



**University of Macedonia
School of Information Science
Department of Applied Informatics**

Master of Science in Applied Informatics

**Course Guide
*Academic Year 2020-2021***

Thessaloniki

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1. Introduction

The Graduate Program has been offered by the Department of Applied Informatics since 2003-2004, with initial funding from the Operational Program for Education and Initial Vocational Training of the Hellenic Ministry of National Education and Religious Affairs. Since 2005-2006 it has been a self-funded Program. The Specializations of the Master's Program were also offered at the Technical Educational Institution (TEI) of Western Macedonia, Kozani campus until the academic year 2013-14 in cooperation with the Departments of Business Administration and Electrical Engineering there.

Since the academic year 2014-2015 the Master's Program of the Department of Applied Informatics of the School of Information Science has been operating under a new curriculum entitled "M.Sc. in Applied Informatics".

Since the academic year 2018-2019 the program has been re-launched following current legislation.

The Graduate Program of the Department of Applied Informatics offers an M.Sc. degree in Applied Informatics in one of the following Specializations:

1. Computer Science and Technology
2. Business Computing

2. Aim - Fields of study

The M.Sc. in Applied Informatics offers high quality graduate level education in Informatics and equips its graduates with a strong background, experience and know-how for the adoption of best practices in applying computing knowledge to meeting society's needs in economics, management and education.

The main goals of the M.Sc. in Applied Informatics are to:

- provide high quality graduate level studies
- offer state-of-the-art computing knowledge
- combine systems, methodology and software in problem-solving
- develop and manage processes for the management of digital economy
- train professionals with the necessary skills for a successful career in the private, public and academic sector.
- prepare students for doctoral studies

Field of study for each specialization:

1. Computer Science and Technology

This specialization constitutes an advanced course of study in technologies, methods and applications of modern computing systems and networks. The knowledge areas are concerned with:

- State-of-the-art technologies of networked and parallel computer systems, ranging from the operating system, to software (including world wide web applications and

“smart” mobile devices) and its systemic development, and

- solving complex computational problems, by using abstract models (mathematics, operational research, data structures and algorithms) and integrating them in advanced applications.

2. Business Computing

The interdisciplinary character facilitates the acquisition of knowledge both in information technology (ICT) and information systems, as well as practices in Business Administration and Economics. It prepares students providing the necessary computer skills for the successful development of entrepreneurship in digital environment, based on technology and innovation with emphasis on e/m business and social media. It offers the best combination of technical, managerial and financial knowledge, shaping the identity of the modern business executive that meets the needs of both business and public administration in the Greek and international area.

All staff involved in the Graduate Program are committed to providing high quality services incorporating the latest teaching methods and the most up-to-date developments in the subject areas involved.

3. Academic / Professional Skills and Employment Prospects

The Graduates of the Postgraduate Program of Applied Informatics have very good employment prospects in the following professional activities:

- Management, Analysis, Design, Implementation and Maintenance of Information Systems.
- Teaching at Universities and Technological Educational Institutions, Secondary Education and Technical and Vocational Training, public and private, in Theoretical, Technological and Applied level.
- Research in Public and Private Research Institutions.
- The provision of services as well as Administration in IT, Networks, Computerization and Technical Services of Ministries, Public Organizations, Services and Enterprises.

1st Specialization "Computer Science and Technology"

This specialization provides students with specialized knowledge in theoretical and practical issues of Informatics. It is designed to cover a wide range of state-of-the-art technologies, while offering an important theoretical background in scientific areas which are of active academic interest. Within the framework of their studies, students will develop skills for the successful design, development and management of modern computing systems and applications, as well as for solving complex computer problems with the ultimate goal of becoming active executives in high technology companies in the field of Informatics, who will be able to recognize new fields of application of modern methods and technologies. The

acquisition of the appropriate theoretical background is a necessary condition for the continuation of their academic course in research directions, including that of the Ph.D.

The specialization is addressed to students with knowledge of Informatics and Sciences, who wish to deepen their knowledge and at the same time gain a broader view of the field of computer science and modern technologies.

2nd Specialization "Business Computing"

This specialization provides postgraduate students with specialized knowledge in Informatics, Business Administration and Economics. The specialization prepares students by providing the necessary skills for the successful development of entrepreneurship based on technology and innovation by offering the best combination of technical, administrative and economic knowledge, shaping the identity of the modern executive that meets the needs of both business and public administration in Greek and international space in the digital age. The specialization is aimed at students with knowledge of Informatics, Science and Economics / Management who wish to acquire an integrated approach to the challenges of Information and Communication Technologies (ICT) in developing skills in the modern business environment with innovative technological tools and methods.

This specialization aims at cultivating analytical thinking and dealing with topical issues, both in the field of Information and Communication Technologies (ICT) and digital entrepreneurship. Therefore it's designed as an integrated educational approach to:

- (a) combine contemporary themes that are usually taught individually (Information Management Systems, Digital Marketing and Social Media, Digital Economy, Financial Accounting Systems, ICT Technologies, Start-up Entrepreneurship, Innovation Management in Digital Enterprises, Electronic & Mobile Business and E-Commerce Technologies, Web Technologies and Web Data Analysis, Legal Issues of Informatics and E-Business, Simulation and Quality Control of Processes, Statistical Data Analysis, Cost Accounting Systems, Information Systems in Financial Analysis and Management, Computational Estimation Techniques, Digital Business Strategy),
- (b) explain the capabilities and train the participants in business computing applications in the modern digital environment,
- (c) provide essential knowledge and skills to meet the growing demand for highly qualified graduates to grasp the opportunities and challenges of emerging information and communication technologies in the economy and administration.

4. Duration

The full-time M.Sc. degree requires three (3) academic semesters. The part-time M.Sc. degree requires five (5) academic semesters.

5. Program of studies

One academic semester consists of thirteen (13) weeks. The course begins on the Monday of the first full week of October. All courses, comprising lectures and laboratories, are for three (3) hours a week.

The sum of all Graduate courses is equal to 90 ECTS credits, and particularly 30 ECTS credits per semester, that is 7.5 ECTS credits per course and 30 ECTS credits for the M.Sc. thesis. The specializations of the M.Sc. program can vary depending on the decision of the General Assembly of Special Composition of the Department of Applied Informatics.

The courses include teaching, lab exercises and exams. Each graduate student has to attend and successfully complete eight (8) courses, four (4) during each of the first two semesters. During the third semester the student has to prepare and be examined on his/her M.Sc. thesis.

The Graduate Program offers students the student the possibility of attending additional courses. More specifically, students who choose to do an additional course will have the same rights but also the same obligations as other students. They will be required to: (i) pay the corresponding cost of the additional course on the dates appointed by the Secretariat, (ii) attend the course and sign the relevant attendance sheet, (iii) submit the required assignments, and (iv) take the set examinations for that course. The Secretariat of the Graduate Program is in a position to issue either certification of attendance to the additional course or an official detailed transcript stating attendance to the additional course. However, it should be noted that there will be a statement in the transcript to the effect that the student's cumulative grade point average does not include the grade of the additional course(s).

All courses are taught either in Greek or in English.

The syllabus for each specialization is the following:

5.1 Courses of the 1st specialization “Computer Science and Technology”

1st Semester (30 ECTS)

Students may choose: 4 courses from Table 1.A

Table 1.A	
	ECTS
Data Structures and Algorithms	7.5
Heuristic Methods	7.5
Cryptography	7.5
Parallel and Distributed Computing	7.5
Advanced Computer Architecture	7.5
Advanced Software Engineering	7.5
Advanced Computer Networks	7.5

2nd Semester (30 ECTS)

Students may choose: either 4 courses from Table 1.B

Table 1.B	
	ECTS
Web and Mobile Application Development	7.5
Information Security in the Internet Age	7.5
Ubiquitous Communications, Clouds, and Big Data	7.5
Simulation Methods	7.5
Topics in Database Technology	7.5
Serious Games Programming	7.5
Advanced Artificial Intelligence	7.5

Third semester

	ECTS
Master/[OR]/Master’s thesis	30

5.2 Courses of the 2nd specialization “Business Computing”

1st Semester (30 ECTS)

Students may choose: either 4 courses from Table 2.A

Table 2.A	
	ECTS
Start-up Entrepreneurship	7.5
Object-Oriented Software Development	7.5
Business Process Intelligence	7.5
Digital Business Strategy	7.5
Financial Accounting Systems	7.5
Cloud Technologies and Web Analytics	7.5
Digital Economy and Business	7.5

2nd Semester (30 ECTS)

Students may choose: either 4 courses from Table 2.B

Table 2.B	
	ECTS
Innovative e-Business Systems	7.5
m-Business & e-Commerce Technologies	7.5
Legal Issues of Informatics and e-Business	7.5
Simulation and Quality Control of Processes	7.5
Cost Accounting Systems	7.5
Information Systems in Financial Analysis and Management	7.5
Digital Marketing & Social Networking	7.5

Third semester

	ECTS
Master/[OR]/Master’s thesis	30

Below are: the curriculum, the course content, and the teaching staff for the academic year 2020-21.

6. Curriculum for the academic year 2020-2021

6.1 1st Specialization: “Computer Science and Technology”

1st Semester

Elective Courses

α/α	Course	Teaching Staff
[1]	Data Structures and Algorithms	Satratzemi Maya , Professor, dpt. of Applied Informatics, UOM
[2]	Heuristic Methods	Sifaleras Angelo , Associate Professor, dpt. of Applied Informatics, UOM
[3]	Cryptography	Petridou Sofia , Assistant Professor, dpt. of Applied Informatics, UOM
[4]	Parallel and Distributed Computing	Margaritis Konstantinos , Professor, dpt. of Applied Informatics, UOM
[5]	Advanced Computer Architecture	Roumeliotis Manos , Professor, dpt. of Applied Informatics, UOM
[6]	Advanced Software Engineering	Chatzigeorgiou Alexandros , Professor, dpt. of Applied Informatics, UOM Ampatzoglou Apostolos , Assistant Professor, dpt. of Applied Informatics, UOM
[7]	Advanced Computer Networks	Foulliras Panayotis , Assistant Professor, dpt. of Applied Informatics, UOM

2nd Semester

Elective Courses

α/α	Course	Teaching Staff
[1]	Web and Mobile Application Development	Kaskalis Theodoros , Associate Professor, dpt. of Applied Informatics, UOM
[2]	Information Security in the Internet Age	Mavridis Ioannis , Professor, dpt. of Applied Informatics, UOM
[3]	Ubiquitous Communications, Clouds, and Big Data	Psannis Konstantinos , Associate Professor, dpt. of Applied Informatics, UOM
[4]	Simulation Methods	Souravlas Stavros , Assistant Professor, dpt. of Applied Informatics, UOM
[5]	Topics in Database Technology	Evangelidis Georgios , Professor, dpt. of Applied Informatics, UOM Koloniari Georgia , Assistant Professor, dpt. of Applied Informatics, UOM
[6]	Serious Games Programming	Xinogalos Stylianos , Associate Professor, dpt. of Applied Informatics, UOM
[7]	Advanced Artificial Intelligence	Refanidis Ioannis , Professor, dpt. of Applied Informatics, UOM

6.2 2nd Specialization: “Business Computing”

