform. Spectral density. Bandpass signals and systems. Complex and physical envelope. Analogue transmission. Modulation and demodulation AM, DSB-SC, SSB, VSB. Quadrature Amplitude Modulation (QAM). Frequency Division Multiplexing (FDM). Transmission bandwidth, Generation of AM and FM waveforms and detectors. Introduction to Noise theory. Impact of Channel Noise. Signal to noise ratio. Performance comparison of analog modulation to Noise. Sampling Theorem, quantization, Pulse-code modulation (PCM).
Recommended or required readings:	• Communication Systems, Simon Haykin • Principles of Communication Systems, Herbert Taub, Donald L. Schilling
Assessment methods:	Written exams at the end of the semester which will contribute 70% to the final grade. Laboratory reports followed by written or oral examination which will contribute 30% to the final grade.
Language of instruction:	Greek

Course Name:	Communication Networks I
Course Type:	Compulsory
Course Level:	Undergraduate (1st cycle)
Year/Semester:	2nd year / 4th semester
Number of ECTS credits:	6
Name of lecturer:	Kostantinos Yiannopoulos - Kaloxylos Alexandros
Learning outcomes:	Students that succeed in this course should be able to: • describe several protocols and technologies (e.g., HTTP, TCP/IP and Ethernet), as well as related network applications (e.g., mail, web, file transfer, peer-to-peer) • implement simple network applications • explain the functions that are executed in every layer of the protocol stack (i.e., physical, data link, network, transport, application layers) • design local area networks • use commands to configure end terminals and network devices. • Analyze the information located in a transmitted packet. • Analyze any network malfunction • Evaluate the efficiency of well-known network protocols.
Prerequisite courses:	
Teaching methods:	Lectures, 4 hours weekly and optionally participate in laboratory exercises
Course contents:	Computer Networks and the Internet, Application Layer, Transport Layer, The Network Layer, the Link layer and local area networks,
Recommended or required readings:	Computer Networking A top-down approach, Kurose, Ross Computers Networks and Internets with Internet Applications, Comer Computer Networks, A. Tanenbaum, D. Wetherall
Assessment methods:	Written exams at the end of the semester 100%. It is possible that students can participate to lab exercises, which will contribute to the final grade with a percentage of 40%. In the latter case the written exams contribute to the final grade with a percentage of 60%
Language of instruction:	Greek

Course Name:	Operating systems
Course Type:	Compulsory
Course Level:	Undergraduate (1st cycle)
Year/Semester:	2nd year / 4th semester
Number of ECTS credits:	6
Name of lecturer:	Vassilakis Costas
Learning outcomes:	Students that succeed in this course should be able to: • describe the goals of the operating system, its structure and the main types of operating systems. • describe the modeling of processes, their switching on the CPU. Additionally, the student will be able to describe how interprocess communication and synchronization is accomplished and how interprocess communication and synchronization problems are solved, and be able to solve related problems. • describe and apply basic process scheduling algorithms. • describe the concept of deadlock, the related problems, the mitigation strategies and the algorithms used to this end. The student will be also able to apply the related algorithms. • describe the goals of memory management, the main techniques for managing memory and the related algorithms. The student will be also able to apply the related algorithms. • describe the basic elements and the functionality of file systems, their structures, their implementation methods and the related techniques and algorithms and solve related problems. • describe the principles and structure of input/output software, and the way that input/output software handles the main device categories. • describe the concepts of security related to the operating system, the existing threats and the mitigation methods and mechanisms, and additionally choose and apply the related algorithms.
Prerequisite courses:	Programming I or Programming II
Teaching methods:	Lectures, 4 hours weekly.
Course contents:	Introduction. Overview of operating systems concepts and elements of computer architecture. Operating system structure. Processes: states, synchronization and scheduling. Deadlocks and deadlock handling. Memory management. Input-output management. Disk devices and file systems. Security.
Recommended or required readings:	• Modern Operating Systems, A. S. Tanenbaum • Operating Systems, Stallings, William • Operating Systems, Silberschatz, Galvin, Gagne
Assessment methods:	Written exams at the end of the semester. It is possible that home assignments will be given, which will contribute to the final grade with a percentage ranging between 10% and 20%.
Language of instruction:	Greek

Course Name:	Algorithms and complexity
Course Type:	Compulsory
Course Level:	Undergraduate (1st cycle)
Year/Semester:	2nd year / 4th semester
Number of ECTS credits:	6
Name of lecturer:	Theocharis Malamatos
Learning outcomes:	Students that succeed in this course should be able to: • describe algorithms for a series of classical computational problems and show their execution on typical instances. • apply algorithm design techniques and construct efficient algorithms. • describe algorithms with clarity in words and in pseudocode. • analyze the complexity of an algorithm and prove its correctness. • recognize basic notions of NP-completeness theory.
Prerequisite courses:	(Programming I or Programming II) and (Discrete mathematics)
Teaching methods:	Lectures, 4 hours weekly.
Course contents:	Algorithms and computational problems, Analysis of algorithms, Asymptotic notations, Recurrence relations. Design techniques: Divide-and-Conquer, Greedy algorithms, Dynamic programming. Graph algorithms: Breadth first search, Depth first search, Topological sorting, Minimum spanning trees, Shortest paths. Introduction to complexity theory: P, NP, and NP-complete problems, Polynomial-time reductions. Special topics: Approximation algorithms, Randomized algorithms and Computational geometry.
Recommended or required readings:	• S. Dasgupta, C. Papadimitriou, V. Vazirani, Algorithms, Kleidarithmos, Athens, 2009. (Greek edition) • J. Kleinberg, E. Tardos, Algorithm Design, Kleidarithmos, Athens, 2009. (Greek edition). • T. H. Cormen, C. E. Leiserson, R. L. Rivest, C. Stein, Introduction to Algorithms (single volume), Crete University Press, Heraklion, 2012. (Greek edition)
Assessment methods:	Assignments with weight 30%-40% and written exam.
Language of instruction:	Greek

Course Name:	Databases
Course Type:	Compulsory
Course Level:	Undergraduate (1st cycle)
Year/Semester:	3nd year / 5th semester
Number of ECTS credits:	6
Name of lecturer:	Skiadopoulos Spiros
Learning outcomes:	Students that succeed in this course should be able to: • design all stages of a database • express complex queries • implement applications using database management systems
Prerequisite courses:	(Programming II or Object-oriented programming) and Discrete mathematics
Teaching methods:	Lectures, 4 hours weekly and lab/exercises, 2 hours weekly
Course contents:	Introduction. The entity relation model (E/R). The relational model, relational algebra and other query languages (relational calculus, Datalog, QBE). SQL. Data constraints, functional dependencies, relational database design, canonical forms. Algorithms for database design, moving from E/R to relational model. Query evaluation.
Recommended or required readings:	Database Systems: The Complete Book, Hector Garcia-Molina, Jeff Ullman, and Jennifer Widom.
Assessment methods:	Written exercises and implementation of a project during semester and written exams at the end of the semester. The final grade results in by taking into account the respective marks of exercises (10-20%), project (30-40%) and final examination (50-80%).
Language of instruction:	Greek

Course Name:	Compilers
Course Type:	Specialization core
Course Level:	Undergraduate (1^{st} cycle)
Year/Semester:	3^{rd} year / 5^{th} semester
Number of ECTS credits:	5
Name of lecturer:	Dimitroulakos Grigoris
Learning outcomes:	Students that succeed in this course should be able to: • describe the purpose and the internal structure of a compiler • describe the purpose and individual stages of lexical analysis • apply manually the algorithms relevant to lexical analysis • write regular expressions and create a lexical analyzer with the flex tool. • describe the purpose, the individual stages and the different algorithmic strategies of syntax analysis • apply manually the algorithms relevant to syntax analysis • express languages in terms of BNF grammars and build basic syntax analyzers using the bison tool • describe the structure and purpose of compiler intermediate representation. • be able to practically produce and visualize an intermediate representation with the flex, bison tools for a given grammar • be able to describe the purpose of semantic analysis and the two basic strategies: 1) syntax directed definition and 2) syntax directed translation • describe the phases and types of compiler back-ends
Prerequisite courses:	Programming II
Teaching methods:	Lectures 2 hours weekly + Laboratory 2 hours weekly.
Course contents:	Introduction, Compiler Structure and Phases, Lexical Analysis, Syntax Analysis, Intermediate Representations, Semantic Analysis, Compiler Back-End
Recommended or required readings:	• Compilers: Principles, Techniques, and Tools, Alfred V. Aho, Monica S. Lam, Ravi Sethi, and Jeffrey D. Ullman 2^{nd} Edition, Addison Wesley • Engineering a Compiler, Second Edition, Keith Cooper and Linda Torczon, Elsevier • Flex & Bison: Text Processing Tools**,** John Levine, OReilly 1^{st} edition
Assessment methods:	The result grade will be the mean (50% written exams + 50% laboratory) of written exams and laboratory grades. Student's performance in the laboratory will be assessed by two means 1) Students' performance first time attending the laboratory will be accessed by in-the-class exams (oral or written) during each laboratory's duration 2) Students' performance failed to pass the course regularly, will have to give separate exams for the laboratory in the regular exam period. To pass successfully the course the following prerequisites should be met: 1) the written exams grade should be no less than 50/100 and 2) The student should attend at least the 80% of the laboratory courses and 3) Written and laboratory grades must derive from the same academic year.
Language of instruction:	Greek

Course Name:	Computer Security
Course Type:	Specialization basic (Specialization on Informatics)
Course Level:	Undergraduate (1^{oc} cycle)
Year/Semester:	3^{o} year / 5^{o} semester
Number of ECTS credits:	5
Name of lecturer:	Nicholas Kolokotronis
Learning outcomes:	Students that succeed in this course should be able to: • describe basic principles of services and mechanisms to ensure confidentiality and integrity. • apply ways of protecting information in most layers of OSI • evaluate the impact in the security of mechanisms of certain parameter choices • describe well-known attacks and the weaknesses that they exploit.
Prerequisite courses:	Communication Networks I
Teaching methods:	Lectures, 4 hours weekly.
Course contents:	Introduction (threats, security services and measures), topics in cryptography (symmetric cryptography, public–key cryptography, hash functions), public–key infrastructures (digital signatures, certificates, trusted third parties, architectures, technologies), identity authentication (passwords, tokens, Kerberos, identity management), security protocols (SSL/TLS, IPSec, SSH), application security (operating systems, e-mail, firewalls), firewalls and intrusion detection systems
Recommended or required readings:	• W. Stallings Cryptography and Network Security: Principles and Practice, 4th Ed., Prentice Hall, 2006 • W. Stallings Network Security Essentials: Applications and Standards, 4th Ed., Prentice Hall, 2006
Assessment methods:	Written exams (70%) at the end of the semester and projects (30%), where the percentage may vary up to ±10%.
Language of instruction:	Greek

