Πανεπιστήμιο
Νεάπολις
Πάφου

NEAPOLIS UNIVERSITY PAFOS

SCHOOL OF INFORMATION SCIENCES

GUIDE

UNDERGRADUATE PROGRAMME
IN APPLIED INFORMATICS
(in short BSCAI)

PAFOS 2015

Table of Contents

Guide of the Undergraduate Programme in Applied Informatics (BSc in Applied Informatics, BScAI)

This Guide contains details of the Undergraduate Programme in Applied Informatics (BScAI). The guide contains information about the philosophy and structure of the programme, the aims, objectives and learning outcomes of the programme, as well as, descriptions of every course taught in the Programme.

The educational philosophy that guides the BScAI at Neapolis University Pafos (NUP) is best understood in light of the University's general mission, which is the pursuit of excellence in teaching, research, and service to the community.

In support of its mission, the University**:**

- Encourages and supports rigorous scholarship and innovative teaching in all academic areas offered by the University.
- Creates an academic environment that values and promotes free, active and original intellectual inquiry among its faculty and students.
- Fosters Programmes that respond to local and national needs and collaborates with other state and private stakeholders to promote economic development and to alleviate ignorance, poverty and injustice.
- Strives continuously to promote activities that apply its intellectual and ethical heritage to work for the good of society as a whole.
- Welcomes students, faculty and staff from all backgrounds and beliefs and creates a sense of community that facilitates their development and enhances their career aspirations.

The BScAI reflects the priorities of the mission and is designed to provide a course of studies that meets local and national needs, that promotes links with the local Information and Communications Technologies (ICT) communities, that is informed by rigorous scholarship and embraces modern pedagogy and learning technologies. At the same time, the Programme strengthens synergy with the other programs offered at NUP by including in its curriculum interdisciplinary courses from the areas of Economics, Finance, and Business. In fact, the Programme offers the possibility to its graduates to acquire, among other, a specialization in the area of what we call Operational Informatics. The Programme is offered by the School of Information Sciences, which is dedicated to the academic excellence through teaching and research in the areas of Computer Science, Communications and Signal Processing. The School is developing considerable strengths in the area of Informatics and offers a Bachelor of Science in Applied Informatics and a Master in Information Systems.

The School aspires to extend the range of taught Informatics programmes at graduate and undergraduate level and to launch a Doctoral Programme in Information Sciences as well. The programme will help to build the research capability of the school by attracting academics of international standing with a long experience both in teaching and in research acquired at universities in Europe, UK and Greece.

Programme Aims and Objectives

The aim of the BScAI Programme is to provide a course of study to those who aspire to become experts in the field of ICT applying them effectively in the public and the private sector. The programme's curriculum is designed to explore the essential elements of Applied Informatics and to prepare students for increasingly complex technical responsibilities in the public or the private sector, local government, and business organizations. The core curriculum emphasizes both the skills

and knowledge required to effectively manage and develop technical Information resources and to understand the larger academic, industrial and business setting in which ICT, is developed, deployed and assessed in the field.

The programme provides up-to-date knowledge in a number of diverse areas that comprise the field of Informatics, such as Theory of Computation, Software development, Information Systems, and applications in the fields of Management, Finance, Economics and Business. In addition, the Programme aims to equip students with technical, analytical, ethical, accountability, and leadership skills to enhance their decision-making ability and to promote organisational well-being within the context of a continually changing and competitive technological and economic environment.

A fundamental philosophy of the programme is its empirical approach to the study of Applied Informatics, where the acquired new knowledge and skills are blended with the participants' experience and are applied from the beginning to real-life scenarios.

This approach broadens and deepens student understanding of applying techniques and processes from the area of Informatics; it fosters skills of research, analysis, synthesis and creativity; and it encourages innovation and awareness of the role of information and technology in innovation. Finally, it develops awareness of ethical, social, environmental and global issues affecting management decisions in relation to ICT.