1st Semester

Elective Courses

α/α	Course	Teaching Staff
[1]	Start-up Entrepreneurship	Fouskas Kostantinos , Assistant Professor, dpt. of Applied Informatics, UOM
[2]	Object-Oriented Software Development	Xinogalos Stylianos , Associate Professor, dpt. of Applied Informatics, UOM Chatzigeorgiou Alexandros , Professor, dpt. of Applied Informatics, UOM
[3]	Business Process Intelligence	Vergidis Konstantinos , Assistant Professor, dpt. of Applied Informatics, UOM
[4]	Digital Business Strategy	Kitsios Fotios , Associate Professor, dpt. of Applied Informatics, UOM
[5]	Financial Accounting Systems	Vazakidis Athanasios , Professor, dpt. of Applied Informatics, UOM Stavropoulos Antonios , Associate Professor, dpt. of Applied Informatics, UOM
[6]	Cloud Technologies and Web Analytics	Koloniari Georgia , Assistant Professor, dpt. of Applied Informatics, UOM Papadimitriou Panagiotis , Assistant Professor, dpt. of Applied Informatics, UOM
[7]	Digital Economy and Business	Stiakakis Emmanuel , Associate Professor, dpt. of Applied Informatics, UOM

2nd Semester

Elective Courses

α/α	Course	Teaching Staff
[1]	Innovative e-Business Systems	Tambouris Efthimios , <i>Professor, dpt. of Applied Informatics, UOM</i>
[2]	m-Business & e-Commerce Technologies	Georgiadis Christos , <i>Professor, dpt. of Applied Informatics, UOM</i>
[3]	Legal Issues of Informatics and e-Business	Alexandropoulou Evgenia , <i>Professor, dpt. of Applied Informatics, UOM</i>
[4]	Simulation and Quality Control of Processes	Nikolaidis Yiannis , <i>Associate Professor, dpt. of Applied Informatics, UOM</i>
[5]	Cost Accounting Systems	Vazakidis Athanasios , <i>Professor, dpt. of Applied Informatics, UOM</i>
[6]	Information Systems in Financial Analysis and Management	Dasilas Apostolos , <i>Assistant Professor, dpt. of Applied Informatics, UOM</i>
[7]	Digital Marketing & Social Networking	Vlachopoulou Maro , <i>Professor, dpt. of Applied Informatics, UOM</i>

7. Course Content

7.1 1st Specialization: “Computer Science and Technology”

1st Semester

Elective Courses

Title	Data Structures and Algorithms
Instructor(s)	Maya Satratzemi
Objectives	This course surveys the most important algorithms and data structures in use on computers today. Particular emphasis is given to algorithms for sorting, searching, and string processing as well as graph algorithms. The course will concentrate on developing implementations, understanding their performance characteristics, and estimating their potential effectiveness in applications.
Skills	Ability to analyze the performance of advanced data structures and algorithms. Ability to implement advanced data structures with Java an Object Oriented language. Ability to understand the usefulness of a data structure for a particular problem. Ability to adapt a data structure according to the requirements of a problem. Ability to combine data structures.
Prerequisites	Graduates with IT background. Knowledge of fundamental data structures and Java programming language.
Meeting the prerequisites	For Science graduates (except Informatics): Self-study of basic data structures. Additional educational material on the Java programming language can be provided to students. Graduates with no IT background can attend and successfully pass the undergraduate course Object Oriented Programming in Java.
Content	<p>The Data Structures and Algorithms is one of the most important and historic disciplines of Computer Science, with continuous development providing solutions to fundamental problems of sorting, organizing, managing and searching information. While recent years have seen tremendous growth of the Internet to support a wide range of activities. The internet is promoted as a universal means support human activities. The provision and distribution of information on the Internet has led to the development of Networked Information Systems. Is of the utmost importance to effectively search this information and therefore the search algorithms for locating data in a large volume of information is fundamental. Also, graph algorithms allow us to address many of the difficult and important problems: Communication, circuit, mechanical, financial stock, transportation, internet, game, social relationship, neural network, protein, chemical compound. Finally, string algorithms face the problem of text matching, as the cases of: text editors, search word(s) in the contents of a website or a DNA sequence.</p> <p><i>Contents</i></p> <p>Fundamentals: Basic Programming Model, Data Abstraction, Bags, Queues, and Stacks, Case Study: Union-Find</p> <p>Sorting: Elementary Sorts, Mergesort, Quicksort, (implementations, improvements, duplicate keys, 3-way partitioning, Bentley-McIlroy quicksort, Dual-pivot quicksort), system sort in Java, Priority Queues, Sorting various types of data (immutable keys, Alternate orderings, Items with multiple keys, Priority queues with comparators), Applications</p>

	<p>Symbol Tables Elementary symbol tables (sets, dictionary clients, indexing clients). Binary Search Trees. Balanced Search Trees. AVL. 2-3 trees, Red-Black Trees. B-Trees, Hash tables.</p> <p>Strings: Sorting Strings (key-indexed counting, LSD string sort, MSD string sort, 3-way string quicksort, suffix arrays), String Symbol Tables, Substring Search (brute force, Knuth-Morris-Pratt, Boyer-Moore, Rabin-Karp), Data compression, applications.</p> <p>Graphs. Graph API. Components of a graph. Graph traversal (DFS, BFS), applications (Facebook, Kevin Bacon numbers, Fewest number of hops in a communication network).. Directed graphs (transportation, web, food, WordNet, scheduling, financial stock, cell phone, infectious disease, game, citation, object graph, inheritance, control flow).</p>
Textbooks	<ol style="list-style-type: none"> 1. Robert Sedgewick, Kevin Wayne, <i>Algorithms, 4th Edition</i>, Addison-Wesley, 2011 2. T. Cormen, C. Leiserson, R. Rivest, and C. Stein, <i>Introduction to Algorithms</i>, MIT Press. 3. J. Kleinberg and E. Tardos, <i>Algorithm Design</i>, Pearson, 2014. 4. Michael T. Goodrich and Roberto Tamassia, <i>Data Structures and Algorithms in Java</i>, Wiley 5. Mark Allen Weiss, <i>Data Structures and Problem Solving Using Java (Fourth Edition)</i>, Addison-Wesley, 2010 6. Mark Allen Weiss, <i>Data Structures and Algorithm Analysis in Java (Third Edition)</i>, Addison-Wesley, 2012 7. Kurt Mehlhorn, Peter Sanders, <i>Algorithms and Data Structures: The Basic Toolbox</i>, Springer Verlag, 2008 8. Selected papers on: Searching, Graphs, Strings algorithms
Assessment	<p>(50%) Homework assignments : (5) Programming exercises & (1) study & written presentation of a paper (1 assignment every 2 weeks)</p> <p>(50%) Written Final examination</p>
Website of the course	<p>http://compus.uom.gr/MINF168/</p>

Title	Heuristic Methods
Instructor(s)	Angelo Sifaleras
Objectives	This course aims to an introduction to modern metaheuristic methods in real-world large-scale problem solving, where a compromise between the solution quality and the computational time is required.
Skills	By successfully attending this course, graduate students will develop skills related to i) modeling of complex practical problems and ii) the algorithmic solution in a short computational time.
Prerequisites	Good knowledge of operational research, programming, and data structures.
Meeting the prerequisites	Personal study and/or completion of a related undergraduate module. Some introductory concepts in optimization and scientific programming will be provided during the course. Additional educational material on optimization problems and the Python programming language will be provided to students.
Content	<p>In solving optimization problems various exact mathematical programming algorithms are usually applied. However, such conventional methods are not usually efficient with combinatorial or global optimization problems, especially when the problem has a large and complex search space. The majority of these computational problems belong to the NP-hard class and thus, a solution in polynomial time is not possible (unless $P = NP$).</p> <p>In order to efficiently solve such problems several heuristic methods have also been studied in an attempt to find a compromise sub-optimal solution in a short computation time. Heuristic search methods are usually produced using simple intuitive and creative thinking, and are often useful in local search to quickly find good solutions in a small search area. Metaheuristic methods are higher level methods, which systematically coordinate the whole search process by the heuristic methods. Although, metaheuristic algorithms cannot guarantee finding a global optimal solution, they often provide very good results in several practical problems.</p> <p>The following topics will be studied in this module:</p> <p>Introduction to computationally hard combinatorial and global optimization problems and also to exhaustive search methods. Basic concepts such as solution representation, local search, neighborhoods, and local optimal. Introduction to variable neighborhood search, genetic algorithms, nature inspired algorithms, (e.g., swarm intelligence), tabu search, simulated annealing. Applications of metaheuristic algorithms in routing and inventory problems. Statistical analysis of computational experiments of heuristics.</p>
Textbooks	<p>Μαρινάκης Ι., Μαρινάκη Μ., Ματσατσίνης Ν. Φ., Ζοπουνίδης Κ., (2011). Μεθευρετικοί και Εξελικτικοί Αλγόριθμοι σε Προβλήματα Διοικητικής Επιστήμης, Εκδόσεις Κλειδάριθμος</p> <p>Zbigniew Michalewicz, David B. Fogel, (2004). How to Solve It: Modern Heuristics, 2nd ed., Springer.</p>
Assessment	The written exam is worth 50% of the final mark and the coursework for the course is worth the remaining 50% of the final mark. Each student is required to submit two programming deliverables. These two assignments are due on the tenth teaching week and on the date of the course written examination, respectively.
Website of the course	https://eclass.dai.uom.gr/courses/MAI101

Title	Cryptography
Instructor(s)	Sofia Petridou
Objectives	At the end of the course the student should: <ul style="list-style-type: none"> • comprehend the difference between classic and modern cryptography; • explain the advantages and disadvantages of symmetric and asymmetric cryptosystems; • compare modern cryptosystems and cryptographic protocols; • deepen in the theoretical background of cryptography, and • develop algorithms and programs in order to implement cryptosystems.
Skills	Simulation of cryptographic communication, develop and evaluate code in Sage.
Prerequisites	Undergraduate background in Discrete Mathematics and Computer Science
Meeting the prerequisites	Personal study
Content	Stream Ciphers Block Ciphers – AES Public-key Cryptography – RSA, Elgamal, Rabin Elliptic Curve Cryptography: elliptic curves (EC), EC cryptosystems (ElGamal, Diffie-Hellman key exchange) Hash functions and Message Authentication Codes (MAC) Digital signatures Identity Based Cryptography (IBE): encryption schemes with bilinear pairings and quadratic residues, comparison with other public-key encryption/decryption schemes. Cryptographic Protocols: advanced cryptographic protocols, interactive proofs and zero-knowledge protocols, secure multi-party computation, secure e-voting systems.
Textbooks	1. Understanding Cryptography, A Textbook for Students and Practitioners, Christof Paar, Jan Pelzl 2. Handbook of Applied Cryptography, A.J. Menezes, P.C. van Oorschot and S.A. Vanstone, http://cacr.uwaterloo.ca/hac/ 3. Introduction to Mathematical Cryptography, J. Hoffstein, J. Pipher, J.H. Silverman, Springer. 4. N.Smart, Cryptography, An Introduction, http://www.cs.bris.ac.uk/~nigel/Crypto_Book/
Assessment	40% project assignment 60% final written examination
Website of the course	http://compus.uom.gr/MINF207/index.php