Course Name:	Human Computer Interaction
Course Type:	Specialization basic
Course Level:	Undergraduate
Year/Semester:	3rd year / 5th semester
Number of ECTS credits:	5
Name of lecturer:	Lepouras, George
Learning outcomes:	At the end of the lectures the students should: • Know the User Interface development lifecycle • Be able to design a usable interface • Be able to select the most prominent UI evaluation technique
Prerequisite courses:	Programming I or Programming II
Teaching methods:	Lectures, 4 hours weekly plus laboratory hours
Course contents:	Introduction to Human Computer Interaction, The user, The Computer, Their Interaction. Basic principles of usability. Development life cycle. User requirements capture. UI design. User modelling. Tools for UI development. UI evaluation. Help and documentation.
Recommended or required readings:	• Dix, Finlay, Abowd, Beale, Human Computer Interaction, 3rd edition (Greek edition from Giourdas). • Interaction Design: Beyond Human-Computer Interaction, Helen Sharp, Yvonne Rogers, Jenny Preece Also: course notes in Greek
Assessment methods:	Group project and Final exam. A group project consisting a small tasks will be given. The project is compulsory and corresponds to 40% of the total mark. Final exam. The final exam corresponds to the 60% of the total mark. These percentages may change from year to year (up to +/- 10%). Passing grade: a student has to get at least 4.5/10 at each assessment method (project, final exam) and the total mark should be at least 5/10
Language of instruction:	Greek

Course Name:	Software Engineering
Course Type:	Specialization basic
Course Level:	Undergraduate
Year/Semester:	4th year / 7th semester
Number of ECTS credits:	5
Name of lecturer:	Costas Vassilakis
Learning outcomes:	On completion of this course, students are expected to be able to: • describe the goals of software engineering, the basic concepts, the methodologies used and the tools supporting them. • describe the software life cycle, the phases it comprises of and the activities taking place in each phase. Additionally, be able to shape the life cycle of a small scale software development project • describe the aspects that should be taken into account while developing software (usability, performance, human and organizational factors etc.) as well as the impact of each aspect • describe and create/use the most commonly used UML diagrams (use case diagrams, class diagrams, sequence diagrams, state machine diagrams, deployment diagrams) • describe the processes of requirement elicitation and analysis and the tools they use and be able to perform these processes • describe the design processes, the tools and the criteria used therein, and be able to design a system • describe and carry out the processes and techniques of writing code according to the design and testing the code • describe how a project is organized and the structure of communication among the project participants
Prerequisite courses:	Object-oriented programming
Teaching methods:	Lectures, 4 hours weekly
Course contents:	Introduction. Software development paradigms – software life cycle models. Requirements – analysis, specification and validation. Design. Software architecture. Detailed design. Implementation and testing. Project organization and phases, team organization and communication.
Recommended or required readings:	• «Software Engineering», I. Sommerville • «Software Engineering», E. Giakoumakis & N. Diamantidis • «Object-Oriented Software Engineering Using UML, Patterns and Java», B. Bruegge & A. Dutoit • «Software Engineering A Practitioner's Approach», Roger S. Pressman • «Object-Oriented and Classical Software Engineering», Stephen R. Schach
Assessment methods:	Mandatory home assignments with a weight ranging from 30% to 50% and written exams, with a weight ranging from 70% to 50%. In order for a student to succeed in the course, s/he must meet the threshold of 40% in both home assignments and written exams, and the student's weighted average should be 5 or more.
Language of instruction:	Greek

Course Name:	Wireless and Mobile Communications I
Course Type:	Specialization Compulsory
Course Level:	Undergraduate (1st cycle)
Year/Semester:	3rd year / 5th semester
Number of ECTS credits:	5
Name of lecturer:	George Tsoulos
Learning outcomes:	Students that succeed in this course should be able to: • describe the different types of cell structures. • explain why and how frequency reuse is used in cellular systems • describe the different types of interference in cellular systems • describe how cellular systems can accommodate large number of users in a limited radio spectrum using the trunking concept • calculate the performance of a wireless communication system • describe how mobility affects performance • describe how radio resources can be assigned to users • describe ways to improve performance and calculate the improvement
Prerequisite courses:	Principles of Telecommunication Systems or Signals and Systems
Teaching methods:	Lectures, 4 hours weekly.
Course contents:	Introduction to wireless and mobile communication systems. Principles of cellular systems. Frequency reuse. Co-channel and adjacent channel interference and system capacity. Trunking and grade of service. Channel assignment strategies. Improving coverage and capacity in cellular systems.
Recommended or required readings:	• Mobile and Personal Communication Networks, M.Theologou • Wireless Communication Systems, A.Kanatas, P.Constantinou, G.Pantos
Assessment methods:	Written exams at the end of the semester. It is possible that home assignments will be given, which will contribute to the final grade with a percentage ranging between 10% and 20%.
Language of instruction:	Greek

Course Name:	Digital Communications
Course Type:	Specialization compulsory
Course Level:	Undergraduate (1st cycle)
Year/Semester:	3rd year / 5th semester
Number of ECTS credits:	5
Name of lecturer:	Sagias Nikos
Learning outcomes:	Students that succeed in this course: • Will acquire an understanding on basic concepts related to source coding • Will acquire an understanding on sampling process • Will be able to identify the differences between ideal and practical sampling process • Will understand quantization techniques and encoding methods • Will be able to define and present the characteristics of a quantizer given the signal quality • Will develop abilities for design of PCM systems • Will acquire an understanding on baseband modulation techniques and waveforms • Will be able to give a geometric representation to signals and to design the appropriate receiver • Will acquire an understanding on passband modulations (ASK, PSK, FSK) • Will be able to design optimum receive and transmit filters for zero intersymbol interfererence • Will be able to define and present the requirements in terms of bandwidth and power for optimum performance of digital communication systems
Prerequisite courses:	Signals and Systems
Teaching methods:	Lectures, 4 hours weekly Laboratory, 1 hour weekly
Course contents:	Digital transmission, baseband systems, binary and multilevel PAM and PPM systems, bit error probability calculation, performance analysis, digital signals spectra, signals geometric representation, matched filters, correlators, detectors, intersymbol interference (ISI, equalisers) and noise. Digital data transmission through carrier modulation, binary and multilevel ASK, FSK, PSK and DPSK modulations, ideal receivers and performance comparison, power and bandwidth requirements. Elements of sampling theory, quantization methods and coding. PCM, DPCM and delta modulation systems, TDM multiplexing. Noise theory. Impact of quantization and channel noise on the Signal-to-Noise-Ratio. Comparison of analog and digital signal transmission methods.
Recommended or required readings:	• J. G. Proakis and M. Salehi, “Communication Systems Engineering”, 2nd edition, Prentice Hall, 2001. • S. Haykin, “Communication Systems”, 4th edition, Wiley, 2000. • T. Rappaport, “Wireless communications: Principles and Practice”, 2nd edition, Prentice Hall, 2002.
Assessment methods:	Written exams at the end of the semester.in both theory and laboratory with a percentage 70% and 30%, respectively.
Language of instruction:	Greek

Course Name:	Cryptography
Course Type:	Specialization elective (Specialization on Informatics)
Course Level:	Undergraduate (1^{oc} cycle)
Year/Semester:	4th year / 7th semester
Number of ECTS credits:	5
Name of lecturer:	Nicholas Kolokotronis
Learning outcomes:	Students that succeed in this course should be able to: • describe basic principles in using cryptographic algorithms in order to provide confidentiality and integrity. • apply main design methodologies to develop own ciphers • evaluate the strength cryptographic algorithms based on design building blocks • apply well-known cryptanalytic techniques.
Prerequisite courses:	Mathematics I or Discrete Mathematics
Teaching methods:	Lectures, 4 hours weekly.
Course contents:	Introduction (applications, algorithms classification, attack models), classical ciphers (permutation, mono– & poly–alphabetic substitution, perfect secrecy, classical cryptanalysis), stream ciphers (generator models, Golomb's postulates, Berlekamp–Massey algorithm, linear complexity, cryptanalysis), block ciphers (Feistel structure, substitution–permutation networks, modes of operation, differential and linear cryptanalysis), public–key cryptography (principles, RSA algorithm and Rabin, ElGamal, McEliece systems, probabilistic algorithms, attacks), digital signatures (Fiat-Shamir, Feige-Fiat-Shamir, Schnorr and others, one-time signatures, attacks), hash functions.
Recommended or required readings:	• M. Burmester, *et al.*, *Modern Cryptography – Theory and Applications*. Papasotiriou Pubs, 2011
Assessment methods:	Written exams (70%) at the end of the semester and projects (30%), where the percentage may vary up to ±10%.
Language of instruction:	Greek

Course Name:	Mathematical Modeling and Complex Networks
Course Type:	Specialization elective
Course Level:	Undergraduate (1st cycle)
Year/Semester:	4th year / 7th semester
Number of ECTS credits:	5
Name of lecturer:	Vlachos Dimitrios
Learning outcomes:	Students that succeed in this course should be able to: • Understand the complexity theory and the theory of critical phenomena • Understand the building blocks of complex networks • Apply dynamical and evolutionary processes to complex networks • Understand the architecture and function of important physical networks
Prerequisite courses:	Probabilities and statistics, Physics, Object-oriented programming
Teaching methods:	Lectures, 4 hours weekly.
Course contents:	Introduction to the theory of complexity, critical phenomena, percolation, fractals. Complex networks, network evolution models, correlations, communities and modularity, clusters, centrality, self-similarities. Dynamical process in complex systems, information spreading, epidemics, evolutionary processes in complex networks. Study of the Internet (physical layer), Web, social and economic networks, biological networks, discrete geometries.
Recommended or required readings:	• Lecture notes • Linked: The New Science of networks, A-L Barabasi • Large Scale Structure and Dynamics of Complex Networks, G. Caldarelli, A. Vespignani
Assessment methods:	Five sets of homework with total weight 25% and 3 hours written exams with weight 75%.The relevant weights can be changed (+/-10%).
Language of instruction:	Greek

Course Name:	Advanced User Interfaces - Virtual Reality
Course Type:	Specialization elective
Course Level:	Undergraduate
Year/Semester:	4th year / 7th semester
Number of ECTS credits:	5
Name of lecturer:	-
Learning outcomes:	At the end of the lectures the students should be able to: • Understand the Virtual Reality System's development life-cycle • Identify the best technologies at hand • Develop a simple Virtual Reality application
Prerequisite courses:	Human-Computer Interaction and Graphics
Teaching methods:	3 hours lectures and 1 hour lab per week
Course contents:	Introduction to Virtual Reality, Human Factors, Virtual Reality I/O technologies, Content development tools and techniques, User interaction design and development, System intergration.
Recommended or required readings:	• 3D User Interfaces: Theory and Practice, Doug A. Bowman, Ernst Kruijff, Joseph J. LaViola, Jr., Ivan Poupyrev. • Virtual Reality Technology, Second Edition with CD-ROM, Grigore C. Burdea, Philippe Coiffet Also: class notes in Greek
Assessment methods:	Group project and Final exam. A group project consisting a small tasks will be given. The project is compulsory and corresponds to 40% of the total mark. Final exam. The final exam corresponds to the 60% of the total mark. These percentages may change from year to year (up to +/- 10%). Passing grade: a student has to get at least 4.5/10 at each assessment method (project, final exam) and the total mark should be at least 5/10
Language of instruction:	Greek