Learning outcomes

The overall learning outcome for students completing the BSc in Applied Informatics is to develop a broad conceptual understanding of the theory and practice of applying ICT in public or private organizations. At the end of the course students shall therefore have:

- A sound theoretical and practical knowledge in most areas of Informatics and the way Informatics intersects and interacts with other scientific disciplines.
- The ability to analyze and design Information Systems meant to cover needs in various sectors and environments.
- The ability to deal with the operational side of Computing and Information systems and the way theses integrate with an organization.
- The ability to think laterally, critically, innovatively, creatively, and to make connections among diverse fields of study in analyzing real world problems and applying Informatics -based solutions
- A global perspective based on an understanding of both the technical and the operational environments of an organization when applying ICT.
- The ability to lead and to interact effectively in group situations and to manage in diverse technological and operational environments.
- Gained experience in applying ICT methods and tools.
- Achieved substantial competency in analysis and design, and in management techniques; and understood the political, economic and social context of Informatics.
- Developed skills related to critical thinking and autonomous learning.
- Developed communication, and teamwork skills.

Programme Structure

Programme Foundations

The BScAI Programme is offering a modern undergraduate programme in Applied Informatics based on the latest recommendations given jointly by two top international scientific organizations, namely, the Association for Computing Machinery (ACM), and the IEEE Computer Society (CS), enriched with interdisciplinary courses from the areas of Economics, Management, Finance and Business. The

end result is to produce graduates capable to respond to requirements of their professional endeavor in all sectors of economy including industry, commerce, education, health, and research.

The programme has as objective to offer a horizontal knowledge to all basic subjects of Informatics and interdisciplinary subjects through a carefully planed set of compulsory courses. In addition, the Programme offers as option to its students, specialization opportunities through compulsory per specialization courses and electives. Also, free electives complement the students' knowledge. In particular, the Programme offers:

- a degree that certifies besides basic knowledge in Informatics focused knowledge in four (4) specializations grouped into two sections;
- a Programme structure according to the European Credit Transfer and Accumulation System (ECTS);
- sound foundational knowledge through a carefully reduced set of core courses in comparison to similar BSc Programmes;
- reduced classroom hours per week by adopting a free lectures day for the first two years of study;
- an introductory course covering the broad area of Informatics that helps the student to formulate his own pathway through the Programme; and
- free electives in any discipline, including the case through the ECTS and Erasmus.

Programme Duration

The programme is implemented in 8 semesters and requires 240 ECTS units to be accumulated by a student for graduation.

Programme breakdown

The Programme is divided into two 2-years cycles; the **basic** cycle and the **focused** cycle of studies:

- **Basic** cycle (1st to 4th semesters): It is composed of,
    a. an **introductory** course in Informatics,
    b. 15 compulsory **core** courses in Informatics (including 3 courses in management, finance and economy) and
    c. 4 introductory **interdisciplinary** courses.

  This cycle actually corresponds to Tier 1 of the ACM/IEEE CS model curriculum.

- **Focused** cycle (5th to 8th semester): It is composed of,
    a. two additional compulsory **core** courses and **elective** courses. The electives are distinguished into the following three classes:
        i. **Basic specialization** courses for securing a specialization reflected in the graduation certificate.
        ii. **Electives of a specialization.**
        iii. **Free electives** (from any other BSc course of NUP or outside institute).
    b. Thesis (compulsory)**.**

  The focused cycle effectively corresponds to Tier 2 and Electives of the ACM/IEEE CS model curriculum.

The Programme caters for four (4) specializations, namely,

- **E1** for a specialization in **Operational Informatics**.
- **E2** for a specialization in **Information Systems**.
- **E3** for a specialization in **Software development**.
- **E4** for a specialization in **Computer Systems and Networks**.