Title	Parallel and Distributed Computing)
Instructor	Konstantinos G. Margaritis
Objectives	<p>On completion of the course, the student should be able to:</p> <ul style="list-style-type: none"> • understand and account for models, limitations and fundamental concepts within parallel and distributed computations, and apply this understanding to the analysis of concrete systems and algorithms. • adapt and develop algorithms and applications for execution on parallel and distributed systems and analyse them for correctness, reliability, and performance.
Skills	Study, design, analysis, programming and execution of parallel and distributed computations.
Prerequisites	Computer programming, algorithms and data structures
Meeting the prerequisites	Personal study, participation in undergraduate courses
Content	<p>Parallel and distributed systems: Shared and distributed memory systems, multi-core processors, general purpose graphical processing units, memory hierarchy, interconnection networks, networking infrastructure, clusters, grids and clouds.</p> <p>Operating systems and interprocess communication: processes, threads, mutual exclusion and synchronization, locks, semaphores, condition variables, monitors, messages and message queues, client-server and remote procedure call.</p> <p>Models, environments and techniques of parallel and distributed computing: multithreading, message passing, sockets, remote procedure call and remote objects, service-oriented, channels and actors, general purpose graphical processing unit programming, functional programming, big data. Parallel and distributed algorithms: data and functional parallelism, master-workers, task graphs, pipelining (data flow),</p> <p>Parallel and distributed algorithms: data and task parallelism, master-workers, task graphs, pipelining (data flow), pool of tasks, functional models. Metrics and experimental performance evaluation of parallel and distributed applications</p>
Textbooks	<p>Introduction to Parallel Computing (2nd edition). Ananth Grama, Anshul Gupta, George Karypis, and Vipin Kumar, 2003, ISBN 78-8131708071</p> <p>Parallel and Distributed Computation D.Bertsekas and J.Tsitsiklis, 1989, ISBN 0-13-648700-9</p> <p>Parallel Programming in C withMPI and OpenMP, Michael Quinn, 2004, ISBN 007-282256-2</p> <p>Parallel Programming (2nd edition). B.Wilkinson, M.Allen, 2005, ISBN 0-13-140563-2</p> <p>Programming Massively Parallel Processors, Second Edition, D.Kirk, W.Hwu, 2013, ISBN 978-0-12-415992-1</p> <p>Distributed Systems: Concepts and Design (5th edition). George Coulouris, Jean Dollimore, Tim Kindberg and Gordon Blair,2011, ISBN 0-13-214301-1</p> <p>Distributed Systems (3rd edition). Maarten van Steen, Andrew S. Tanenbaum, 2017, ISBN 978-1543057386</p> <p>Concurrency - State Models & Java Programs (2nd edition). J. Magee, J. Kramer,</p>

	<p>2006, ISBN 978-0470093559</p> <p>Distributed and Cloud Computing: From Parallel Processing to the Internet of Things Kai Hwang, Jack Dongarra and Geoffrey C. Fox, 2011, ISBN 9780123858801</p>
Assessment	<p>50% Laboratory exercises</p> <p>50% Final written examination</p> <p>Students should achieve at least 'pass' grade in both Laboratory exercises and Final written examination.</p>
Course webpage	

Title	Advanced Computer Architecture
Instructor(s)	Manos Roumeliotis
Objectives	By the end of the course, students should have a comprehensive knowledge of computer science, from the hardware perspective (design and implementation)
Skills	Programming
Prerequisites	Programming, Logic Design
Meeting the prerequisites	Prerequisites can be met by either a corresponding course, or a corresponding undergraduate degree.
Content	Study and analysis of modern processor design techniques, like superscalar design, advanced pipeline, the use of Very Long Instruction Words, multilevel cache, etc. The course examines the out of order execution, instruction reordering buffers, the handling of execution exceptions, reservation tables, and branch prediction techniques. The material includes the analysis of design techniques and access to specialized memories for superscalar processors, the reordering of load/store instructions, etc. Finally, the course studies the performance evaluation of superscalar processors and multicore processors.
Textbooks	John P. Shen and Mikko Lipasti, "Modern Processor Design: Fundamentals of Superscalar Processors," McGraw Hill.
Assessment	2 Project reports 20%, Final Exam 80%.
Website of the course	http://compus.uom.gr/MINF184/

title	Advanced Software Engineering
Instructor(s)	Alexander Chatzigeorgiou, Apostolos Ampatzoglou
Objectives	<p>The objective of this course is the study of principles, techniques and tools which are used for the development of large scale software projects with emphasis on the design of object-oriented systems.</p> <p>By employing programming languages such as C++ and Java as well as the Unified Modeling Language (UML) students will have the opportunity to investigate the application of the most established Design Principles, Design Patterns and Refactorings for the evaluation of design quality and the resolution of design/coding problems encountered in software industry. Students will participate in collaborative software development projects to simulate actual industrial (or open-source) processes and will also employ state-of-the-art Computer-Aided Software Engineering tools. In the context of this course references to the open research problems in the field of Software Engineering will be made.</p>
Skills	<p>Upon successful completion of this course students will be able to:</p> <ul style="list-style-type: none"> - apply techniques and tools for the analysis, design and implementation of comprehensible, maintainable and reusable software systems - perform maintenance on software projects - evaluate the design quality of software systems - develop software projects collaboratively
Prerequisites	<ul style="list-style-type: none"> - familiarity with the algorithmic way of problem solving - knowledge of an object-oriented programming language - knowledge of basic data structures
Meeting the prerequisites	<p>For students with insufficient background on the aforementioned fields, the parallel attendance of the undergraduate course "Procedural Programming" of the 1st semester or/and "Object-Oriented Programming" of the 3rd semester is suggested. Alternatively, personal study on the topics where students lack the corresponding background is suggested, employing bibliography provided by the instructor.</p> <p>In the context of the course, one lecture is devoted to reminding fundamental features of an object-oriented programming language.</p>
Content	<ul style="list-style-type: none"> • Introduction to Software Engineering. Challenges in the development of large-scale software projects • Brief overview of object-oriented programming concepts: Java • Agile Software Development Methodologies • Overview of the Unified Modeling Language (UML) • Object-Oriented Analysis and Design (ICONIX Methodology) • Collaborative Software Development. Version Control Systems • Object-Oriented Design Principles • Design Patterns • Design Heuristics • Software Refactoring • Software Quality. Software Metrics. • Empirical Studies in Software Engineering

	<ul style="list-style-type: none"> • Computer-Aided Software Engineering (CASE) tools
Textbooks	<p>Gamma, E., Helm R., Johnson, R., Vlissides, J. Design Patterns: Elements of Reusable Object-Oriented Software. Addison-Wesley, 1994.</p> <p>Fowler, M., Beck, K., Brant, J., Opdyke, W., Roberts, D., Refactoring: Improving the Design of Existing Code. Addison Wesley, 1999.</p> <p>Martin, R.C., Agile Software Development: Principles, Patterns and Practices. Prentice Hall, 2003.</p> <p>Rosenberg, D., Stephens, M., Use Case Driven Object Modeling with UML: Theory and Practice, Apress, 2007.</p>
Assessment	<p>50% final exams</p> <p>50% 2 Personal Assignments and 2 Team Projects</p>
Website of the course	<p>http://compus.uom.gr/MINF111/</p>

Title	Advanced Computer Networks
Instructor(s)	P. Fouliras
Objectives	The study of advanced issues in Computer Networks, so that students can better appreciate, simulate, evaluate, design new or modify existing infrastructure and services and prepare themselves for pursuing research in this field
Skills	(to be acquired): Computer Network and Protocol simulation, network infrastructure services programming
Prerequisites	Basic knowledge of Computer Networks, programming preferably in C++
Meeting the prerequisites	Undergraduate course in Computer Networks. Personal study in C++ programming.
Content	Wireless networks, routing protocols, VLAN, packet loss-congestion-appropriate mechanisms, P2P networks, protocols and real-time traffic, QoS, monitoring, performance analysis and evaluation, design, simulation. Internet of Things.
Textbooks	<ul style="list-style-type: none"> • James F. Kurose, Keith W. Ross, "Computer Networking-A Top-down Approach", 7th Edition, Pearson Addison-Wesley. • Deploying IP and MPLS QoS for Multiservice Networks: Theory & Practice (The Morgan Kaufmann Series in Networking) by John William Evans and Clarence Filsfil • John T. Moy, "OSPF-Anatomy of an Internet Routing Protocol", Addison Wesley.
Assessment	70% written exams, 30% individual lab/programming assignments
Website of the course	http://compus.uom.gr/MINF170/

2nd Semester

Elective Courses

Title	Web and Mobile Application Development
Instructor(s)	T. Kaskalis
Objectives	The subject focuses on: (1) modern web architecture principles, (2) the development of interactive web applications (mostly front-side but also back-side), (3) the functioning of asynchronously communicating web application processes, (4) the design and development of mobile devices' applications, based on web technologies, (5) semantic web elements and the respective data storage, search and exchange standards, (6) applying principles, practices and technologies oriented towards application development for heterogeneous platforms.
Skills	Utilization of web technologies on platforms with diverse underlying characteristics. Application development using semantic web standards and asynchronous communication. Assessment ability of web technologies' application development tools and environments. Distinction and management of operations, services and data in web architecture levels. Critical analysis of elements and architectural design of mobile applications. Fluent use and expansion of programming interfaces regarding web and mobile applications.
Prerequisites	Basic programming abilities.
Meeting the prerequisites	Pre-graduate introductory programming course (e.g. in C).
Content	Modern web content development technologies (HTML5, CSS3). Web application scripting languages (Javascript). Document Object Model, Application Programming Interfaces, multi-tier architecture. Web application and services asynchronous communication (AJAX, JSON). Scripting languages frameworks (libraries, frameworks). Mobile devices' application design and development with web technologies. Architecture and creation of mobile applications. Modern topics of ambient web services.
Textbooks	M. Pilgrim, <i>Dive Into HTML5</i> , http://diveintohtml5.info <i>CSS Basics</i> , http://www.cssbasics.com A. Rauschmayer, <i>Speaking JavaScript: An In-Depth Guide for Programmers</i> , O'Reilly Media, 2014, http://speakingjs.com/es5/ A. Rauschmayer, <i>Exploring ES6</i> , Leanpub, 2016, http://exploringjs.com/es6/ R. Braithwaite, <i>JavaScript Allongé, the "Six" Edition</i> , Leanpub, 2016, https://leanpub.com/javascriptallongesix/read By Y. Fain, V. Rasputnis, A. Tartakovsky & V. Gamov, <i>Enterprise Web Development, Building HTML5 Applications: From Desktop to Mobile</i> , O'Reilly Media, 2014, http://enterprisewebbook.com/ http://jsbooks.revolunet.com/
Assessment	During the course, students will carry out 3 or 4 homework assignments (50% of final grade). The rest 50% will come from a written final examination.
Website of the course	http://compus.uom.gr/MINF187/index.php

Title	Information Security in the Internet Age
Instructor(s)	Ioannis Mavridis
Objectives	<p>Understanding of information protection issues and techniques in the Internet.</p> <p>Application of security mechanisms and attack scenarios.</p> <p>Studying of Internet mal-use cases and implementation of defense methods.</p> <p>Utilization of methodologies and response techniques for security incidents.</p> <p>Studying of relevant issues and investigation of research directions in cyber-security.</p>
Skills	Linux, Windows
Prerequisites	Basic Knowledge and handling of Linux & Windows operating systems, being familiar with computer networks as well as with information security issues.
Meeting the prerequisites	Relevant courses and introductory lectures.
Content	<p>Introduction – Internet threats and attacks</p> <p>Applied cryptology and security mechanisms</p> <p>Network security systems & protocols – Attack scenarios</p> <p>Web application security – Attack scenarios</p> <p>Access control enhancements – Attack scenarios</p> <p>Cyber-crime protection</p> <p>Incident response and digital forensics</p> <p>Critical infrastructure protection, early warning systems, cyber-security.</p>
Textbooks	<p>Information Systems and Networks Security (in Greek)</p> <p>G.Pangalos & I.Mavridis</p> <p>Publ. Anikoula, 2002</p> <p>ISBN: 960-516-018-8</p> <p>Cryptography and Network Security</p> <p>W. Stallings,</p> <p>Prentice Hall (5e),</p> <p>ISBN-13: 978-0136097044</p> <p>Applied information security: a hands-on approach, Basin D., Schaller P., Schläpfer M., Springer, 2011</p>
Assessment	50% Written examination and 50% Written assignment orally examined
Website of the course	http://compus.uom.gr/MINF179/