Course Name:	Computational geometry
Course Type:	Elective in Infomatics Direction
Course Level:	Undergraduate (1st cycle)
Year/Semester:	4th year / 8th semester
Number of ECTS credits:	6
Name of lecturer:	Theocharis Malamatos
Learning outcomes:	Students that succeed in this course should be able to: • recognize basic notions of computational geometry and describe fundamental geometric algorithms. • design efficient algorithms for computational geometry problems.
Prerequisite courses:	(Data structures) or (Algorithms and complexity)
Teaching methods:	Lectures, 4 hours weekly.
Course contents:	Convex hulls. Segment intersection. Polygon triangulation. Halfplane intersection. Lower envelopes and Duality. Orthogonal range searching. Point location. Voronoi diagrams. Delaunay triangulations. Line arrangements. Linear programming.
Recommended or required readings:	• M. de Berg, O. Cheong, M. Van Kreveld, M. Overmars, Computational Geometry Algorithms and Applications, Crete University Press, Heraklion, 2011. (Greek edition) • I. Z. Emiris, Computational Geometry: A modern algorithmic approach, Kleidarithmos, Athens, 2008. (in Greek)
Assessment methods:	Assignments with weight 50% and written exam.
Language of instruction:	Greek

Course Name:	Numerical Analysis
Course Type:	Specialization elective
Course Level:	Undergraduate (1st cycle)
Year/Semester:	3rd year / 6th semester
Number of ECTS credits:	6
Name of lecturer:	Theodore E. Simos
Learning outcomes:	Students that succeed in this course should be able to: • describe the basic principles of Numerical Analysis. • describe the way of constructing and analyzing numerical methods • describe how to modified methods to solve specific real world problems • program methods of Numerical Analysis in a MATLAB environment
Prerequisite courses:	
Teaching methods:	Lectures, 4 hours weekly.
Course contents:	Introduction to Numerical Analysis. Errors: Errors in calculations. Interpolation: Introduction, Lagrange Interpolation, Newton Interpolation, Difference Quotient, Finite Differences, Newton-Gregory Polynomials, Correction in Interpolation. Approximation Theory: Introduction, Polynomial Approximation, Least Squares Theory, Chebyshev Technique. Numerical Differentiation: Introduction, Method of Undetermined Coefficients. Numerical Integration: Introduction, Newton-Cotes Methods, Method of Undetermined Coefficients. Numerical Solution of Nonlinear Equations: Introduction, Bisection Method (Bolzano), Fixed Point Iteration Method, Method of Newton-Raphson.
Recommended or required readings:	• G. Avdelas, T. Simos, Numerical Analysis, Symeon, Athens, 2004. (in Greek) • G. Papageorgiou, C. Tsitouras, Numerical Analysis with Applications in Matlab and Mathematica, Symeon, Athens, 2004. (in Greek)
Assessment methods:	Written exams at the end of the semester. It is possible that home assignments will be given, which will contribute to the final grade with a percentage ranging between 15% and 25%.
Language of instruction:	Greek

Course Name:	Combinatorial Optimization
Course Type:	Specialization elective
Course Level:	Undergraduate (1st cycle)
Year/Semester:	4th year / 8th semester
Number of ECTS credits:	6
Name of lecturer:	Theodore E. Simos
Learning outcomes:	Students that succeed in this course should be able to: • describe the mathematical model of a problem. • find feasible or optimal solutions • use the Octave software for solving computationally combinatorial optimization problems
Prerequisite courses:	
Teaching methods:	Lectures, 4 hours weekly.
Course contents:	Introduction to optimization. Introduction to mathematical modeling. Graphical method. Simplex method. Duality theory. Robustness analysis. Extensions of linear programming (network, game and transportation problems). Computer applications.
Recommended or required readings:	• G. Avdelas, T. Simos, Introduction to Operational Research, Symeon, Athens,2006. (in Greek) • P. Kiochos, G. Thanos, D. Salamouris, Operational Research, Synchroni Ekdotiki, 2002. (in Greek)
Assessment methods:	Written exams at the end of the semester. It is possible that home assignments will be given, which will contribute to the final grade with a percentage ranging between 35% and 50%.
Language of instruction:	Greek

Course Name:	Advance topics on data and information management
Course Type:	Specialization elective
Course Level:	Undergraduate (1st cycle)
Year/Semester:	3nd year / 5th semester
Number of ECTS credits:	6
Name of lecturer:	Skiadopoulos Spiros
Learning outcomes:	At the end for the course, the student will be familiar with the current trends in data and information management.
Prerequisite courses:	Databases
Teaching methods:	Lectures, 4 hours weekly and lab/exercises, 1 hours weekly
Course contents:	Distributed databases. Databases and XML. OLAP. Object relational databases. Spatial and spatiotemporal data management. Constraint databases. Semantic web. RDF and SPARQL. Data models and query languages for linked data. Anonymity and privacy.
Recommended or required readings:	• A Semantic Web Primer, Grigoris Antoniou, Frank van Harmelen (http://www.coma.fsb.hr/katedra/download/A%20Semantic%20Web%20Primer.pdf). • Information Sharing on the Semantic Web, H. Stuckenschmidt and F. van Harmelen. Springer.
Assessment methods:	Written exercises and implementation of a project during semester and written exams at the end of the semester. The final grade results in by taking into account the respective marks of exercises (10-20%), project (30-40%) and final examination (50-80%).
Language of instruction:	Greek

Course Name:	Information Retrieval
Course Type:	Specialization elective
Course Level:	Undergraduate (1st cycle)
Year/Semester:	4th year / 7th semester
Number of ECTS credits:	5
Name of lecturer:	Tryfonopoulos Christos
Learning outcomes:	Students that succeed in this course should be able to: • describe fundamental concepts and theory in the area of Information Retrieval, • describe and implement fundamental algorithms and methods used to index, search, cluster, browse, rank and filter information, • design, develop, and evaluate novel algorithms and techniques for performing Information Retrieval and Data Management on the Web.
Prerequisite courses:	(Programming II OR Object-Oriented Programming OR Advanced issues in Programming) AND Data Structures
Teaching methods:	Lectures 4 hours weekly, and laboratory/tutorial exercises 1 hour weekly.
Course contents:	Web search basics. Document preprocessing, analysis, storage and indexing. Retrieval models (Boolean/Vector Space/ Probabilistic). Tolerant retrieval. Evaluation measures and standard test collections. Document clustering (flat/hierarchical). Link analysis. Frequent itemset mining. XML retrieval. Relevance feedback and query expansion. Latent semantic indexing.
Recommended or required readings:	• Google's PageRank and Beyond: The Science of Search Engine Rankings, A.N. Langville, C.D. Meyer • Introduction to Information Retrieval, C.D. Manning, P. Raghavan, H. Schütze • A Semantic Web Primer, G. Antoniou, F. van Harmelen
Assessment methods:	The course grade will be based on programming projects (possibly involving a personal examination) and/or exercises (in-class or homework) that will jointly account for 50% of the final grade, and a 3-hour written examination that will account for the remaining 50% of the final grade. These percentages may vary (+/-10%) each year.
Language of instruction:	Greek

Course Name:	Semantic web
Course Type:	Specialization elective
Course Level:	Undergraduate (1st cycle)
Year/Semester:	3rd year / 6th semester
Number of ECTS credits:	5
Name of lecturer:	Wallace Manolis
Learning outcomes:	Students that succeed in this course should be able to: • explain the notion of the semantic web • εξηγεί την έννοια του σημασιολογικού ιστού • identify application fields for semantic web technology • create XML documents • read and explain RDF/OWL documents • design and develop simple ontologies • list the different forms of uncertainty and explain their differences
Prerequisite courses:	None
Teaching methods:	Lectures, 4 hours weekly
Course contents:	Introduction to the vision of the Semantic Web, structured web documents: XML, resource description framework: RDF, web ontology language: OWL, logic and inference: rules, ontology engineering, uncertainty, representation of uncertain knowledge, applications
Recommended or required readings:	A Semantic Web Primer (in Greek) Grigoris Antoniou and Frank van Harmelen, Klidarithmos Press, 2009
Assessment methods:	At least three individual assignments with a total weight of 30%, intermediate theory examination with a weight of 20%, final theory examination with a weight of 50%. Additional optional practical design and implementation assignments will be made available, which will contribute to the final grade to a percentage up to 40%, in the case that they result in a fully functional actual system according to the set specifications.
Language of instruction:	Greek

Course Name:	Computer Architecture II
Course Type:	Specialization elective
Course Level:	Undergraduate (1^{st} cycle)
Year/Semester:	3^{rd}year / 6^{th} semester
Number of ECTS credits:	5
Name of lecturer:	
Learning outcomes:	Students that succeed in this course should be able to: • describe the basic techniques of instruction level parallelism for enhancing performance in general purpose processors • describe the basic techniques of data level parallelism in SIMD (Single Instruction Multiple Data), Vector and GPU (Graphics Processing Units) architectures • to describe the basic techniques to exploit thread level parallelism in parallel systems with distributed or shared memory architectures • apply the algorithms of memory coherency protocols for shared and distributed memory architectures • describe the structure and models of warehouse scale computers and describe the algorithms for exploiting request-level and data level parallelism. • apply existing techniques for memory hierarchy design • assess performance of parallel computer systems
Prerequisite courses:	Computer Architecture I
Teaching methods:	Lectures 4 hours weekly.
Course contents:	Introduction, Instruction Level Parallelism, Pipeline Hazards, Static & Dynamic Scheduling, Hardware Speculation, Multithreading, Vector Architectures, Graphics extensions in SIMDs, GPUs, Data level parallelism, Shared Memory Architectures, Distributed Memory Architectures, Multicore Performance Issues, Warehouse Scale Computing
Recommended or required readings:	• Computer Architecture. A Quantitative Approach 5th Edition John L. Hennessy (Author), David A. Patterson (Translated in Greek 4^{th}edition) • Parallel Computer Architecture by David Culler, J.P. Singh and Anoop Gupta 1^{st} Edition
Assessment methods:	Written exams at the end of the semester. It is possible that home assignments will be given, which will contribute to the final grade with a percentage ranging between 10% and 50%.
Language of instruction:	Greek

Course Name:	Distributed Information Management
Course Type:	Specialization elective
Course Level:	Undergraduate (1st cycle)
Year/Semester:	4th year / 7th semester
Number of ECTS credits:	5
Name of lecturer:	Tryfonopoulos Christos
Learning outcomes:	Students that succeed in this course should be able to: • describe fundamental concepts and algorithms as applied in areas such as the Web, peer-to-peer and distributed/parallel systems, • design, develop, and evaluate fundamental algorithms and systems in the area of Distributed Information Management • identify and record important research questions in the area of Distributed Information Management.
Prerequisite courses:	Databases AND Data Structures
Teaching methods:	Lectures 4 hours weekly.
Course contents:	Distributed Information Retrieval (crawling, distributed indexes, link analysis). Distributed/peer-to-peer data and information management (in unstructured, structured, and self-organising environments). (Distributed) Information Filtering. Social data/information management. (Distributed) Digital libraries, Distributed/Palallel data computation (Map/Reduce, Hadoop, Pregel, Cassandra). Personalisation (user profiles, collaborative information filtering).
Recommended or required readings:	• Course notes written by the instructor • Papers in the areas described in Section “Course contents”
Assessment methods:	The course grade will be based on programming projects (possibly involving a personal examination) and/or exercises (in-class or homework) that will jointly account for 40% of the final grade, survey and presentation of topics related to the course that will account for 30% of the final grade, and a 3-hour written examination that will account for the remaining 30% of the final grade. These percentages may vary (+/-10%) each year.
Language of instruction:	Greek