Groups E1 and E2 comprise the so-called **Orientation A** of the curriculum and groups E3 and E4 comprise the **Orientation B**. The orientation A conceptually indicates the application of Informatics in some domain (i.e., Operational Informatics and Information Systems), whereas orientation B conceptually refers to the S/W and H/W infrastructure needed (Software development and Computer Systems and Networks), to develop and support applications.

Note that the Programme does not include currently explicitly a specialization in the area of the Theory of Informatics. However, a student may build up his/her theoretical knowledge in pure Computer Science by selecting appropriate electives. The tables below present the lists of courses comprising the Applied Informatics Programme.

The table below,

Table 1, gives the **core courses** of the Program, showing also the prerequisites and semester.

Table 1 – Compulsory Core Courses

Compulsory Core Courses							
Course ID	**Course**	**Lecture hours**	**Tutor hours**	**Lab hours**	**ECTS**	**Prerequisite**	**Semester**
AIINTR	Introduction to Computer Science and networks	3	1		6		1st
AIK01	Introduction to programming	3	1	2	7		1st
AIK02	Linear Algebra	3	2		7		1st
AIK03	Management Information Systems	3	1		6		1st
AIK04	Discrete mathematics	4	2		6		2nd
AIK05	Calculus	4	2		7		2nd
AIK06	Data Structures and Programming techniques	3	1	1	7	AIKO1	2nd
AIK07	Computer Architecture I	3	1	1	6	AIK03	2nd
FINA100/ AIK08	Finance	3	1		7	ECON101	3rd
AIK09	Probability and Statistics	3	1		6	AIK05	3rd
AIK10	Object-oriented programming	3	1	2	7	AIK01	3rd
AIK11	Graphics I	3		1	6	AIK02	3rd
AIK12	Algorithms and Complexity	4	2		7	AIK04	4th
AIK13	Operations Research	3	1		6	AIK05	4th
AIK14	Design and use of Data Bases	3	1	1	7	AIK07	4th
AIK15	Communication Networks I	3	1		6	AIK06	4th
AIK16	Operating Systems	4			6	AIK07	5th
AIK17	Software Engineering	3	1		6	AIK10	6th

The inclusion in the core courses of the course on Finance and that on Operations Research is something not met normally to traditional core sets of Informatics. The inclusion of such courses in our core set shows our intention to educate students capable to deal, as early as possible, with real applications of Informatics in diverse areas. Finance, on one hand is the driving force of any human activity and Operations Research, on the other hand, is the basic tool for analyzing areas and problems in which Informatics may be applicable.

In line with the above argument, the Programme includes the four (4) compulsory courses listed in Table 2. The first two of them are our interdisciplinary introductory courses, taken one (1) per semester and help the students to get a global view of the real world in Economy and Business. The course on Psychology is essential to let students deal and react properly in their public and customers' relations. These courses are to be delivered by staff of the relevant schools of NUP. The 4th course (i.e., PEPS100) will allow the students to develop language and communication skills for both oral and written presentations and reports.

Table 2 - Compulsory Interdisciplinary Courses

Compulsory Interdisciplinary Courses							
Course ID	**Course**	**Lecture hours**	**Tutor hours**	**Lab hours**	**ECTS**	**Prerequisite**	**Semester**
ECON101	Introduction to Economics	3	1		4		1st
BUSN100	Introduction to Business	3	1		4		2nd
PSYC100	Introduction to Psychology	3	1		4		3rd
PEPS100	Language and Communication Skills	3	1		4		4th

The table below, Table 3, gives the optional laboratory courses. These laboratory courses stand independently of the corresponding courses in order to provide better quality of training only to those students who are really interested in laboratory hands; on experience with the hardware aspects of Informatics. Those students who do not wish to enroll to these lab courses have to replace them by some other courses in order to fill the ECTS gap.