Title	Ubiquitous Communications, Clouds, and Big Data
Instructor(s)	Konstantinos Psannis http://users.uom.gr/~kpsannis/
Objectives	By the end of the course, students should have a comprehensive knowledge of advanced communications systems and information technology in order to design ICT apps and services (ICT in Societal Challenges/Industrial Development/Product).
Skills	ICT-Application Development. Ability to understand the usefulness of the Convergence of Information Technology (IT) and advanced Communications Systems (CS).
Prerequisites	Knowledge of fundamental of Telecommunications Systems- Data and Communications Networks.
Meeting the prerequisites	<p>Graduates with no Information Technology background can attend undergraduate courses (Communications Systems and Networks).</p> <p>http://opencourses.uom.gr/courses/efarmosmenhs-plhroforikh/1102-thlepikoinonies-systhmata-epikoinonion</p> <p>Additional educational material (e-books, white papers: industry perspective of a problem/solution, patents) can be provided to students. Self-study of basic Communications Systems and Networks, attend webseminars/ web-conferences</p> <p>http://users.uom.gr/~kpsannis/</p> <p>https://www.researchgate.net/profile/Kostas_Psannis</p> <p>https://orcid.org/0000-0003-0020-6394</p>
Content	<p>BIG Data Processing –Networking–Broadcasting and Communications.</p> <p>Internet of Things: Connects ALL Things- Things that THINK!</p> <p>Cloud-Based Communications Systems: Convergence of (mobile) Cloud Computing and Telecommunications Networks (wired/wireless).</p> <p>4G LTE & DVB-T/M/S & WiMAX. Hybrid LTE -DVB channels, PHY-layer and Application-layer optimization). Network as a Service (Wired : GEANT-EU/GRNET-GR/SINET-JP/Internet2-USA high speed connectivity /Wireless: Network as a Service 4G LTE & DVB-T/M/S & WiMAX</p> <p>Cloud-based unified communications systems, NIST’s definition of Cloud Computing, Enterprise Cloud (JAPAN-EU-USA), Co-location Interconnectivity, X-as-Service</p>

	<p>Networking and Cloud: An Era of Change, Role of the Platform in Cloud Service Delivery , Building the Cloud-Ready Network, Transforming Telecoms Services with a Secure, Agile Private Cloud Environment, Cloud: Powered by the Network</p> <p>3D/ HD/UHD Video- Audio - Haptic data, real time -multipoint communications, Avatars/Tele-robotics. . Digital Media over Cloud (synnefo.it.uom.gr Okeanos.GRnet Google Cloud, DropBox Amazon Simple Storage Service Box Microsoft Apple icloud), Multipoint /Avatars/Tele-Robotics /Olfactory/Haptic Senses. Experiments on International Connections (E-ICONS)- Green Data streams over TEIN3 (Pan-Asian), Science Information Network (SINET, Japan), GRNET (Greece)- Okeanos Cloud, and GEANT (European Union) dedicated high capacity connectivity. Next Generation Mobile Networks (5G): Building a virtual zero latency gigabit experience, Three key development areas in 5G, Bridging the spectrum gap with 5G, Cloud Technologies for Flexible 5G Radio Access Networks.</p> <p>Internet of Things (IoT): Sensor networks-Platforms for connected smart Objects. Internet of Things: integration of several technologies and communications solutions. Telecoms Technologies: (a) RFID systems(RFID), (b) Wireless Sensor Networks (WSN), and RFID sensor networks (RSN). Apps/Services: (a) Transportation and logistics domain (b) Healthcare domain (c) Smart environment (home, office, plant) domain and (d) Personal and social domain.</p> <p>Big data over advanced integrated cloud and network infrastructure (OKEANOS - GRNET's cloud service). Network as a Service : IoT – clouds, mobile cloud computing- converged network design-converged infrastructure) . Algorithms for high-quality global data network services/apps</p> <p>ICT in the Societal Challenges, ICT-Industrial Leadership/Development/Product. Seamless ICT: Globally integrated ICT environments, Low-cost, flexible and on-demand ICT environments, Safe ICT environments. BIG DATA, Cloud-based unified Communications systems and Internet of Things. ICT environment OPTIMIZATION through seamless ICT</p>
Textbooks	Hakima Chaouchi, The Internet of Things: Connecting Objects, 288 pages, Wiley, May 2010.

	<p>William Stallings, Wireless Communications & Networks: Pearson New International Edition, 2nd Edition Nov 2013.</p> <p>Ricardo Puttini, Thomas Erl, Zaigham Mahmood, Cloud Computing: Concepts, Technology & Architecture, 2015.</p> <p>Zeng, Deze, Gu, Lin, Guo, Song ,m Cloud Networking for Big Data, 1st ed. Edition, Kindle Edition , Springer, 2015</p> <p>Michael P. Fitz, Fundamentals of Communications Systems, McGraw-Hill 2012.</p> <p>Frank H. P. Fitzek, Marcos D. Katz, Mobile Clouds: Exploiting Distributed Resources in Wireless, Mobile and Social Networks, Wiley, February 2014</p> <p>e-books, Patents (http://patft.uspto.gov/) , e-White papers industry perspective of a problem/solution (Compus)</p> <p>https://www.researchgate.net/profile/Kostas_Psannis</p>
Assessment	<p>(i) Personal Assignment and Team Project (presentation of a technical paper)(50%)</p> <p>(ii) Final Exams (50%)</p>
Website of the course	<p>http://users.uom.gr/~kpsannis/</p> <p>http://compus.uom.gr/MINF193/</p>

Title	Simulation Methods
Instructor(s)	S. Souravlas
Objectives	In the end of this course, the students should be able to <ul style="list-style-type: none"> • Effectively develop their computing skills on simulation. • Apply the appropriate mathematical and statistical methods to design models and process simulations. • Use the most sophisticated tools for simulating processes from a variety of scientific areas.
Skills	Programming
Prerequisites	Statistics and Basic Knowledge on Programming
Meeting the prerequisites	Partially from the course and from previous studies
Content	Systems study, continuous systems (construction of analytical models and sensitivity analysis), discrete systems (activities and events), Petri nets, process modeling with Petri nets, Simulation Timing Mechanisms, Simulation Languages (GPSS, MATLAB, SIMULINK) and development of simulation models for a variety of scientific fields, Randomness controls, Analysis of simulation results, deterministic systems simulation, queue models.
Textbooks	Manos Roumeliotis and Stavros I. Souravlas «Simulation Techniques-Theory and Applications», 2 nd Edition, 2015, Tziolas Publications. As supportive material, the following textbooks could be usedQ <ol style="list-style-type: none"> 1. D. Maki, M. Thompson, Mathematical Modeling and Computer Simulation, Brooks/Cole, 2006. 2. G. S. Fishman, Discrete-Event Simulation, Springer, 2001. Moreover, any paper or reference found from any electronic source. The following packages could be used as application software: GPSS, MATLAB.
Assessment	During the course, the students will work on two small projects (10% of the final grade for each one) and on a big project assigned to them in the middle of the semester (30% of the final grade). The remaining 50% of the final grade is taken from the final exam.
Website of the course	http://compus.uom.gr/MINF205/index.php

Title	Topics in Database Technology
Instructor(s)	Georgios Evangelidis & Georgia Koloniari
Objectives	(a) To study in detail fundamental and advanced issues on database design and implementation (transaction management, views, recursive SQL, stored procedures, database tuning). (b) To study modern trends in data models and database applications (data warehouses, post-relational databases, XML databases).
Skills	Acquire knowledge in terms of theory and practice on database development issues. Get to know and use modern models and applications of databases.
Prerequisites	Undergraduate course in Databases (entity-relationship model, relational model, normalization, relational algebra, SQL).
Meeting the prerequisites	Requirements will be met due to the profile of the applicants.
Content	Database Transactions and Concurrency Control Technologies (Multi-granular locking CC, Multi-versioning CC, Optimistic CC), case studies on IBM DB2, Oracle, MySQL, Postgresql. Security and authorization. Multi-dimensional data and text indexes. Partitioning, Replication and Clustering. Recursive SQL. SQL Stored Procedures, views and triggers. XML Databases. NoSQL Databases. Graph Databases. Linked Data.
Textbooks	Database Management Systems (3rd edition), by Raghu Ramakrishnan and Johannes Gehrke, McGraw-Hill, 2002. Database Systems: The Complete Book (2nd Edition), by Hector Garcia-Molina, Jeffrey D. Ullman, and Jennifer Widom, Prentice Hall, 2008. Readings in Database Systems (4th edition), by J. M. Hellerstein and M. Stonebraker (eds.), Morgan Kaufmann Publishers, 2005.
Assessment	Three (3) Homework Assignments (50%) Final Written Examination (50%)
Website of the course	http://compus.uom.gr/MINF177/

Title	Serious Games Programming
Instructor(s)	S. Xinogalos
Objectives	The aim of the course is for students to acquire: (a) basic knowledge of the role, the types and the features of serious games, as well as the whole process of devising a serious game, (b) capabilities of designing and implementing serious games using contemporary tools, interfaces and programming languages, (c) knowledge and capabilities of using/devising evaluation metrics of serious games based on the aims defined during its design.
Skills	Upon successful completion of this course students will be able to: <ul style="list-style-type: none"> • evaluate the design quality of serious games and the degree they fulfill the initial goals • design serious games taking into account various factors/design principles • implement simple serious games using the object-oriented programming technique and game libraries\engines
Prerequisites	Knowledge of object-oriented programming
Meeting the prerequisites	Attending relevant undergraduate courses. Material for study will be provided.
Content	The <i>role</i> of serious games as tools for educating, skills acquisition and simulation in various sectors, such as education, health and business processes. <i>Types</i> and <i>features</i> of serious games. Review of representative examples of serious games. <i>Designing and evaluating a serious game:</i> <ul style="list-style-type: none"> • Design principles, methodologies and serious games design frameworks. • Evaluating the quality of serious games design through serious games evaluation frameworks and specialized questionnaires. <i>Programming serious games:</i> <ul style="list-style-type: none"> • Familiarization with basic game elements through the development of simple games in Java with the educational programming environment Greenfoot: the levels of the game, the characters and their actions, collision detection, incorporating educational content and activities. • Implementing games with specially designed C# classes: the loop of the game, graphical user interface, interaction and event handling, game map (scrolling), text, 2D graphics and animation, arrays and collections of objects. • Introduction to game development with the game engine Unity 3D.
Textbooks	Ernest Adams, Fundamentals of Game Design, New Riders, 2009. David Michael, Serious Games: Games That Educate, Train, and Inform, Cengage Learning PTR, 2005. Clark Aldrich, The Complete Guide to Simulations and Serious Games: How the Most Valuable Content Will be Created in the Age Beyond Gutenberg to Google, Pfeiffer, 2009. Daniel Schuller, C# Game Programming: For Serious Game Creation, Cengage Learning PTR, 2010. Arjan Egges, Learning C# by Programming Games, Springer, 2013. Andrew Davison, Killer Game Programming in Java, O'Reilly Media, 2005. David Brackeen, Bret Barker, Lawrence Vanhelsuwe, Developing Games in Java, New Riders, 2003.