Course Name:	Compilers II
Course Type:	Specialization elective
Course Level:	Undergraduate (1st cycle)
Year/Semester:	4th year / 7th semester
Number of ECTS credits:	5
Name of lecturer:	
Learning outcomes:	Students that succeed in this course should be able to: • describe the characteristics and purpose of intermediate representations • describe the characteristics of computer languages' type systems • describe the algorithms and techniques from high to medium level intermediate representation • describe the characteristics and functionality of runtime environments • describe the purpose of dependence checking and apply the Delta dependence test • describe the purpose and apply the basic algorithms of data flow analysis • describe and apply the algorithms of the basic stages of code generation (instruction selection, scheduling and register allocation) • describe and apply optimizing loop transformations • describe and apply the basic design patterns for compiler construction
Prerequisite courses:	Compilers I
Teaching methods:	Lectures 2 hours weekly + Laboratory 2 hours weekly.
Course contents:	Introduction, Intermediate Representations, Languages' Type Systems characteristics, Medium Level Intermediate Representation generation, Dependence Analysis, Data Flow Analysis, Instruction Selection, Scheduling, Register Allocation, Optimizing Loop Transformations, Design Patterns for Compilers
Recommended or required readings:	• Programming Language Pragmatics, Michael Scott, 3rd Edition (Translated 2nd edition) • Engineering a Compiler, Second Edition, Keith Cooper and Linda Torczon, Elsevier • Flex & Bison: Text Processing Tools**,** John Levine, OReilly 1st edition
Assessment methods:	The result grade will be the mean (50% written exams + 50% laboratory) of written exams and laboratory grades. Student's performance in the laboratory will be assessed by two means 1) Students' performance first time attending the laboratory will be accessed by in-the-class exams (oral or written) during each laboratory's duration 2) Students' performance failed to pass the course regularly, will have to give separate exams for the laboratory in the regular exam period. Also, it is possible to substitute laboratory obligations with a project that may count for at most 80% of the final course grade To pass successfully the course the following prerequisites should be met: 1) the written exams grade should be no less than 50/100 and 2) The student should attend at least the 80% of the laboratory courses (this constraint holds without project assignment) and 3) Written and laboratory/project grades must derive from the same academic year.
Language of instruction:	Greek

Course Name:	Parallel Algorithms
Course Type:	Specialization elective
Course Level:	Undergraduate (1st cycle)
Year/Semester:	4th year / 7th semester
Number of ECTS credits:	5
Name of lecturer:	Vlachos Dimitrios
Learning outcomes:	Students that succeed in this course should be able to: • Analyze and design parallel algorithms using the channel-task model • Deploy a parallel algorithm using the MPI interface • Analyze the speed-up of a parallel algorithm • work with basic parallel algorithms especially those applied in search problems and array calculation
Prerequisite courses:	Programming I or Programming II
Teaching methods:	Lectures, 4 hours weekly.
Course contents:	The task/channel model, Foster's design methodology, the n-body problem, Message Passing Programming, benchmarking parallel performance, Floyd's algorithm, performance analysis, Amdahls law, the Karp-Flatt metric, matrix-vector multiplication, matrix multiplication, sorting, combinatorial search, divide and conquer, parallel alpha-beta search
Recommended or required readings:	• Lecture notes • Parallel Programming in C with MPI and OpenMP, M.J. Quinn
Assessment methods:	Five sets of homework with total weight 25% and 3 hours written exams with weight 75%.The relevant weights can be changed (+/-10%).
Language of instruction:	Greek

Course Name:	Systems Programming
Course Type:	Specialization elective
Course Level:	Undergraduate
Year/Semester:	3rd year / 5th semester
Number of ECTS credits:	5
Name of lecturer:	-
Learning outcomes:	On completion of this course, students are expected to be able to: • describe the most important Unix standards and implementations and write code that can be compiled and run without changes on any system • query and set resource limits for processes • use tools for static code correctness checking • use library and system calls to read, write and manage files and directories • use library and system calls to manage processes and their environment, as well as to create and use dynamically linked libraries • use pipes, named pipes, semaphores, shared memory, message queues and sockets for interprocess communication and synchronization • write multi-threaded programmes and use library and system calls to manage and synchronize threads
Prerequisite courses:	Programming II and Operating systems
Teaching methods:	Lectures, 3 hours weekly and Laboratory exercise, 1 hour weekly
Course contents:	Introduction. Basic concepts. Standards and implementations. Limits management. Input-output for files and directories. Processes. Signals. Interprocess communications. Threads.
Recommended or required readings:	• «Linux Application Development», Johnson Michael • «Advanced Programming in the Unix Environment», W. Richard Stevens, Stephen A. Rago • «Unix Network Programming», Richard Stevens • «Unix™ Systems Programming: Communication, Concurrency, and Threads», Steven Robbins, Kay Robbins
Assessment methods:	Mandatory home assignments with a weight ranging from 30% to 40% and written exams, with a weight ranging from 70% to 60%. In order for a student to succeed in the course, s/he must meet the threshold of 40% in both home assignments and written exams, and the student’s weighted average should be 5 or more.
Language of instruction:	Greek

Course Name:	Data Management Systems
Course Type:	Specialization elective
Course Level:	Undergraduate (1^{st} cycle)
Year/Semester:	4^{th} year / 7^{th} semester
Number of ECTS credits:	5
Name of lecturer:	Tryfonopoulos Christos
Learning outcomes:	Students that succeed in this course should be able to: • describe fundamental concepts and theory related to the architecture and functionality of a Data Management System, • describe, analyse, and implement fundamental tools and techniques used in Data Management Systems, • design and develop novel algorithms and techniques related to the area of data management.
Prerequisite courses:	Databases AND Data Structures
Teaching methods:	Lectures 4 hours weekly, and laboratory/tutorial exercises 1 hour weekly.
Course contents:	Architecture of database systems. Disks and files (memory hierarchy, RAID, file organization – heap/ordered/hash/clustered files). System catalogs and record storage. Tree-structured (ISAM, B-trees, B+ trees) and hash-based (static/extendible/linear) indexing. Query processing and optimization (selection, projection, join, groupby). Transaction processing and management (schedules and serializability). Concurrency control and crash recovery. Parallel and distributed databases. Special types of databases.
Recommended or required readings:	• Fundamentals of Database Systems, R. Elmasri - S.B. Navathe • Database Management Systems, R. Ramakrishnan, J. Gehrke • Database System Concepts, A. Silberschatz, H.F. Korth, S. Sudarshan • Database Systems: The Complete Book, H. Garcia-Molina, J.D. Ullman, J. Widom
Assessment methods:	The course grade will be based on programming projects (possibly involving a personal examination) and/or exercises (in-class or homework) that will jointly account for 50% of the final grade, and a 3-hour written examination that will account for the remaining 50% of the final grade. These percentages may vary (+/-10%) each year.
Language of instruction:	Greek

Course Name:	Artificial intelligence
Course Type:	Specialization elective
Course Level:	Undergraduate (1st cycle)
Year/Semester:	3nd year / 5th semester
Number of ECTS credits:	6
Name of lecturer:	Skiadopoulos Spiros
Learning outcomes:	This course discusses some fundamental notions of artificial intelligence. At the end for the course, the student will be familiar with some of the key subareas of artificial intelligence.
Prerequisite courses:	Databases
Teaching methods:	Lectures, 4 hours weekly and lab/exercises, 1 hours weekly
Course contents:	Solving problems with search agents. Searching strategies: breadth-first search, uniform-cost search, depth-first search, depth-limited search, iterative deepening depth-first search, bi-directional search. Heuristic functions: greedy best-first search, A*-search. Local search. Constraint satisfaction problems. Agents for knowledge representation and reasoning. Propositional and first order logics. Knowledge base design. Reasoning systems: modus ponens, unification, forward and backward chaining, resolution. Introduction to logic programming and Prolog.
Recommended or required readings:	• Artificial Intelligence: A Modern Approach, Stuart Russell and Peter Norvig.
Assessment methods:	Written exercises and implementation of a project during semester and written exams at the end of the semester. The final grade results in by taking into account the respective marks of exercises (10-20%), project (30-40%) and final examination (50-80%).
Language of instruction:	Greek

Course Name:	Wireless Links
Course Type:	Elective
Course Level:	Undergraduate (1st cycle)
Year/Semester:	3rd year / 6th semester
Number of ECTS credits:	4
Name of lecturer:	Georgia Athanasiadou
Learning outcomes:	Students that succeed in this course should be able to: • Identify the basic propagation mechanisms. • Produce the statistical characteristics of the wireless channel from the impulse response. • Select the appropriate path loss model according to the propagation environment. • Estimate the outage probability of a system in different propagation environment based on link budget calculations. • Characterize the wireless channel according to the small scale fading (flat/frequency selective fading, fast/slow fading). • Describe the measurement principles of wideband channel sounders.
Prerequisite courses:	Electromagnetic Fields or Principles of Telecommunication Systems
Teaching methods:	Lectures, 4 hours weekly. Laboratory, 1 hour weekly. (optional)
Course contents:	Free Space Transmission and wireless links (Friis equation). Transmission over Irregular Terrain (Huygen principle, Uniform Theory of Diffraction, Fresnel Zones), path loss for line- and non-line of sight transmission, shadowing, attenuation models (Okumura-Hatta, Walfisch-Bertoni, COST231, etc. Characterization of multi-path effects (time and space characteristics, mechanisms and models), Doppler shift. Transmission characteristics in operational environments (indoor-outdoor, pico-, micro- cells, statistical and empirical and deterministic channels). Coverage calculations. Calculation and modeling methods for EM waves transmissions. Application and practice.
Recommended or required readings:	• Wireless Communications - Principles and Practice, Rappaport Theodore • *Radio* Propagation *for Modern Wireless Systems*, Henry L. Bertoni • *Radio Propagation in earth environment,* J. Kanellopoulos (in Greek)
Assessment methods:	Written exams at the end of the semester. It is possible that home assignments will be given which will contribute to the final grade with a percentage ranging between 10% and 20%.
Language of instruction:	Greek

Course Name:	Telephone Networks
Course Type:	Specialization elective
Course Level:	Undergraduate (1st cycle)
Year/Semester:	3rd year / 2nd semester
Number of ECTS credits:	5
Name of lecturer:	Yiannopoulos Konstantinos
Learning outcomes:	Students that succeed in this course should be able to: • Describe and explain the basic operation of the public switched тelephone network (PSTN) • Describe and explain the concepts of multiplexing, switching and routing in a telephone network • Describe and explain plesiosynchronous and synchronous digital hierarchies • Describe and explain analogue and digital signaling, with emphasis given on signaling system 7 • Describe and explain the requirements and operation of intelligent networks • Describe and explain the basic operation of end-user access technologies (mainly xDSL) • Solve basic and advanced problems on switching, routing, multiplexing and signaling in telephone networks
Prerequisite courses:	-
Teaching methods:	Lectures, 4 hours weekly.
Course contents:	• Introduction to Telephone Networks: Network Architecture and Telephone Exchange Hierarchy, Voice Requirements, Signaling • Analogue Local Loop and User End: Telephones (Microphone, Speaker, Bell, Dialer), Local Loop Architecture (Twisted Pair, Box, SLIC), Analogue Local Loop Signaling • Digital Telephone Networks: Analogue (FDM) vs Digital (TDM) Telephony, Digital Transmission Hierarchies (ITU Standards) • Voice Digitization: Voice Spectrum, PAM and PCM Systems, Voice Sampling, Voice Quantization (A-Law, μ-Law, Quantization Noise), Voice Compression (DPCM and Delta Modulation) • Digital Switching: Space Switching, Crossbar Switch, Clos 3-Stage Non-Blocking Switch and Clos Theorem, Blocking Probability, Time-Domain Switching, Combined Space-Time Switching, Digital Crossconnects, Digital Switching Hierarchies • Voice in SONET/SDH and ATM Networks: SONET Frame Architecture and Rates, Virtual Tributaries, Voice Capacity of SONET Networks, SDH Frame Architecture and Rates, Virtual Containers, Voice Capacity of SDH Networks, ATM Layer Architecture, Description of AAL-1 and AAL-2, Voice Transport in AAL-1 and AAL-2 • Signaling in Telephone Networks: Channel Associated Signaling in FDM and TDM Systems (CCITT-R1, CCITT-R2, CCITT #5), Common Channel Signaling (SS6, SS7), Signaling System 7 Architecture (SSPs, SCPs, STPs) and Layers (MTP 1-3, TUP, ISUP, SSCP, TCAP) • Intelligent Networks: Intelligent Network Architecture, Formal Call Model, Applications (Portability, Call Forwarding, Toll Free Calls, 800- Calls and Number Translation, Time-of-Day Routing, Private Virtual Network) • Access Networks: xDSL basics (multiplexing modulation/demodulation), access architecture, protocol stack (PPPoE, PPPoA), equipment (DSLAMs, BRAS), technologies (ADSL, SDSL, VDSL)
Recommended or required reading:	• E. Billis, "Automated Telephony," Symmetria • J. C. Bellamy, "Digital telephony," Wiley

readings:	• J.C. Bellamy, "Digital telephony," Willey • L. Dryburgh and J. Hewett, "Signaling System No. 7 (SS7/C7): Protocol, Architecture, and Services," Cisco Press
Assessment methods:	Written exams at the end of the semester.
Language of instruction:	Greek

Course Name:	Wireless and mobile communications II
Course Type:	Specialization Elective
Course Level:	Undergraduate (1st cycle)
Year/Semester:	3rd year / 6th semester
Number of ECTS credits:	5
Name of lecturer:	Kaloxylos Alexandros
Learning outcomes:	Students that succeed in this course should be able to: • describe the fundamental principles of operation in cellular networks (GSM, GPRS, UMTS, LTE-SAE) • compute the values for parameters that are evaluated during the execution of handovers • evaluate the signaling load that is needed for mobility management protocols (e.g., location management) • evaluate basic parameters that are related to the dimensioning of a cellular network • describe the fundamental operation of wireless networks • understand in depth issues arising from the interworking of different access networks (e.g., network management, mobility management QoS support)
Prerequisite courses:	
Teaching methods:	Lectures, 4 hours weekly
Course contents:	Cellular Systems Architecture, management of radiochannels, mobility management, communication management, systems integration, network management for cellular networks, QoS Support in mobile and wireless networks
Recommended or required readings:	Mobile Communication Systems, Kanatas, Konstantinou, Pantos, Mobile and personal communications, Theologou
Assessment methods:	Written exams at the end of the semester 100%.
Language of instruction:	Greek

Course Name:	Communication Networks II
Course Type:	Specialization elective
Course Level:	Undergraduate (1st cycle)
Year/Semester:	3rd year / 5th semester
Number of ECTS credits:	5
Name of lecturer:	Moscholios Ioannis
Learning outcomes:	Students that succeed in this course should be able to describe: • the basic principles of PDH, SDH/SONET. • Frame Relay and ATM technologies and the QoS mechanisms of these technologies. • the PPP, HDLC, OSPF, ISIS and BGP protocols • the TCP protocol together with congestion control mechanisms. • the basic routing principles of MPLS. • the basic principles of IPv6.
Prerequisite courses:	-
Teaching methods:	Lectures, 4 hours weekly.
Course contents:	Physical layer technologies for high speed networks (PDH, SDH). Virtual circuit network technology. Frame-Relay, Asynchronous Transfer Mode (ATM). Point-to-point link protocols (PPP, HDLC). Routing protocols: OSPF and ISIS. Routing architecture on the internet and BGP routing protocol. Multicast. P-NNI for ATM networks. TCP protocol: bottleneck and flow control mechanisms. Network quality of service support.: ATM categories, quality of service mechanisms for TCP/IP networks. MPLS technology: services and applications. Introduction to IPv6.
Recommended or required readings:	W. Stallings, Data and Computer Communications, 10th ed., Pearson, 2013. A. Tanenbaum, Computer Networks, 5th ed., Prentice Hall, 2010.
Assessment methods:	Written exams at the end of the semester.
Language of instruction:	Greek

Course Name:	Communication Networks Simulation Techniques
Course Type:	Specialization elective
Course Level:	Undergraduate (1st cycle)
Year/Semester:	4th year / 8th semester
Number of ECTS credits:	5
Name of lecturer:	Moscholios Ioannis
Learning outcomes:	Students that succeed in this course should be able to: • describe the notion of simulation and the basic simulation techniques. • simulate multirate loss and queueing systems based on SIMSCRIPT III. • simulate circuit-switched networks of one or more service-classes based on SIMSCRIPT III. • compare the results obtained by simulation with those obtained by the corresponding analytical models.
Prerequisite courses:	-
Teaching methods:	Lectures, 4 hours weekly.
Course contents:	Simulation as a means of communication networks analysis and design. Simulation for the purposes of: performance analysis, stability analysis, availability analysis, design and planning, etc. Overview of basic simulation techniques (discrete events, rare events, etc.). Simulation time scale of a communication network (packet arrival scale, connections arrival scale, etc.). Communication network modelling for simulation: node models, line models, source models, random variable generation. Simulation languages and environments. Practice on simple programming for discrete events simulation. The SIMSCRIPT III simulation environment for networks. Performance analysis of network simulation through SIMSCRIPT III. Comparison to other methods of performance analysis: methods based on analytical models, methods based on measurements.
Recommended or required readings:	A. Pomportsis, A. Tsoulfas, Simulation of Computer Networks, Tziolas, 2001 (in Greek).
Assessment methods:	Written exams at the end of the semester.
Language of instruction:	Greek

Course Name:	Sensor Networks
Course Type:	Elective
Course Level:	Undergraduate (1st cycle)
Year/Semester:	4th year / 8th semester
Number of ECTS credits:	5
Name of lecturer:	Anthony Boucouvalas
Learning outcomes:	Students that succeed in this course should be able to understand and design: • To acquire a comprehensive and fundamental understanding of sensors, • wireless sensors nodes, • networks, • architectures, protocols, and applications.
Prerequisite courses:	A fundamental knowledge of computer networks or mobile communications is required.
Teaching methods:	Lectures, 4 hours weekly.
Course contents:	Introduction. Applications, Node architecture, operating system, MAC protocol, Routing Protocols, Dynamic Power management, Embedded Systems, Synchronization, Localisation, Programming environments.
Recommended or required readings:	• E-class notes
Assessment methods:	100% Exam
Language of instruction:	Greek

Course Name:	Microwaves and Waveguides
Course Type:	Specialization elective
Course Level:	Undergraduate (1st cycle)
Year/Semester:	3nd year / 5th semester
Number of ECTS credits:	5
Name of lecturer:	Anthony Boucouvalas
Learning outcomes:	Students that succeed in this course should be able to: • Understand the basic principles of operating at Microwave frequencies and waveguiding. • Be competent in understanding the important properties of waveguides for communications, and how they affect the system. • describe mathematically the waveguide properties such as dispersion, attenuation and cutoff frequencies. • Understand the differences between copper and fibre optic waveguides and their uses. • Understand transmission lines theory. • Design based on transmission line theory reflectionless transmission. • Design making use of Smith Chart. • Design using basic optical fibre waveguides, optical telecommunication systems. • Comprehend and design using attenuation and dispersion limited optical fibre links.
Prerequisite courses:	
Teaching methods:	Lectures, 4 hours weekly.
Course contents:	Introduction. Overview of microwave and optical wireless systems concepts, sources, LEDs and Lasers, detectors pin and APD and components elements. E-M theory and waveguides, Boundary conditions, propagation constants and cutoffs, modes of propagation, dispersion, optical fibre components such as couplers WDM, isolators, Transmission line theory, Smith Charts, Optical fibre system design WDM transmission.
Recommended or required readings:	• E-class notes
Assessment methods:	Written exams at the end of the semester, 100%
Language of instruction:	Greek

Course Name:	Optical Wireless Communications
Course Type:	Elective
Course Level:	Undergraduate (1st cycle)
Year/Semester:	4th year / 7th semester
Number of ECTS credits:	5
Name of lecturer:	Anthony Boucouvalas
Learning outcomes:	Students that succeed in this course should be able to: • Understand the basic application difference between optical fibre and optical wireless communications. • Be competent in understanding the model of indoor and outdoor optical wireless channel. • describe mathematically the channel model. • Design basic links and understand the compromises of the various link parameters. • Design using various sources and detectors suitable for the link purpose. • Comprehend and describe the impact of the ambient noise on the design of links. • Understand the various applications which make the use of such links necessary. • Understand and describe modulation formats suitable for optical wireless links.
Prerequisite courses:	
Teaching methods:	Lectures, 4 hours weekly.
Course contents:	Introduction. Overview of optical wireless systems concepts, sources, LEDs and Lasers, detectors pin and APD and components elements. Indoor optical wireless channel, noise system design, outdoor channel applications, outdoor channel and system design.
Recommended or required readings:	• E-class notes
Assessment methods:	Written exams at the end of the semester, 100%
Language of instruction:	Greek