Assessment	50% final exams (computer-based) 50% personal assignments: carrying out three assignments (1) on evaluating existing serious games using special frameworks and criteria, (2) designing and implementing a game in Java, (3) designing and implementing a serious game.
Website of the course	http://compus.uom.gr/MINF172/

Title	Advanced Artificial Intelligence
Instructor(s)	Ioannis Refanidis
Objectives	The course presents both the theory of Artificial Intelligence, as well as its applications and more specifically modeling and solving interesting combinatorial problems using constraint satisfaction techniques and taking decisions under uncertainty. It also presents the modern view of intelligent systems, with probabilistic knowledge representations and reasoning with exact and approximate (through sampling) methods.
Skills	Upon the successful completion of the course, students will be able to: <ul style="list-style-type: none"> • model and solve planning & scheduling problems using the suitable algorithms, • model probabilistic decision problems using Bayesian networks, • apply probabilistic reasoning in real world problems, such as target tracking and localisation. • analyzing data and develop predictive models using machine learning methods
Prerequisites	It is recommended, that the student has the undergraduate course in Artificial Intelligence. The classes of this undergraduate course have been recorded (Spring semester of academic year 2013-14) and are available online through the Open Courses program of University of Macedonia. The student is also expected to have a basic understanding of probabilities and statistics. Finally, the student is also expected to have good programming skills (e.g., know at least one programming language (such as Python)).
Meeting the prerequisites	During the semester about 2 weeks (out of 12 weeks) are devoted in reviewing the fundamentals of Artificial Intelligence, such as basic search algorithms, logic, constraint programming and basic notions of probabilities.
Content	<ul style="list-style-type: none"> • Uninformed & heuristic search algorithms: Depth first search, breadth first search, best first search, A*. • Constraint satisfaction problems and constraint modeling. Solving constraint satisfaction problems. Consistency algorithms and arc consistency. Consistency algorithms' degree and efficiency. Combining search and constraint propagation. • Knowledge representation and reasoning, propositional and first order logic • Planning. Progression, regression, partial order planning, graph-based planning, planning as satisfiability. Planning and scheduling. Hierarchical planning. • Acting under uncertainty. Rational decisions. A decision theory agent. Basic notations of probabilities. Probability axioms. Reasoning with complete joint probability distributions. Independence. Conditional independence. • Probabilistic reasoning. Bayesian networks. Markov blanket. Continuous variables. Exact reasoning in Bayesian networks. Reasoning through enumeration. Approximate reasoning. Direct sampling. Rejection sampling. Likelihood weighting. Monte Carlo Markov chain. • Temporal probabilistic reasoning. Stationary processes. Markov hypothesis. Reasoning in temporal models: Filtering, Prediction, Smoothing. Finding the

	<p>most likely explanation. Viterbi algorithm. Dynamic Bayesian networks. Particle filtering.</p> <ul style="list-style-type: none"> • Making simple decisions. Maximum expected utility. Axioms of utility theory. Utility functions. Risk aversion, risk neutral. Multicriteria utility functions. Decision networks. Value of information. Expert systems of decision theory. • Sequential decision making problems. Markov decision processes (MDPs). Value iteration. Policy iteration. Partially observable Markov decision processes. • Machine learning. Neural networks. Deep neural networks. Convolutional and recurrent neural networks. Support vector machines. • Elements of natural language processing.
Textbooks	<ul style="list-style-type: none"> • Stuart Russell & Peter Norvig, Artificial Intelligence, A Modern Approach (3rd edition), Prentice Hall, 2009. ISBN: 0136042597. • Mausam and Andrey Kolobov, Planning with Markov Decision Processes, an AI perspective. Morgan and Claypool, 2012. • Judy Pearl, Probabilistic Reasoning in Intelligent Systems. Morgan Kaufmann, 1988.
Assessment	<p>Home projects 50%</p> <p>The final written examination, will contribute 50% of the final mark.</p>
Website of the course	<p>http://compus.uom.gr/MINF117/</p>

7.2 2nd Specialization: “Business Computing”

1st Semester

Elective Courses

Title	Start-up Entrepreneurship
Instructor(s)	Fouskas Konstantinos
Objectives	<p>The aim of the course is to provide a systematic understanding of the integrated approach to entrepreneurship and new business establishment. It provides an overview of basic business steps and components that can become the introduction of students to the field of entrepreneurship with innovative approaches. In each course will analyze important elements of entrepreneurship that will present topics related to the genre selection business , targeting and positioning in the market , analyzing customer segments - developing business value , costing and pricing , business development and team recruitment , seeking financing and business launch .</p> <p>All these steps will be accompanied by a business analysis tools such as the Business Model Canvas, analysis of case studies of successful and non- successful business and presentation of scientific studies show that reveal the factors that help or hinder the success of an entrepreneurial effort.</p> <p>Moreover, we will analyze specific issues related to the development of entrepreneurship in specific environments, such as e-business and entrepreneurship to exploit new technologies in traditional sectors.</p>
Skills	<ul style="list-style-type: none"> • To understand and evaluate the process of entrepreneurship • To compare and understand the use of scientific knowledge in the development of start-ups by applying appropriate business tools • To analyze and evaluate the strategic options available to entrepreneurial activity • To create added value to the business environment with the use of innovation
Prerequisites	-
How to fulfill the prerequisites	-
Course Contents	<ul style="list-style-type: none"> • Introduction to the course and examples • Entrepreneurial thinking and motivation • Seeing Entrepreneurially – I Seeking a business idea • ‘Segmenting and targeting the right customers • Business model canvas • Business model – Special issues • Team development and management • Business Plan • Global challenges on entrepreneurship • Financial issues and fund rising • Interim and Final presentation of Business plan
Textbooks	<ul style="list-style-type: none"> • Blamk, S., & Dorf, B. (2012). The Startup Owner's Manual: The Step-by-Step Guide for Building a Great Company. K&S Ranch. • Bosma, N., & Schutjens, V. (2011). Understanding regional variation in entrepreneurial activity and entrepreneurial attitude in Europe. The Annals of Regional Science, 47(3), 711-742. • Chichester. Treleaven, P. (2000) eBusiness Start-Up, Kogan Page, London.

	<ul style="list-style-type: none"> • Combe, C.A. (2005) e-Business adoption trajectories of SME's in Scotland, <i>Current Issues in E-Business Research</i>, June, pp 29-40. • Creswell, J. W. (2014). <i>Qualitative, Quantitative, and Mixed Methods Approaches</i>. Fourth Edition. Sage Publ. • Eric Ries, (2011), <i>The Lean Startup: How Constant Innovation Creates Radically Successful Businesses</i> • Green, J. V. (2013). <i>The Opportunity Analysis Canvas</i>. Venture Artisans Press. • <i>Harvard Business Review on Entrepreneurship</i>, Harvard Business School Press • Hisrich R., & Peters M. (2002). <i>Entrepreneurship</i>, 5th Edition, McGraw Hill. • Keeley, L., Pikkell, R., Quinn, B., & Walters, H. (2013). <i>Ten Types of Innovation</i>. Wiley Inc. • Kuratko, D., & Hodgetts, R. (2004). <i>Entrepreneurship: Theory, Process, Practice</i>, 6th ed., Thomson South-Western. • March. Wickramasekera, R. and Matthews, S. (2007) <i>Wotif.com: An Online Success Story</i>, <i>International Journal of e-Business Management</i>, Vol. 1, Issue 1, December, pp 50-52. • Osterwalder, A. & Pigneur, Y. (2010). <i>Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers</i>. John Wiley & Sons, Inc. • Pavic, S., Koh, S.C.L., Simpson, M. and Padmore, J. (2007) <i>Could e-business create a competitive advantage in UK SME's? Benchmarking: An International Journal</i>, Vol. 14, No. 3, pp 320-351. • Peter F. Drucker Page (2007), <i>Innovation and Entrepreneurship</i>, Routledge; 2Rev Ed edition • Putsis, W. (2014). <i>Compete Smarter, Not Harder: A Process for Developing the Right Priorities Through Strategic Thinking</i>. Wiley Inc. • Ries, E. (2011). <i>The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses</i>. Crown Business. • Scarborough, N. M. (2013). <i>Essentials of Entrepreneurship and Small Business Management</i>. Prentice Hall. • Scase, R. (2002). <i>Living in the corporate zoo, life and work in 2010</i>, Oxford, Capstone Publishing Ltd: UK. • Stam, E., & Schutjens, V. (2005). <i>The fragile success of team start-ups (No. 1705)</i>. <i>Papers on entrepreneurship, growth and public policy</i>. • Stam, E., Bosma, N., Van Witteloostuijn, A., De Jong, J., Bogaert, S., Edwards, N., & Jaspers, F. (2012). <i>Ambitious entrepreneurship. A review of the academic literature and new directions for public policy</i>, AWT report, 41. • Strauss, S. D. (2003). <i>The Business Start-Up Kit</i>. Dearborn Trade. • Van Gelderen, M., Thurik, R., & Bosma, N. (2005). <i>Success and risk factors in the pre-startup phase</i>. <i>Small Business Economics</i>, 24(4), 365-380. • Warner, M. and Witzel, M. (2004) <i>Managing in Virtual Organizations</i>, Thomson, London. • William D. Bygrave, Andrew Zacharakis (February 2014), <i>Entrepreneurship</i>, 3rd Edition, Wiley • Yang, K., & El-Haik, B.S. (2003). <i>Design for Six Sigma: A Roadmap for Product Development</i>, Second Edition. McGraw Hill. • Γεωργαντά, Ζ. (2003) <i>Επιχειρηματικότητα και Καινοτομίες: Το management της επιχειρηματικής καινοτομίας</i>, Αννικούλα, Θεσσαλονίκη. • Λαμπρόπουλος, Π. (2005). <i>Εγχειρίδιο επιχειρηματικότητας. Οργάνωση, διαχείριση ατο- μικών και μικρών επιχειρήσεων</i>, Δ' Έκδοση, Εκδόσεις
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	<p>Προπομπός.</p> <ul style="list-style-type: none"> • Σαμαρά Ε. & Βάλβη Θ. (2010). Καινοτομία Επιχειρηματικότητα Θεωρία – Πράξη, Εκδόσεις Σοφία • Σκουλάς, Ν. (2002) Το Εγχειρίδιο του Μικρού και Μεσαίου Επιχειρηματία: Πρακτικός οδηγός για μια κερδοφόρα μικρή και μεσαία επιχείρηση, Ελληνικά Γράμματα, Αθήνα. • Χατζηκωνσταντίνου Γ. & Γωνιάδης Η. (2009). Επιχειρηματικότητα και καινοτομία. Από την ίδρυση στη διοίκηση και την επιβίωση της νέας επιχείρησης, Εκδόσεις Gutenberg
Assessment	<ol style="list-style-type: none"> 1. Team assignment & assignment presentation - 50% of final grade 2. Final exams - 50% of final grade
Website of the course	http://compus.uom.gr/MINF194/

Title	Object-Oriented Software Development
Instructor(s)	Stelios Xinogalos & Alexander Chatzigeorgiou
Objectives	The development of large scale information systems entails significant challenges both in terms of technology and management of the involved activities and resources. The objective of this course is the introduction to the object-oriented approach for the analysis, design and implementation of software, which constitutes the most widely adopted approach for the development of contemporary systems. The Java programming language is employed in order to illustrate systematic methods for confronting the complexity of large-scale projects. The course covers introductory and advanced concepts of object-oriented programming as well as the specification and decomposition of a problem (analysis) and its solution by means of software (design). Computer-Aided Software Engineering (CASE) tools will be employed during various phases of the development process.
Skills	Upon successful completion of this course students will be able to: <ul style="list-style-type: none"> - specify the various phases in the development of a large-scale software project and identify the related challenges - apply object-oriented analysis and design techniques for the development of a software system - implement object-oriented software
Prerequisites	
Meeting the prerequisites	
Content	<ul style="list-style-type: none"> • Introduction into the object-oriented way of thinking • Definition of classes, Construction of Objects • Relations among classes, Exchange of messages among objects • Usage of Library Classes • Improvement of object-oriented system structure by means of Inheritance • Object-Oriented Design Principles. Use of Abstraction • Development of Graphical User Interfaces • Event Handling • Modern Integrated Development Environments • Introduction to Software Engineering. Challenges in the development of large-scale software systems • Overview of the Unified Modeling Language (UML) • Object-Oriented Analysis: Domain model, requirements specification, use cases • Object-Oriented Design: Object interaction, allocation of responsibilities, sequence diagrams, class diagrams
Textbooks	David J. Barnes, Michael Kolling, Αντικειμενοστρεφής προγραμματισμός σε Java, (Pearson 3rd edition), Κλειδάριθμος, 2008. H. M. Deitel and P. J. Deitel, Java: How to Program, Prentice Hall, 2009. C. Larman, Applying UML and Patterns: An Introduction to Object-Oriented