Course Name:	Simulation of Communications Systems
Course Type:	Specialization elective
Course Level:	Undergraduate (1st cycle)
Year/Semester:	4th year / 8th semester
Number of ECTS credits:	5
Name of lecturer:	Sagias Nikos
Learning outcomes:	Students that succeed in this course: • Will acquire an understanding on Monte Carlo simulation • Will acquire an understanding on random processes generation • Will be able to identify the differences in system performance between theory and practice • Will be able to evaluate the bit and symbol error probability • Will develop abilities for design of PCM systems • Will acquire an understanding on advanced modulation formats (QAM, orthogonal, bi-orthogonal, trans-orthogonal modulations, OFDM, CDMA) • Will be able to give a geometric representation to signals and to design and simulate the appropriate receiver • Will acquire an understanding on simulating passband modulation techniques and waveforms (ASK, PSK, FSK) • Will be able to analyze the performance of digital communication systems employing channel coding and/or diversity
Prerequisite courses:	Programming I
Teaching methods:	Lectures, 4 hours weekly, Matlab
Course contents:	Line codes NRZ, RZ, AMI, Manchester, coherent and non-coherent modulation techniques PSK, FSK, QAM, advanced modulation techniques OFDM και CDMA. Random number generation, Monte Carlo simulation, bit and symbol error rate calculation, performance analysis, digital signals spectra, signals geometric representation, maximum likelihood detectors, matched filters, correlators, intersymbol interference, pulse shaping, simulation of digital communication systems.
Recommended or required readings:	• T. M. C. Jeruchim, P. Balaban, and K. Sam Shanmugan, “Simulation of Communication Systems: Modeling, Methodology and Techniques,” Springer; 2nd edition, 2000. • J. G. Proakis, M. Salehi, and G. Bauch, “Contemporary Communication Systems Using MATLAB”, CL-Engineering; 2nd edition, 2003. • W. H. Tranter, K. S. Shanmugan, T. S. Rappaport, and K. L. Kosbar, “Principles of Communication Systems Simulation with Wireless Applications”, Prentice Hall, 2004.
Assessment methods:	Written exams at the end of the semester and assignments during the semester with equal weights.
Language of instruction:	Greek

Course Name:	Satellite Communications
Course Type:	Specialization elective
Course Level:	Undergraduate (1st cycle)
Year/Semester:	3rd year / 6th semester
Number of ECTS credits:	5
Name of lecturer:	Sagias Nikos
Learning outcomes:	Students that succeed in this course: • Will acquire an understanding on basic concepts on satellite communications • Will acquire an understanding on orbital mechanics • Will be able to express the differences between various satellite orbits • Will be able to perform coordinates transformations • Will be able to define and describe propagation impairments • Will develop abilities for design satellite links • Will acquire an understanding on link budget analysis • Will be able to estimate link budget and quality parameters • Will acquire an understanding on carrier-based modulation techniques and waveforms (PSK, FSK) • Will be able to define multiple access networks and multibeam systems • Will be able to design and simulate satellite links using AGI software
Prerequisite courses:	
Teaching methods:	Lectures, 4 hours weekly, AGI STK software
Course contents:	Introduction to satellite communications: Definitions, satellite types, orbital mechanics and orbits (low & medium earth orbits (LEO & MEO), high elliptical orbit (HEO), geosynchronous earth orbit (GEO)), coordinates transformations. Calculation methods for link budget, propagation impairments (free space loss, atmospheric, rain attenuation, shadowing), effects of noise on various receiver parts (antenna, absorptive network, amplifier), definitions of various parameters (EIRP, cross-polar isolation and discrimination (XPI and XPD), G/T figure, transponder input/output backoff). Description of multiple access networks and multibeam systems. Study on contemporary satellite systems (DVB-S, Iridium, GPS, Inmarsat, VSAT). Simulation studies on orbit planning and link budget with STK software by Analytical Graphics (AGI).
Recommended or required readings:	• T. Pratt, C. W. Bostian, and J. E. Allnutt, “Satellite Communications”, 2nd edition, Wiley, 2003. • G. Maral and M. Bousquet, “Satellite Communication Systems”, 3rd edition, 1986.
Assessment methods:	Written exams at the end of the semester and possible assignments during the semester using STK.
Language of instruction:	Greek

Course Name:	Antennas
Course Type:	Specialization Elective
Course Level:	Undergraduate (1st cycle)
Year/Semester:	3rd year / 5th semester
Number of ECTS credits:	5
Name of lecturer:	George Tsoulos
Learning outcomes:	Students that succeed in this course should be able to: • describe the radiation mechanism • describe the antenna characteristics • calculate the directivity and gain • calculate the radiation pattern • calculate the circuit elements of an antenna • calculate the characteristics of a linear antenna • calculate the characteristics of a loop antenna • analyze linear antenna arrays • measure and simulate in Matlab antenna characteristics
Prerequisite courses:	Electromagnetic Fields or Physics
Teaching methods:	Lectures (4 hours weekly) Laboratory (1 hour weekly)
Course contents:	Introduction. Radiation mechanism, pattern and regions. Isotropic antenna. Radiation intensity. Directivity and calculation methods. Gain and efficiency factor. Antenna as a circuit element and aperture. Friis transmission equation. Application in radar. Antenna temperature. Linear antennas. Infinitesimal dipole or Hertz dipole. Analysis of linear random length dipole antenna. Half wavelength dipole: radiation pattern, directivity, gain. Active height. Antennas over perfect ground. General analysis of antenna radiation field – applications. Arrays: introduction, linear arrays, uniform linear arrays.
Recommended or required readings:	• Antennas, C.Balanis • Antennas, J.Kraus • Antennas – Wireless Links, C.Kapsalis, P.Kottis
Assessment methods:	Written exams at the end of the semester. Lab assignments every week (or every second week) contributing to the final grade with a percentage ranging between 20% and 35%. It is possible that home assignments will be given and/or intermediate written exams will take place, while each of the above will contribute to the final grade with a percentage ranging between 10% and 20%.
Language of instruction:	Greek

Course Name:	Modern Cellular Communication Systems
Course Type:	Specialization Elective
Course Level:	Undergraduate (1st cycle)
Year/Semester:	4th year / 7th semester
Number of ECTS credits:	5
Name of lecturer:	George Tsoulos
Learning outcomes:	Students that succeed in this course should be able to: • describe and analyze spread spectrum modulation • describe key elements of a CDMA system • describe factors that affect CDMA performance • describe and analyze OFDM • describe key elements of an OFDMA system • calculate the performance of an OFDMA system • describe different diversity techniques, their performance and implementation complexity • describe the key characteristics of 3G-4G systems • describe the network planning methodology for a 3G system and key performance indicators
Prerequisite courses:	Wireless and Mobile Communications I
Teaching methods:	Lectures (4 hours weekly)
Course contents:	Introduction to the design and analysis of cellular communication systems (fixed, wireless and mobile). Multiplexing methods and modern cellular systems. Physical layer techniques (OFDM and spread spectrum, RAKE receiver), logical channels and control mechanisms. Diversity methods (frequency, polarization, time, space) and performance improvement techniques. Radio resource management. WCDMA-OFDMA, 3G-4G system characteristics. Network planning methodologies and examples.
Recommended or required readings:	• Introduction to Wireless Systems, B.Black, P.Dipiazza, B.Ferguson, D.Voltmer, F.Bery • Mobile Communication Systems, A.Kanatas, P.Constantinou, G.Pantos • Wireless Communications, T.Rappaport
Assessment methods:	Written exams at the end of the semester. It is possible that home assignments will be given and/or intermediate written exams will take place, while each of the above will contribute to the final grade with a percentage ranging between 10% and 20%.
Language of instruction:	Greek

Course Name:	Switch and Router Architectures
Course Type:	Specialization elective
Course Level:	Undergraduate
Year/Semester:	4th year / 7th semester
Number of ECTS credits:	5
Name of lecturer:	Politi Christina
Learning outcomes:	On completion of this course, students are expected to be able to: • Understand the fundamental role of switching in all kinds of networking schemes, independently from the context/ τtransport mode in which they operate • Describe the basic concepts of the interconnection networks and the properties that characterize an interconnection network • Derive and manipulate switching functions that form the basis of all digital circuits and reduce switching functions to simplify circuits used to realize them. • Design two classes of blocking networks, namely banyan networks and sorting networks, that play a very important role in the building of multistage networks having specific properties in terms of blocking • Understand the way re-arrangable networks are operating and prove/investigate whether a given network is re-arrangably nonblocking • Design re-arrangable interconnection networks based on given criteria • Understand strict-sense non-blocking networks and design specific kinds of networks like Clos and non-blocking mainly referred to banyan based interconnection networks. • Apply all the above to the high level design of packet and circuit switched networks • Understand the high level node architecture of all telecom and data networks with respect to switching and other functions (technology specific design) • Explain and apply fundamental characteristics of relevant electronic and optical technologies, such as propagation delay, power dissipation and noise margin to the switch design
Prerequisite courses:	
Teaching methods:	Lectures, 4 hours weekly.
Course contents:	Introduction - Motivation of hierarchical networks - Topology - Telephone Networks - General Concepts ; Switching principles - Model switch; Blocking properties - Accessibility / Accessibility ; Networks and Switches - Topologies and equivalent topologies - Cost and switch size; Monitoring and switch control algorithms ; Blocking Conditions - Architecture (banyan, sorting); Non Blocking Conditions - Architectures; examples network architectures with many stages; circuit switched architectures-SONET / SDH; packet switching nodes-ATM switches; IP Routers - General principles and examples of architectures; materials and switching technologies ; Optical circuit switched networks
Recommended or required readings:	• Lecture Notes • Switching Theory Architecture and Performance in Broadband ATM Networks, Ac. Pattavina • Broadband packet switching technologies - A Practical Guide to ATM Switches and IP Routers, H. JONATHAN CHAO, CHEUK H. LAM, EIJI OKI • Optical Switching, Tarek El-Bawab • Connection Oriented Networks, SONET/SDH ATM, MPLS, Optical Networks, H. Peros
Assessment methods:	Compulsory written exams at the end of the semester. Home assignments will be given, which will contribute to the final grade with

	a percentage of 20%. Mini project will be given that will contribute to the final grade by 20%.
Language of instruction:	Greek

Course Name:	Introduction to Radar
Course Type:	Specialization Elective
Course Level:	Undergraduate (1st cycle)
Year/Semester:	4th year / 8th semester
Number of ECTS credits:	5
Name of lecturer:	George Tsoulos
Learning outcomes:	Students that succeed in this course should be able to: • describe a pulsed radar • describe ways to reduce radar cross section • calculate the radar range • describe a continuous wave radar • describe a moving target radar • describe a synthetic aperture radar • describe different surveillance and radiometry techniques • describe radiation pattern control techniques and their application to radar
Prerequisite courses:	Antennas
Teaching methods:	Lectures (4 hours weekly)
Course contents:	Introduction to RADAR systems. Radar cross-section. Radar equation. Signal detection under noise presence. Scattering theory. Moving target RADAR, continuous wave RADAR, FM modulated RADAR. Synthetic aperture RADAR. Introduction to Radio surveillance and radiometry. Control mechanisms of antenna radiation patterns. Adaptive antennas study and analysis. Examples and applications.
Recommended or required readings:	• Introduction to Radar Systems, M.Skolnik
Assessment methods:	Written exams at the end of the semester. Lab assignments every second week contributing to the final grade with a percentage ranging between 20% and 35%. It is possible that home assignments will be given and/or intermediate written exams will take place, while each of the above will contribute to the final grade with a percentage ranging between 10% and 20%.
Language of instruction:	Greek

Course Name:	Optoelectronics
Course Type:	Specialization elective
Course Level:	Undergraduate
Year/Semester:	3rd year / 6th semester
Number of ECTS credits:	5
Name of lecturer:	Politi Christina
Learning outcomes:	On completion of this course, students are expected to be able to: • Understand the nature/characteristics of light by investigating how light is generated and its behavior as both wave and particle and master interactions between light and matter (electrons) • Describe, clarify and interpret the particular natural phenomena in the field of optoelectronics and integrated optics • Understand sources, detectors and transmission media for optoelectronics i.e. understand principles of semiconductor laser action, modulation, amplification and photo detection combined with the basic principles of dielectric optical waveguides • Apply and relate optoelectronic parameters with fiber optics components, devices and systems operation • Design at high level optoelectronic components for specific application to meet performance criteria and select suitable components for the subsystem realization • Calculate performance characteristics on semiconductor devices including light emitting and laser diodes, modulators, amplifiers and photodetectors • Calculate performance characteristics on fibre devices including amplifiers and passive devices for WDM • Illustrate obtained knowledge in solving practical problems
Prerequisite courses:	Physics
Teaching methods:	Lectures and Lab, 4 hours weekly.
Course contents:	This course is designed to expose students to optoelectronics with emphasis on the functions of optoelectronic devices for fiber optic systems. Specifically it investigates devices used for the transmission, modulation, transmitting and detecting light. Specifically, the contents are as follows: Introduction - Optoelectronic devices; Optics and the nature of light - Elements of linear and non - linear optics; Electronics - Elements of Solid State Physics - Crystalline structures - Heterostructures - Semiconductor properties - pn junction; Light emission - Elements of laser theory- Lasers for telecommunications (DBR, DFB, FP, tunable wavelength lasers) - Einstein Relations - Fibre lasers - semiconductor Lasers - semiconductor and organic LED; Light Modulation - Electrooptic phenomenon, acousto-optic effect - modulator circuits ; Light detection, photo - detectors , thermal detectors , photonic devices and circuits; optical amplification and optical amplifiers theory ; Optical fiber amplifiers - semiconductor optical amplifiers; Optical switching and wavelength conversion; Principles of optical filter and examples - optical multiplexers - Passive devices ; optoelectronic devices for Optical Communications
Recommended or required readings:	• John Wilson - John Hawkes, Optoelectronics an Introduction • Singh J., Optoelectronics
Assessment methods:	Written exams at the end of the semester. Lab experiments will be reported and will contribute to the final grade with 10%. It is possible that home assignments will be given, which will contribute to the final grade with a percentage ranging between 10% and 20%.
Language of instruction:	Greek

Course Name:	Stochastic Network modeling & Performance Analysis
Course Type:	Specialization elective
Course Level:	Undergraduate (1st cycle)
Year/Semester:	3rd year / 7th semester
Number of ECTS credits:	5
Name of lecturer:	Moscholios Ioannis
Learning outcomes:	Students that succeed in this course should be able to: • describe the notion of traffic load and its properties. • describe Little's law. • describe basic loss and queueing models. • solve problems by applying the classical Erlang B, Erlang C, Engset and Pollaczek–Khinchine formulas. • describe and design multirate loss systems that accommodate telecommunication traffic. • solve problems by applying the recursive formulas of Kaufman-Roberts and Roberts in the case of complete sharing policy and bandwidth reservation policy, respectively. • describe the basic principles of overflow systems and solve problems based on the Equivalent Random Theory.
Prerequisite courses:	-
Teaching methods:	Lectures, 4 hours weekly.
Course contents:	The basic characteristics of teletraffic systems. Traffic load – Traffic load properties. Little's Law. Analysis of Markovian loss models: M/M/s – M(n)/M/s. The Erlang B formula. The Engset formula for a small number of traffic sources. Analysis of Markovian queueing models: M/M/1, M/M/s/k, M/G/1. The Erlang C formula. The Pollaczek–Khinchine formula. Multirate Loss Models. The complete sharing policy of the available link bandwidth. The Kaufman-Roberts recursive formula. The bandwidth reservation policy. The Roberts' recursive formula. Overflow systems: The Equivalent Random Theory – ERT.
Recommended or required readings:	M. Logothetis, Theory and applications of teletraffic, 2nd ed., Papasotiriou, 2012 (in Greek).
Assessment methods:	Written exams at the end of the semester.
Language of instruction:	Greek

Course Name:	Specification of Communication Protocols
Course Type:	Specialization elective
Course Level:	Undergraduate (1st cycle)
Year/Semester:	4th year / 8th semester
Number of ECTS credits:	5
Name of lecturer:	Kaloxylos Alexandros
Learning outcomes:	Students that succeed in this course should be able to: • explain the principles for the specification, modelling and verification of telecommunication network protocols • use finite state machines to describe simple protocols • identify problems that arise during design time and tackle them • implement simulation and validation models • use tools for the verification of the correct operation of a protocol • analyze the operation of existing protocols and model their operation in order to verify their correct operation
Prerequisite courses:	
Teaching methods:	Lectures, 4 hours weekly
Course contents:	Protocols Structure, Specification and modelling, correctness requirements finite state machines, validation of protocols
Recommended or required readings:	Object oriented design, UML, Principles and heuristic rules A. Χατζηγεωργίου UML distilled: A brief guide to the standard object modeling language, M Fowler
Assessment methods:	Written exams at the end of the semester 100%. It is possible that students can participate in a project, which will contribute to the final grade with a percentage of 50%. In the latter case the written exams contribute to the final grade with a percentage of 50%
Language of instruction:	Greek

Course Name:	Introduction to Information Theory and Coding
Course Type:	Elective
Course Level:	Undergraduate (1st cycle)
Year/Semester:	3nd year / 6th semester
Number of ECTS credits:	5
Name of lecturer:	Andreas Maras
Learning outcomes:	Students that have successfully completed this course should be able to: • understand the importance of entropy in defining the information content of sources and capacity for channels. In particular, should be able to: • apply probabilistic modeling for describing the information content of simple sources such as those used for transmitting voice or data, or even both and also learn how to describe them via the notion of entropy. • describe the various measures of entropy for discrete-time memoryless sources, i.e., conditional and joint, as well as its equivalent forms for analog memoryless information sources. • analyze the information channel via its various matrix representations such as the channel matrix, input-output information system matrix, mutual information and most importantly, its capacity. • describe the capacity of simple information channels such the Binary Symmetric Channel and the Binary Erasure Channel. • gain full insight into the famous Shannon's channel coding and its application to data processing and coding. • realize the importance of the data processing theorem in obtaining the capacity of practical every day telecommunication systems. • understand the basic geometric notions of coding theory and the important properties of codes such as the error detecting capability and error correcting capability. • understand also the definition of linear error correcting binary codes via two alternative definitions using well known results from linear algebra. • use linear algebra to obtain the Hamming minimum distance and further utilize it to define the error-correcting radius of any binary linear code. • realize the limits of error correcting codes through the Hamming upper bound and also Plotkin's bound as well as the Gilbert-Varshamov bound of binary linear error-correcting codes . • describe the family of Hamming's binary linear error correcting codes and decode them via Slepian's algebraic method.
Prerequisite courses:	Probability and Statistics
Teaching methods:	Lectures, 4 hours weekly.
Course contents:	Introduction. The concept of entropy as Shannon's information measure. Joint, mutual and conditional entropy. The memoryless discrete as well as analog information source. Capacity of noisy channels and coding for discrete memoryless channels. The data processing theorem (Cascading of channels). Introduction to error correcting codes. Linear block codes. Binary Hamming codes.
Recommended or required readings:	• **An Introduction to Error Correcting Codes**, A. Maras
Assessment methods:	Written exam at the end of the semester.
Language of instruction:	Greek

Course Name:	Internet Applications and Web Services Development
Course Type:	Specialization elective
Course Level:	Undergraduate (1st cycle)
Year/Semester:	3rd year / 6th semester
Number of ECTS credits:	5
Name of lecturer:	Tselikas Nikolaos
Learning outcomes:	Students that succeed in this course should be able to: • recognize the functionality of common application protocols (e.g., FTP, SMTP, POP, IMAP, DNS). • recognize the common request and response messages of HTTP and their meaning. • use HTML to implement static web pages • use CSS for web design. • use Javascript to implement client-side dynamic web pages and applications. • use PHP to implement server-side dynamic web pages and applications. • connect to MySQL Server with PHP scripting in order to implement 3-tier internet applications. • edit, serialize/deserialize, validate and handle XML documents. • use XML Schema (XSD) to define the structure of XML documents. • use basic AJAX (Asynchronous Javascript and XML) techniques. • use open APIs, like Google Maps API. • design and implement mash up applications. • design and implement Java-based Web Services by using either SOAP over HTTP or RESTful architecture.
Prerequisite courses:	Object Oriented Programming
Teaching methods:	Lectures (3 hours weekly) Laboratory (1 hour weekly)
Course contents:	Application layer protocols (e.g., FTP, SMTP, POP, IMAP, DNS), HTTP, HTML, CSS, client side scripting (Javascript), server side scripting (PHP), PHP/MySQL scripting, XML, XML Schema and Asynchronous Javascript and XML (AJAX), Google Maps API and mash up applications, SOAP/REST Web Services.
Recommended or required readings:	• *Internet Applications Development: Theory and Practice*, P. Kenterlis • *Internet Technologies*, C. Douligeris, R. Mavropodi, E. Kopanaki • *HTML, XHTML, and CSS Bible*, S. M. Schafer • *JavaScript: The Definitive Guide*, D. Flanagan • *PHP 5 Power Programming*, A. Gutmans, S. S. Bakken, D. Rethans. • *Professional Ajax*, N. C. Zakas, J. McPeak, J. Fawcett.
Assessment methods:	Written exams at the end of the semester. Project assignment will be given, which will contribute to the final grade with a percentage ranging between 20% and 40%.
Language of instruction:	Greek

Course Name:	Distributed Systems Programming
Course Type:	Specialization elective
Course Level:	Undergraduate (1st cycle)
Year/Semester:	4th year / 8th semester
Number of ECTS credits:	5
Name of lecturer:	-
Learning outcomes:	Students that succeed in this course should be able to: • recognize the differences between different distributed architectural models (e.g., client-server, n-tier, peer-to-peer, publish-subscribe). • use Eclipse and/or NetBeans IDE for distributed Java programming development. • implement Java applications by using threads. • implement TCP and UDP socket based applications. • implement multithreaded socket applications. • use the remote-procedure-call (RPC) technique. • define and implement Java remote interfaces. • implement Java-based distributed services and applications by using Java Remote Method Invocation (Java RMI). • define and implement IDL (Interface Definition Language) interfaces. • implement distributed services by using CORBA middleware and distributed objects technologies. • define and implement WSDL (Web-Services Definition Language) interfaces. • distinguish the differences between the dominant Web Service Architectures (i.e., SOAP RPC over HTTP and RESTful Web Services). • use Glassfish or Tomcat Application Server and Apache AXIS SOAP engine to implement SOAP Web Services. • edit, serialize/deserialize and handle JSON (Javascript Simple Object Notation) documents. • use Glassfish Application Server and Jersey API implementing JAX-RS specifications to implement RESTful Web Services. • use the RESTClient plug-in in Firefox or DEV HTTP Client plug-in in Chrome, for RESTful Web Services debugging.
Prerequisite courses:	Object Oriented Programming
Teaching methods:	Lectures (3 hours weekly) Laboratory (1 hour weekly)
Course contents:	Architectural models (client-server, n-tier, peer-to peer, publish-subscribe), sockets, processes, threads, single threaded programming, multi threaded programming, distributed services and applications, remote procedure call, distributed objects technologies and middleware, Java Remote Method Invocation (Java RMI), CORBA architecture, Microsoft DCOM, SOAP RPC over HTTP Web Services, RESTful Web Services.
Recommended or required readings:	• *Distributed Systems: Principles and Paradigms*, A. S. Tanenbaum, M. Van Steen • *Distributed Systems with Java*, I. K. Kavouras, I. Z. Milis, G. V. Xilomenos, A. A. Roukounaki
Assessment methods:	Written exams at the end of the semester. Home assignments will be given (every week or every two weeks), which will contribute to the final grade with a percentage ranging between 20% and 50%.
Language of instruction:	Greek