	Analysis and Design and Iterative Development, Prentice Hall, 2004. D. Rosenberg, M. Stephens, Use Case Driven Object Modelling with UML: Theory and Practice, Apress, 2007.
Assessment	60% final exams 40% 5 Personal Programming Assignments
Website of the course	http://compus.uom.gr/MINF167/

Title	Business Process Intelligence
Instructor(s)	Vergidis Konstantinos
Objectives	<p>The course has a three objectives:</p> <p>to familiarize the students with concepts related to Business Process Management (modelling, analysis, redesign/re-engineering)</p> <p>to provide in-depth training in computational methods and algorithms (process mining, genetic algorithms, heuristics, other optimization methods), and</p> <p>to combine the above in order to produce optimal and adaptive business process models.</p>
Skills	<p>By successful completion of the course, the students will:</p> <p>have a solid understanding of the various stages of Business Process Management,</p> <p>be able to identify, document and break-down the core business processes of an organization or enterprise,</p> <p>employ a series of business process modelling techniques (e.g. EPC, IDEF, BPMN) along with business process analysis and optimisation methods.</p> <p>be familiar with techniques such as: process mining, simulation, machine learning, genetic algorithms, natural language processing.</p> <p>be able to combine BPM approaches and computational methods in order to achieve quantifiable and optimal results for the organization.</p>
Prerequisites	there are no prerequisites for this course
Meeting the prerequisites	-
Content	<p>Business process management is usually treated from two different perspectives: business administration and computer science (Weske, 2012). The life-cycle of a business process entails a series of stages: identification, modelling, analysis, optimisation, re-design/re-engineering and automation (Dumas et al., 2013).</p> <p>The course focuses on initial identification and modelling of a business process utilizing formal modelling techniques and also in optimisation / re-design employing quantifiable criteria and optimisation algorithms. The course main areas of focus are: business process modelling techniques and formal languages, re-design approaches and methodologies utilizing techniques such as process mining, simulation, machine learning, genetic algorithms, natural language processing.</p>
Textbooks	<p>Linden, M., Felder, C. and Chamoni P. (2011), Dimensions of Business Process Intelligence, Springer.</p> <p>Weske, M. (2012), Business Process Management: Concepts, Languages, Architectures, Springer (2nd edition), New York.</p> <p>Dumas, M., La Rosa, M., Mendling, J., Reijers, H.A. (2013), Fundamentals of Business Process Management, Springer, London.</p> <p>Cummings, F. (2002), Enterprise Integration: An Architecture for Enterprise</p>

	Application and Systems Integration, John Wiley & Sons, Toronto.
Assessment	20% weekly exercises (10) 30% project 50% exams
Website of the course	http://compus.uom.gr/MINF206/

Title	Digital Business Strategy
Instructor(s)	Fotios Kitsios Invited speakers
Objectives	The aim of the course is to highlight the importance of strategic management in the digital business environment. To prepare future managers to leverage technologies, applications and skills in adoption and change management of business ideas, opportunities and strategies that organizations need to manage in order to plan and lead digital business initiatives. In this course, students learn how to leverage classic strategic frameworks and principles, SWOT, Competitor, Environmental, Five Forces, and Capabilities Analyses and Strategy Maps in a changing world. Therefore, future managers Develop an understanding of all the dimensions to take into consideration when crafting a new strategy. These tools are applied in case studies of industry leaders Google, Apple
Skills	<ul style="list-style-type: none"> • Understand the importance of digital business strategy • Develop the ability to think strategically, analyze the competitive environment, and recommend firm positioning and value creation • Align information technology with new organizational forms of electronic business • Develop effective strategies in digital business environment • Gear up for the challenges of strategy formulation and implementation in a 21st century business
Prerequisites	-
Meeting the prerequisites	-
Content	<ol style="list-style-type: none"> 1. Introduction to e-business 2. The markets for electronic commerce 3. The economics of digital business 4. Analysing the industry impacts of digital business 5. Formulation a digital business strategy 6. Developing a digital business strategy 7. Implementing a digital business strategy 8. Evaluation a digital business strategy 9. Managing digital business change 10. Case studies
Textbooks	<ul style="list-style-type: none"> • Dave Chaffey: "Digital Business & E-Commerce Management, 6th ed. Strategy Implementation & Practice 6th Revised ed. Edition, Prentice Hall, 2015. ISBN-13: 978-0273786542 (712 pp) • Chen Stephen: "Strategic Management of E-Business", John Wiley & Sons, Inc. New York, NY, USA, 2004. ISBN:0471496332 (386pp) • Dave Chaffey: "E-business and E-commerce Management: Strategy, Implementation and Practice," fourth edition, Prentice Hall, 2009. ISBN 9780273719601 (735 pp) • Tawfik Jelassi, Albrecht Enders, "Strategies for E-business: Creating Value through Electronic and Mobile Commerce", Prentice Hall (2004) • Colin Combe, "Introduction to E-business: Management and strategy, 2006, Elsevier, ISBN-13: 978-0-7506-6731-9 • Mohini Singh, Dianne Waddell, "E-Business Innovation and Change Management", Irm Press (2003) • In Lee, "Emergent Strategies for E-Business Processes, Services and Implications: Advancing Corporate Frameworks", Information Science Reference (2008) • Petter Gottschalk, "E-business strategy, sourcing, and governance",

	<p>ISBN 1-59904-004-2, Idea Group Inc (2006)</p> <p>Papers</p> <ul style="list-style-type: none"> • Porter, M.E. (2001) Strategy and the Internet, Harvard Business Review, • Amit, R. and Zott, C. (2001) Value creation in E-Business, Strategic Management Journal, 22, pp 493-520. • Combe, C.A. (2002) The management of e-commerce strategies for gaining and sustaining competitive advantage in the online bookselling industry: The case of Amazon.com, International Journal of e-Business Strategy Management, Vol.4, No.2, November/December, pp 153-165. • Combe, C.A. (2004) Assessing customer relationship management strategies for creating competitive advantage in electronic business, Journal of Knowledge Management Practice, Vol.5, August, pp 4-14.
Assessment	<p>50% final written examination</p> <p>50% team assignment</p>
	<p>The assignment designed specifically to apply and showcase the skills that student learned in the course. To this end, a comprehensive Strategic Analysis, provides an opportunity for students to synthesize concepts and knowledge from the course. Students select an organization (digital business) for this project and analyze the current state of the organization, strategic issues facing the organization, strategic paths the organization might pursue, make a recommendation of the best path for the organization to pursue, and write an Executive Summary. Their finished project will serve as an artifact showcasing their ability to conduct research on/within an organization, select and apply the most appropriate analytical tools, build a well-supported case for a specific position, and effectively communicate key points with executive leadership.</p>
Website of the course	<p>http://compus.uom.gr/MINF192/</p>

Title	Financial Accounting Systems
Instructor(s)	Vazakidis Athanasios & Stavropoulos Antonios
Objectives	The course of "Financial Accounting Systems" aims to provide knowledge of Financial Accounting, of understanding the content and mode of the Greek Charts of Accounts (groups 1-8), of the Double-entry book-keeping using Accounting Information Systems, of the Opening and Closing the books, of handling special issues as K.E.P.Y.O, V.A.T. (Value Added Tax), I.K.A. (Social Security Organisation) and various taxes, of creating Companies Balance Sheet and Table of Results of Operations, of guidance on determining the fair value of companies, according to relevant Greek Legislation and analysis of Accounting Data. Based on the knowledge offered by this course, future managers are prepared to be more effective in their working environment.
Skills	General Skills of Computing and basic knowledge of the Greek Chart of Accounts (Groups 1-8 of G.Ch.A.).
Prerequisites	The approach will be initiated by the student and teacher guidance.
Meeting the prerequisites	The course will take the form of 12 three hour Lectures.
Content	<p>Deepening in Accounting Standardisation.</p> <p>Description and analysis of the Greek Chart of Accounts (groups 1-8).</p> <p>Proper Use of Accounts such as customer, suppliers, securities, sales, purchases and expenses.</p> <p>Accounting errors (prevention, search, correction).</p> <p>Determination of V.A.T. (Value Added Tax), I.K.A. (Social Security Organisation), other taxes.</p> <p>Connect to TAXISNET (Greek Tax-Office System) of all the Accounts where possible.</p> <p>Organizing warehouse data.</p> <p>Prints, projections, changes, modifications, temporary and permanent movements of accounting records.</p> <p>Implementing Exercises in Accounting Information Systems.</p> <p>Double-entry book-keeping using Accounting Information Systems.</p> <p>Creating Balance Sheet and Table of Results of Operation.</p> <p>Financial Statements.</p> <p>Implementing Accounting Exercises using modern Accounting Information Systems in the PC Lab.</p> <p>Determining the fair value of a business (Individual, O.E., E.E., Ltd, SA) based on the relevant Greek Legislation.</p> <p>In depth studies in specialized cases (case studies) in order for the students to understand the importance of analyzing the accounting records and information of the companies to both internal and external stakeholders.</p>
Textbooks	<p>1) Accounting Plan-Computerized Accounting (Vazakidis A, Stavropoulos A, Chatzis A), in Greek, 2nd edition, 2010, Thessaloniki.</p> <p>2) Financial Accounting - Accounting Plan (Stavropoulos A, Vazakidis A, Tsopoglou S), 2nd edition, 2010, Thessaloniki.</p>

	<p>3) Accounting Information Systems - Computerized Accounting, in Greek, (Ginoglou D, Tachinakis P, Protogeros N), 1st edition, 2004, Athens.</p> <p>4) Examples of implementation and analysis of the general plan of accounts in practice, in Greek, (Karagiannis D, Karagiannis I, Karagianni A) 8th edition, 2011, Thessaloniki.</p> <p>5) General Financial Accounting, in Greek, (Ginoglou D, Tachinakis P, Moese S), 2005, Athens, Editor: Rosili</p> <p>6) Accounting - the basis for business decisions (Meigs, W. Meigs, R), 7th edition, 1998, Athens.</p> <p>7) Financial & Managerial Accounting (Needles B, Powers M, Crosson S), 2008</p> <p>8) Financial Accounting (Stickney, Clyde and Weil Roman), 10th edition Thomson South Western, 2004.</p> <p>9) Extensive material of notes and analytic case studies will be delivered at the end of each lecture.</p>
Assessment	Written examination
Website of the course	http://compus.uom.gr/MINF185/

Title	Cloud Technologies and Web Analytics
Instructor(s)	Georgia Koloniari – Panagiotis Papadimitriou
Objectives	The main objective of the course is the theoretical and practical training in order to familiarize students with topics of data management and analysis especially for Web systems and with the concepts of cloud computing and datacenters.
Skills	By the end of the course, students will be able to: - understand cloud computing concepts, services and technologies, and datacenters - model, manage and analyze relational data - develop skills and knowledge in issues such as Web data analysis using appropriate software.
Prerequisites	-
Meeting the prerequisites	-
Content	The course includes the following: <ul style="list-style-type: none"> • Modeling relational databases • Database management and SQL • OLAP • Web Search • Analyzing web usage data • Cloud characteristics, cloud deployment models • Roles and cloud services for enterprises • Server and network virtualization • Datacenters
Textbooks	For cloud technologies: <ul style="list-style-type: none"> • Cloud computing: Αρχές, τεχνολογία και αρχιτεκτονική, T. Erl, Z. Mahmoud and R. Puttini, Γκιούρδας 2015. • Cloud computing: Μια πρακτική προσέγγιση, A. E. Velte, T. Velte and R. Elsenpeter, Γκιούρδας 2010. For Web Analytics: <ul style="list-style-type: none"> • Database Management Systems (3rd edition), by Raghu Ramakrishnan and Johannes Gehrke, McGraw-Hill, 2002. • Bing Liu, “Web Data Mining - Exploring Hyperlinks, Contents, and Usage Data”, Springer 2011 • Τεχνολογίες Παγκόσμιου Ιστού και Ηλεκτρονικού Εμπορίου, Χ. ΓΕΩΡΓΙΑΔΗΣ, Εκδόσεις Κάλλιπος 2015, https://repository.kallipos.gr/handle/11419/2288, http://repfiles.kallipos.gr/html_books/9536/
Assessment	4 Assignments (50%) Final Exam (50%)
Website of the course	http://compus.uom.gr/MINF197/index.php

Title	Digital Economy and Business
Instructor(s)	Emmanouil Stiakakis
Objectives	The course aims to investigate the ways and the extent that the Internet and the other Information and Communications Technologies (ICTs) contribute to the modern economy. It also aims to examine the characteristics of the digital economy and the similarities - differences from the traditional economy. A final objective of the course is to examine the characteristics of the digital business, especially those that can provide a competitive advantage in the modern business environment.
Skills	Upon successful completion of the course, postgraduate students will be able to: <ul style="list-style-type: none"> • understand the important role of ICTs and the Internet for the economy • perceive the enormous opportunities that the creation of a digital enterprise provides nowadays • obtain adequate knowledge upon crucial business and economic issues, such as digital currency, electronic waste, software piracy etc.
Prerequisites	---
Meeting the prerequisites	---
Content	<ul style="list-style-type: none"> • Introduction to digital economy – similarities and differences from traditional economy • Digital divide and digital inequalities • Productivity and efficiency measurement in the digital economy • The productivity paradox – use of productivity measurement tools in the digital economy • Pricing policies in the Internet • Digital goods distribution • Economic implications of e-waste on the environment • The positive aspect of Information and Communications Technologies for the solution of environmental issues • Economic changes due to free software – open source software • Economic implications of software piracy • The business and the economic dimension of the digital currency • Measurement of digital economy parameters in Greece and other countries
Textbooks	<ol style="list-style-type: none"> 1. Goldfarb, A., Greenstein, S.M. and Tucker, C.E. (2015) <i>Economic Analysis of the Digital Economy</i>. National Bureau of Economic Research, The University of Chicago Press, USA. 2. Brousseau, E. and Curien, N. (2007) <i>Internet and Digital Economics: Principles, Methods and Applications</i>. Cambridge University Press, Cambridge, UK. 3. Turban, E., Leidner, D., McLean, E. and Wetherbe, J. (2008) <i>Information Technology for Management: Transforming Organizations in the Digital Economy</i>. John Wiley & Sons, Hoboken, NJ. 4. McKenzie, R.B. (2003) <i>Digital Economics: How Information Technology</i>

	<p><i>has Transformed Business Thinking</i>. Praeger Publishers, Westport, CT.</p> <p>5. Στειακάκης, Ε. (2013) Ψηφιακή Οικονομική. Εκδόσεις Ανικούλα, Θεσσαλονίκη.</p>
Assessment	50% final written examination / 50% one (1) individual assignment
Website of the course	http://compus.uom.gr/MINF121/index.php

2nd Semester

Elective Courses

Title	Innovative e-Business Systems
Instructor(s)	Efthimios Tambouris
Objectives	The main objective of this course is to provide students with the theoretical foundations and practical familiarisation around innovative e-business systems (ERP, CMS, CRM, BI chatbots etc).
Skills	Upon successful completion of this course students will be able to: <ul style="list-style-type: none"> • work in teams following basic agile IT project management principles • recall the characteristics of main enterprise information systems • visualize and analyse open data to support business decisions using chatbots and data analytics • use software applications such as ERP SAP S4/HANA, CMS WordPress, CRM Salesforce, Tableau, RapidMiner, Rasa etc. for solving business problems
Prerequisites	None
Meeting the prerequisites	
Content	Introduction on Enterprise Information Systems Agile IT Project Management Enterprise Information systems (SAP S/4HANA, CMS WordPress, CRM Salesforce) Data Visualization systems (Tableau) Business Intelligence – Machine Learning systems (RapidMiner) Virtual Assistants – chatbots (Rasa)
Textbooks	For the theoretical part, slides will be provided in electronic form. For workshops, educational material and links will be provided on the use of SAP S/4HANA, WordPress, Salesforce, Tableau and RapidMiner and Rasa
Assessment	50% Personal Assignments and Team Projects 50% Final Exams
Website of the course	https://openeclass.uom.gr/courses/UNI136/

Title	m-Business & e-Commerce Technologies
Instructor(s)	Christos K. Georgiadis
Objectives	The purpose of this course is the study of important concepts, techniques and challenges in the area of mobile business applications and e-commerce technologies. The course covers a wide range of issues and introduces students to recent technological advances and developments. Furthermore, it addresses the application of new technologies that support the design and development of business software applications for mobile users (such as mobile native apps and mobile Web apps) and the appropriate use and adaptation of e-commerce technologies for mobile environments. Moreover, emphasis is given on interoperability issues regarding enterprise applications which have in many cases to combine mobile services and web content using service-based approaches.
Skills	Using basic programming tools, associated with the development of mobile applications and the use of electronic commerce technologies in the area of mobile business.
Prerequisites	-
Meeting the prerequisites	-
Content	<p>Lectures :</p> <ul style="list-style-type: none"> - Challenges of exploiting new opportunities in a mobile environment - mobility, personal networks and business applications - Mobile devices, smart devices, tablets and mobile platform constraints - Mobile user behavior - factors affecting the adoption of mobile business services - Emerging technologies - Human Computer Interaction in the mobile environment (mobile HCI) - Location-aware mobile applications and context awareness. - Personalization approaches and recommendations - Mobile recommender systems. - Privacy and trust in mobile and electronic commerce environments. Concerns regarding the management of mobile security and smartphone security. - Mobile payment systems. - Interoperability between m-commerce and e-commerce applications. Business data exchange using mobile Web Services: Service-Oriented Architecture (SOA), XML Web Services, Quality of Web Services, Classic and Business Transactions. <p>Lab:</p> <ul style="list-style-type: none"> - Introduction to mobile programming (Native apps, Android) - Introduction to mobile Web application development (HTML5, CSS3) - Introduction to hybrid app development - Creation and composition of Web Services - BPEL (Business Process Execution Language)
Textbooks	<ul style="list-style-type: none"> - Shah M., "Mobile Working: Technologies and Business Strategies" (Routledge Series in Information Systems), Routledge, 2013 - Laudon K.C., Traver C.G., "E-Commerce: Business. Technology. Society", Pearson Education, 10th Edition, 2014. - Skeldon P., "M-Commerce", Crimson Publishing, ISBN-10: 1854586750, 2011 - Weerawarana S. et al.: "Αρχιτεκτονική Πλατφόρμας Υπηρεσιών Ιστού", επιστ. επιμέλεια ελλ. έκδοσης Χ. Γεωργιάδης, Κλειδάριθμος, 2008 - J. Annuzzi Jr., L. Darcey S. Conder, "Introduction to Android Application

	<p>Development”, 4th edition, Addison-Wesley, 2014</p> <p>- M. Firtman, “Programming the Mobile Web”, 2nd edition, O’ Reilly, 2013.</p> <p>- Χ. Γεωργιάδης, «Τεχνολογίες Παγκόσμιου Ιστού και Ηλεκτρονικού Εμπορίου: Σύγχρονες τάσεις και προκλήσεις», ΣΕΑΒ, ISBN 978-960-603-125-0, 2016: http://repository.kallipos.gr/handle/11419/2288</p>
Assessment	<p>Final written examination 50%</p> <p>2 Projects 50%</p>
Website of the course	<p>http://compus.uom.gr/MINF196/</p>

Title	Legal Issues of Informatics and e-Business
Instructor(s)	Eugenia Alexandropoulou, Professor of I.T. Law
Objectives	The lesson aims to deal with important legal issues related to the use of Information Technology with emphasis in the regulatory framework of the Internet. It concerns the e-processing of personal data in business and communications, the protection of privacy in social networks, the intellectual rights, the e-crime, the specific protection of minors using the internet, as well as the legal framework of e-commerce.
Skills	The students are familiarized with the rights and obligations of the internet user and the issues of compliance to the legal rules governing the use of the I.T. and the Internet, in various sectors.
Prerequisites	-
Meeting the prerequisites	-
Content	<ul style="list-style-type: none"> • Introduction to the I.T. Law and its various issues • Electronic Processing of Personal Data: Legal rules of the processing, the obligations of the data controller and the rights of the data subject • E-processing of personal data in business (customers, consumers, employees) with emphasis in banking • Legal framework of electronic communications • E-communication's confidentiality (telecommunications-Internet) and its legal protection • Use of new technologies and privacy legal protection. The example of the Radiofrequency Identification (RFID) • Monitoring (e-Surveillance) and Privacy • Copyright and Information Technology/ Software Legal Protection • Intellectual property rights in the Internet • E-crime and relative legal regulation • Legal protection of minors using the Internet • Legal framework of e-commerce
Textbooks	<p>Alexandropoulou, E., Personal data, ed. NOMIKI BIBLIOTHIKI, Athens 2016</p> <p>Alexandropoulou, E., Copyright and Information Technology, ed. Themis-N.A. Sakkoula, Athens 2012 (in greek)</p> <p>Christodoulou, K., Personal Data Law, ed. Nomiki Bibliothiki, Athens - Thessaloniki 2013 (in greek)</p> <p>Iglezakis,I., Law of the Information Technology, ed. Sakkoula, Thessaloniki-Athens 2013</p> <p>Karakostas, I., Law and Internet, 3rd ed., ed. P.N.Sakkoula, Athens 2009 (in greek)</p> <p>Sidiropoulos, Th., The Law of the Internet, 2nd ed., ed. Sakkoula, Thessaloniki 2008</p> <p>(in greek)</p> <p>Reed Chr., Internet Law, 2nd ed., Cambridge University Press 2004</p> <p>Lucas, A., Devèze, J., Frayssinet, J., Droit de l' Informatique et de l' Internet, P.U.F., Paris 2001</p> <p>Dudley,A.-Braman,J.-Vincenti,G. Investigating Cyber Law and Cyber Ethics: Issues, Impacts and Practices, Towson University, USA, IGI 2012.</p> <p>www.itlaw.uom.gr</p>

	www.ethemis.gr www.tiresias.gr
Assessment	Written final exams 50%. E-Presentation of a short-essay 50%.
Website of the course	http://compus.uom.gr/MINF171/