Course Name:	Pedagogics
Course Type:	Elective (General)
Course Level:	Undergraduate (1st cycle)
Year/Semester:	4th year / 7th semester
Number of ECTS credits:	3
Name of lecturer:	Angeliki Antoniou
Learning outcomes:	The module of Pegagogics has two dimensions both relevant to the students of the Informatics and Telecommunications Department. The first dimension explains how one can teach and the second how one can design educational technologies. Therefore, at the end of the course the students should be able to: • Know and describe basic educational and learning theories • To apply their knowledge in teaching scenarios • To design educational technologies using the taught knowledge
Prerequisite courses:	None
Teaching methods:	Lectures, 3 hours weekly.
Course contents:	Epistemology, learning theories, teaching practices, cognitive evolution, learning assessment, educational sociology, minorities, disabilities, psychological and learning problems, formation of groups and group dynamics, cognitive requirements of learning, personal learning characteristics, life-long learning
Recommended or required readings:	• Bigge, M.L. & Shermis, S.S. (2004). Learning Theories For Teachers (6th ed.). New York: Harper Collins. • Slavin, R. (2009) Educational Psychology: Theory and Practice, Pearson • Elliot, S.N., Kratochwill, T.R., Cook, J.L., & Travers, J.F. (2000) Educational Psychology: Effective Teaching, Effective Learning. The McGraw-Hill Companies, Inc.
Assessment methods:	Written or oral exams at the end of the semester.
Language of instruction:	Greek

Course Name:	Research Methodology and Scientific Writing
Course Type:	Elective (General)
Course Level:	Undergraduate (1st cycle)
Year/Semester:	3nd year / 6th semester
Number of ECTS credits:	3
Name of lecturer:	Angeliki Antoniou
Learning outcomes:	The module aims at introducing the students with the basics of research methodology and the basics of scientific writing. Therefore, at the end of the course the students should be able to: • Search for relevant information in scientific sources • Know and describe the structure of scientific papers • Know and reproduce the way to use scientific references in literature review • Produce list of references • Follow text formatting instructions • Know and reproduce different methods of scientific research (e.g. observations, experiments) as well as different data analysis methods (e.g. qualitative, quantitative) • Know and reproduce the code of scientific ethics
Prerequisite courses:	None
Teaching methods:	Lectures, 3 hours weekly.
Course contents:	Introduction to research methodology, experiment and observations, scientific paper structure, bibliography and use of sources, scientific code of ethics, data collection methods - questionnaires, qualitative and quantitative data analysis methods
Recommended or required readings:	• Zafeiropoulos, K. (2005) How can I make a research paper? Kritiki publishing (in Greek) • Bell, J. (2010) Doing your reseach project: a guide for first-time researchers in Education, Health and Social Sciences. Open University Press • Mantzaris, I (2012) Scientific Research. Mantzaris Ioannis Publishing
Assessment methods:	Written exams at the end of the semester.
Language of instruction:	Greek

Course Name:	Special Topics in Networks
Course Type:	Specialization elective
Course Level:	Undergraduate (1st cycle)
Year/Semester:	4th year / 8th semester
Number of ECTS credits:	5
Name of lecturer:	Anthony Boucouvalas
Learning outcomes:	Students that succeed in this course should be able to: • Work in groups aiming on clear objectives • Manage the process. • Learn how to publish a technical paper • Learn how to present results in a conference
Prerequisite courses:	
Teaching methods:	Lectures, 4 hours weekly.
Course contents:	Introduction. Working in groups, Advantages and disadvantages, leading a team. Introduction to topics of interest. Writing a publication. Team grouping on advanced topics on telecoms or informatics projects. Manage the process.
Recommended or required readings:	• E-class notes
Assessment methods:	Demonstrator of the project, presentation of work, publish a peer reviewed conference paper. 100%
Language of instruction:	Greek

Course Name:	Legal issues of Informatics and Telecommunications
Course Type:	Elective (General)
Course Level:	Undergraduate
Year/Semester:	4^{th} year / 7^{th} semester
Number of ECTS credits:	3
Name of lecturer:	Sakas Damianos
Learning outcomes:	This course deals with those issues related to the impact of new information and communication technologies on the Law, in terms not only of current legislation but on the regulatory system too. The student will be able to gain knowledge on the application of IT in the context of legal environment and law which are related to organizations and the state.
Prerequisite courses:	
Teaching methods:	Lectures, 3 hours weekly.
Course contents:	The Information Society. The impact of new information and communication technologies on the law. The intervention of legal system. New regulatory models. The role of the state and the law in the Information Society. Implementation and analysis of the legal issues that arise in various fields of Information Technology (e-banking, Blogs, etc.)
Recommended or required readings:	• The law in the Information Society, Mitrou L. • A Model Freedom of Information Law • A Guide for Applying Information Technology in Law Enforcement, David G. Boyd
Assessment methods:	Written examination at the end of the semester. Test, which will contribute to the percentage of 20% to the final score. Tasks, which will contribute to the percentage of 30% to the final score.
Language of instruction:	Greek

Course Name:	New IT product development
Course Type:	Elective (General)
Course Level:	Undergraduate
Year/Semester:	4^{th} year / 8^{th} semester
Number of ECTS credits:	3
Name of lecturer:	Sakas Damianos
Learning outcomes:	This course deals with the need of business units for continuous business growth, through the development of new products and services. Specifically, in this course we will analyze the stages that have to be followed by a new product or service, to successfully contribute to the profitability of an enterprise. The student gets in touch with the strategies followed during the development of a new product / service, by the conception of the idea, up to its commercialization. The course focuses on the Entrepreneurship and the creation of New Products and Services, in the field of Information Technology.
Prerequisite courses:	
Teaching methods:	Lectures, 3 hours weekly.
Course contents:	Birth of Ideas, Comparative Evaluation of Ideas, New Product/Service Concept Development, Marketing Analysis, Business Analysis, Product/Service Control and Testing, Manufacturing Product/Service, Merchandising.
Recommended or required readings:	• Innovation Applying Knowledge, UN Millennium Project • Success Factors of NPD, Holger Ernst
Assessment methods:	Written examination at the end of the semester. Test, which will contribute 20% to the final score. Tasks, which will contribute 30%to the final score.
Language of instruction:	Greek

Course Name:	Didactics of Informatics
Course Type:	Elective (General)
Course Level:	Undergraduate
Year/Semester:	4th year / 7th semester
Number of ECTS credits:	3
Name of lecturer:	Sakas Damianos
Learning outcomes:	Students should gain knowledge on the basic concepts that constitute the cognitive field of Didactics of Informatics and develop skills related to the teaching approach of Informatics and as well as of Information and Communication Technologies (ICT) at all levels of schooling. Emphasis is placed on the presentation and analysis of the context from which emerges the scientific area of Didactics of Information Technology. Also, the concepts of Teaching and of modern pedagogical and psychological context are presented and analyzed.
Prerequisite courses:	
Teaching methods:	Lectures, 3 hours weekly.
Course contents:	• Meet with key pedagogical considerations and applications in the teaching of Computer Science. • Teaching approaches didactic principles, design and implementation of computer courses. • Assessment of needs and evaluation of teaching. Student evaluation forms. • Utilization of teaching means • Educational assessment and forms of utilization of educational software on the teaching of computing. • Utilization of the Internet for the education of students. • Distance learning. • The integration of IT learning in the teaching of other subject areas. • Introduction to the categories and principles of designing educational software.
Recommended or required readings:	• Introduction to the Teaching of Informatics, Vassilis I. Komis
Assessment methods:	Written examination at the end of the semester
Language of instruction:	Greek

Course Name:	Project Management in informatics and telecommunications
Course Type:	Elective (General)
Course Level:	Undergraduate
Year/Semester:	4^{th} year / 7^{th} semester
Number of ECTS credits:	3
Name of lecturer:	Sakas Damianos
Learning outcomes:	Fundamentals governing the administrative planning of an IT project development, collaborative framework of management, project planning, time and cost planning of IT projects, distinction and categorization of subprojects, (Work Breakdown Structure). Organizing project teams and task scheduling, issues of staff selection, issues related to the behavior of an individual / a team in the procedure of developing an IT project. Compiling the project plan (with the use of the language "Business Process Management Notation"), project implementation, editorial, issues of evaluation and tender selection, the role of IT in project management. Reengineering, quality management and project completion. Simulation of all actions of IT Project Management with Dynamic Models (Dynamic Simulation Models).
Prerequisite courses:	
Teaching methods:	Lectures, 3 hours weekly.
Course contents:	Starting a project, Planning a project, Cooperation with management, Create project budget, Organization of a project team, Creating a project plan.
Recommended or required readings:	• Project management guide book, Method 123 • Project management primer, Nick Jenkins
Assessment methods:	Written examination at the end of the semester. Test, which will contribute 20% to the final score. Tasks, which will contribute 30%to the final score.
Language of instruction:	Greek

Course Name:	Entrepreneurship in IT
Course Type:	Elective (General)
Course Level:	Undergraduate
Year/Semester:	4^{th} year / 8^{th} semester
Number of ECTS credits:	3
Name of lecturer:	Sakas Damianos
Learning outcomes:	By the end of the course, the student should be able to plan modern trends of entrepreneurship in IT, analyze competitiveness and strategic planning of innovative actions. The contemporary economic systems set as center of their actions, the entrepreneurship. Prerequisite for the visualization of economic profit is the successful implementation of a series of principles and initiatives, referred to competitiveness, innovation, management and leadership, marketing, advertising, market knowledge, communication, etc. In this course, emphasis is placed on those initiatives that will contribute to a development strategy of sales, focusing on innovation that can originate from computing. Simulation of all actions of Entrepreneurship in Information Technology with Dynamic Models (Dynamic Simulation Models).
Prerequisite courses:	
Teaching methods:	Lectures, 3 hours weekly.
Course contents:	Entrepreneurship, Entrepreneurship & Innovation, Market, Marketing, Communications, Strategic planning, Sales, Organization of the sales department.
Recommended or required readings:	• Entrepreneurship, communication, sales, Kakoulidis P. Kostas • Student notes Entrepreneurship in IT, Nasiopoulos K. Dimitrios
Assessment methods:	Written examination at the end of the semester. Test, which will contribute 20% to the final score. Tasks, which will contribute 30%to the final score.
Language of instruction:	Greek