Title	Simulation and Quality Control of Processes
Instructor(s)	Yiannis Nikolaidis
Objectives	The purpose of this course is for the students to get to know and familiarize themselves with a number of special chapters of Applied Statistics, such as Simulation of Processes and Statistical Process Control. This will be achieved through the use of PCs and simple or advanced software (like Excel and Crystal Ball, and Minitab respectively). The students are introduced to this wide research area partly through theory and partly through working on case studies, using PCs. Finally, their knowledge is broadened through analyzing applied case studies.
Skills	To model and use adequately the relevant software for simple simulation and quality control applications.
Prerequisites	- Quite good knowledge of basics in Statistics - Quite good knowledge of basics in Excel
Meeting the prerequisites	Through the respective undergraduate courses as far as Statistics is concerned. However, for both teaching issues we are going to repeat the main points during the courses
Content	1. Introduction in Statistics: Discrete and Continuous distributions, Sampling distributions, Central limit theorem, Testing for goodness of fit.. 2. Introductory elements of Excel, Crystal Ball 3. Simulation of production processes: Simulation sampling, Statistical analysis of simulation results. Case studies on problems of organization and operational research. 4. Introductory elements of MINITAB 5. Acceptance Sampling for attributes and by variables, control charts for attributes or variables and design of a control chart.
Textbooks	a) "Simulation Techniques – Theory and Applications" M. Roumeliotis – S. Souravlas and b) "Statistical Quality Control" G. Tagaras
Assessment	60% for the final written exam and 40% for the (5-five) design projects.
Website of the course	http://compus.uom.gr/MINF186/index.php

Title	Cost Accounting Systems
Instructor(s)	Vazakidis Athanasios
Objectives	<p>The purpose of this course is the knowledge, experience and understanding of accounting systems within the group 9 of the Greek Chart of Accounts with the use of information systems.</p> <p>The course, based on Estimate and Historic Costing method (analysis of costs to cost centers of business), examines the Cost of Products, Services, Merchandised Goods of Multifunctional Companies (both manufacturing, trading and of services).</p> <p>Then, students are taught modern costing methods such as Activity-Based Costing.</p> <p>The course seeks to deepen the analysis and costing accounting and tries to answer the following questions:</p> <ul style="list-style-type: none"> • Which costing method is best, depending on the different forms of companies? • Can this costing method be easily applied? • Can this costing method provide better information regarding the cost of products to management? <p>Students will have to work with written or oral tasks in order to be prepared to face the complexity of costing accounting.</p>
Skills	General Skills of Computing and basic knowledge of the group 9 of the Greek Chart of Accounts.
Prerequisites	The approach will be initiated by the student and teacher guidance.
Meeting the prerequisites	The course will take the form of lectures and hands-on in PC lab.
Content	<p>Arguments in Cost Accounting Systems.</p> <p>Basic concepts of Costing Accounting.</p> <p>Methods of costing products, merchandised goods and services.</p> <p>Analysis and operation of the group 9 of the Greek Chart of Accounts.</p> <p>Cost to Cost Centers Allocation.</p> <p>Case studies of product costing in annual or monthly base, as well as batch costing.</p> <p>Connection between Costing Accounting and Financial Accounting regarding the Greek Chart of Accounts.</p> <p>Analysis of Activity-based Costing.</p> <p>Case study of product costing with the use of group 9 of Greek Chart of Accounts interrelated with Cost Accounting Information Systems.</p> <p>All studies are solved in the PC Laboratory using modern Cost Accounting Information Systems.</p> <p>Advantages and disadvantages between Costing Accounting Methods.</p>
Textbooks	<ol style="list-style-type: none"> 1. Horngren, Ch., Srikant M., et al., "Cost Accounting and Student CD Package", 11th Edition, 2002, Prentice Hall, USA. 2. Barfield J., Raiborn C. and Kinney M., "Cost Accounting: Traditions & Innovations", 5th Edition 2002, South-Western College Pub, USA.

	<p>3. Bagranoff Nancy A., Simkin Mark G. and Norman Carolyn Strand, "Core Concepts of Accounting Information Systems", John Wiley & Sons; 11th Edition (18 Dec 2009).</p> <p>4. Simkin Mark G., Strand Norman Carolyn A., "Accounting Information Systems", John Wiley & Sons; 12th Edition International Student Version edition (21 Feb 2012).</p> <p>5. Cost accounting with group 9 of the General Plan of Accounts - Monthly Cost Accounting - Annual Cost Accounting & Warehouse handling in practice, in Greek, (Karagiannis D, Karagiannis I, Karagianni A), 4th edition, 2009, Thessaloniki.</p> <p>6. Management Accounting (Garrison R, Noreen E), 11th edition, 2006, Athens</p> <p>7. Extensive material of notes and analytic case studies will be delivered at the end of each lecture.</p>
Assessment	Written examination
Website of the course	http://compus.uom.gr/MINF166/

Title	Information Systems in Financial Analysis and Management
Instructor(s)	Apostolos Dasilas
Objectives	The course will make it possible for participants to: Appreciate the implications of modern finance theory on practical issues. Develop analytical skills to make decision makings with regards to financial issues. Appreciate the intricacies and methodologies for assessing the market value of companies and investments
Skills	Quantitative methods, use of spreadsheets
Prerequisites	Fundamentals in accounting
Meeting the prerequisites	No prerequisites
Content	<ol style="list-style-type: none"> 1. Financial Ratios 2. Depreciation methods 3. Capital budgeting 4. Investment decision rules 5. Cost of capital 6. Valuing stocks 7. Valuing bonds 8. Long-term financing 9. Break-even point analysis 10. Mergers, acquisitions and corporate divestitures
Textbooks	<ol style="list-style-type: none"> 1. Brigham F. E, Ehrhardt C. M. (2019). (2019) «Χρηματοοικονομική Διοίκηση- Από τη Θεωρία στην Πράξη» Εκδόσεις Broken Hill, Κωδικός Βιβλίου στον Εύδοξο: 86056078 2. Berk, J., DeMarzo, P. και Harford, J. (2018) «Αρχές Χρηματοοικονομικής των Επιχειρήσεων», Εκδόσεις Τζιόλα & Υιοί Α.Ε., Κωδικός Βιβλίου στον Εύδοξο: 68406598. 3. Νούλας, Αθ. (2019) «Χρηματοοικονομική Διοίκηση: Επενδυτικές και Χρηματοδοτικές Αποφάσεις», Εκδόσεις Τζιόλα & Υιοί Α.Ε., Κωδικός Βιβλίου στον Εύδοξο: 86054049. 4. Brealey, R., Myers, S. και Allen, F. (2015) «Αρχές Χρηματοοικονομικής των Επιχειρήσεων», Εκδόσεις Utopia, Κωδικός Βιβλίου στον Εύδοξο: 41965173. <p>Teaching notes in PPT + exercises in spreadsheets</p>
Assessment	Group coursework and presentation = 40% Closed-book final exams = 60%
Website of the course	http://compus.uom.gr/MINF102/

Title	Digital Marketing and Social Networking
Instructor(s)	Maro Vlachopoulou Invited speaker(s)
Objectives	<p>The main objective of this course is to present and analyze the strategy and implementation of Digital Marketing & Social Media Marketing based on innovative web technologies, mobile devices / tools, innovative e/m-business models & social media marketing models & Social Networking techniques.</p> <p>The scope of this course is to familiarize the participants on planning, development, implementation and evaluation of innovative web technologies, tools and models in the digital environment.</p> <p>Specific goals for the participating students are:</p> <ul style="list-style-type: none"> • To understand the conceptual framework and the strategy of digital / mobile & social media marketing, • To learn about the innovative technologies, infrastructure and resources requirements, • To plan, analyze and design digital marketing και social networking models, • To describe and discuss the challenges, and the penetration of digital / mobile/ social media-marketing in specific decisions and business sectors (online promotion, distribution, the use of social networks for brand awareness, location based mobile apps, Search Engine Marketing strategy,etc.), • To understand and develop a digital marketing plan & Social Media plan and to identify the additional requirements towards mobile or social media applications. Moreover, to determine the detailed steps of an d/m-marketing plan regarding specific applications, • To understand and analyze innovative marketing models and their constructs in several industrial sectors between the involved parties (collaborative and viral marketing, community models, affiliate marketing, sharing economy models, gamification, social networking platforms, etc.), • To choose and implement web & social media metrics/ analytics and tracking systems in order to identify and measure the effectiveness of digital marketing actions and campaigns (web metrics / analyzing, SEO & SEM search engine optimization / marketing, on line advertising measurement, web site evaluation, social media metrics, analytics and KPI's, etc.), <p>To investigate, analyze and present case studies and best practices in various digital marketing models and business sectors.</p>
Skills	Upon successful completion of the course, postgraduate students will be able to plan, develop and manage an integrated digital & social media marketing strategy.
Prerequisites	General knowledge background on Information Systems Management and e-Business.
Meeting the prerequisites	(If necessary) additional basic bibliography will be provided
Content	<p>Definition approaches & conceptual framework: Digital marketing, Internet marketing, mobile marketing, online Marketing, e- web marketing, social media marketing, applications areas.</p> <p>Typology and use of Marketing Information Systems: Customer Relationship</p>

	<p>Management (CRM), Partners Relationship Management (PRM) and Business Intelligence (BI). Geographic Information Systems in marketing (GIS). Electronic identification and data collection systems (bar codes, EPOS, RFID, QR codes, NFC, smart cards, etc.). Cloud computing, Social & mobile CRM.</p> <p>Digital marketing plan, electronic/mobile - marketing mix & strategy: Marketing research based on innovative tools and web technologies, electronic / online customers' behavior, the customers' journey, segmentation, targeting and positioning strategy in a digital environment, behavioral targeting based on web & social media analytics. Online pricing and selling. Online advertising & promotion, online distribution and multichannel policy, mobile devices and apps.</p> <p>Innovative electronic – mobile – social media marketing models: viral marketing, affiliate μάρκετινγκ, consumer generated marketing and content, e –mail marketing, digital – mobile advertising – promotion, adver-gaming marketing, gamification, augmented reality, mobile apps, social media marketing models (blogs, networks, microblogs, videos, Facebook, Twitter, LinkedIn, YouTube), e.t.c..</p> <p>Search Engine Optimization Marketing SEO /SEM, Paid Search & content marketing, Remarketing (Google Adwords, Adsense).</p> <p>Web & social media metrics / analytics – Key Performance Indicators- The Social Media Metrics Map</p> <p>Case studies and best practices of digital marketing in various business sectors (government, health, smart cities, education, environment, retailing, tourism, logistics)</p>
Textbooks	<ul style="list-style-type: none"> • Dave Chaffey and Fiona Ellis-Chadwick, Digital Marketing, 2015, 6thed., Pearson , 2015 • M.Vlachopoulou , S.Dimitriades (2014), «E- Business & eMarketing – Innovative models in the digital environment”, ISBN: 978-960-7745-32-3, Code Evdoxos 32997535 , edition Rosili, Business Books, Athens. • Tracy L. Tuten (Author), Michael R. Solomon (Author), Social Media Marketing, Μάρκετινγκ με Μέσα Κοινωνικής Δικτύωσης, 2η έκδοση, 2016, Μεταφραστής:Μαρία Κωνσταντοπούλου, ISBN-13:978-960-531-341-8, εκδόσεις Διαύλος. • Tracy L. Tuten (Author), Michael R. Solomon (Author), Social Media Marketing, The Horizontal Revolution, Pearson Education 2015. • Daniel Rowles, 2017, Mobile Marketing How Mobile Technology is Revolutionizing Marketing, Communications and Advertising • Strauss, J. and R. Frost (2013). E-Marketing (7th edition), Prentice Hall. • The Social Media Marketing Book, by Dan Zarrella, Copyright © 2010 Dan Zarrella. Printed in Canada, Published by O'Reilly Media, Inc., 1005 Gravenstein Highway North, Sebastopol, CA 95472. • M.Vlachopoulou (2003), «e- Marketing – Internet Marketing", ISBN960-7745-04-3, edition Rosili, Athens.
Assessment	<p>50% final written examination</p> <p>50% personal assignment and team project</p>
Website of the course	<p>http://compus.uom.gr/MINF195/</p>