Table 3 - Elective Laboratories

Elective Laboratories							
Course ID	**Course**	**Lecture hours**	**Tutor hours**	**Lab hours**	**ECTS**	**Prerequisite**	**Semester**
AIK03L	Laboratory of Logic Design and Architecture			2	2		2nd
AIK15L	Laboratory of Communications Networks I			2	2	AIK13	4th

The following table, Table 4, lists for each specialization the compulsory per specialization courses ("Y" denotes the compulsory per specialization courses). The Orient column shows the applicable orientation(s) A and/or B. The students who wish to get an orientation, which will be stated in their graduation certificate, have to state the desired orientation beforehand, **after** the 4th semester, and they are **obliged to** take all four (4) compulsory (Y) courses of that same orientation. In the opposite case, they have to have any four (4) compulsory (Y) courses from either orientations A and B.

Table 4 - Compulsory & Basic Courses of Specialization

Compulsory & Basic Courses of Specialization												
Course ID	**Course**	**Lecture hours**	**Tutor hours**	**Lab hours**	**ECTS**	**Prerequisite**	**Semester**	**Orient**	**E1**	**E2**	**E3**	**E4**
AIK18	Numerical Analysis	3		1	6	AIK02	5^{o}	A	Y			
AIK19	Implementation of Data Base systems	3	1		6	AIK14	5^{o}	A B		Ba	Y	
AIK20	Computer Architecture II	3		1	6	AIK08	5^{o}	B				Y
AIK21	Analysis and Design of Information Systems	3		1	6	AIK10	5^{o}	A B	Ba	Y	Ba	Ba
AIK22	Artificial Intelligence	3	1		6	AIK06	6^{o}	A B		Ba	Y	
ECON102/AIK23	Macroeconomic Models and Policies	3	1		6	ECON 101	6^{o}	A	Y			
AIK24	Protection and Security of Information Systems	3	1		6	AIK16	6^{o}	A B	Ba	Y	Ba	Ba
AIK25	Network Management	3	1		6	AIK15	6^{o}	B	E			Y

In Table 4 above and the following, Tables 4 to 8, per semester (semesters 5 to 8) are denoted with "Ba"; courses per specialization that are considered to be basic courses for that specialization. A student who wishes to secure a specialization has to select four (4) out of ten (10) of these courses. Also, in these tables are denoted with "E"; the recommended elective courses per specialization, to complete the required ECTS for graduation.

Table 5 – Electives of 5th semester

Electives of 5th semester												
Course ID	**Course**	**Lecture hours**	**Tutor hours**	**Lab hours**	**ECTS**	**Prerequisite**	**Semester**	**Orient**	**E1**	**E2**	**E3**	**E4**
ACCN100/ AIOP01	Financial Accounting	3	1		6	AIK07	5^{o}	A	Ba			
AIOP02	Digital Economy	3	1		6	ECON101	5^{o}	A B	Ba	E	E	E
AICS01	Parallel Systems	3	1		6	AIK07	5^{o}	A B		Ba	E	Ba
AICS02	Communication Networks II	3		1	6	AIK15	5^{o}	B			E	Ba
AIAL01	Analysis and design of Business Applications	3	1		6	BUSN100	5^{o}	A B	E	Ba	Ba	E
AIOP03	Algorithmic Operations Research	3	1		6	AIK05 AIK18	5^{o}	A B	E	E	Ba	
AIOP04	Marketing Information Systems	3	1		6	BUSN100	5^{o}	A	E	E		
AIAL02	Graphics II	3		1	6	AIK11	5^{o}	B			E	E

Table 6 – Electives of 6th semester

Electives of 6th semester												
Course ID	**Course**	**Lecture hours**	**Tutor hours**	**Lab hours**	**ECTS**	**Prerequisite**	**Semester**	**Orient**	**E1**	**E2**	**E3**	**E4**
AIAL03	Data Mining techniques	3	1		6	AIK19	6º	AB	Ba	Ba	Ba	E
AICS03	Systems Programming	3	1		6	AIK16	6º	B			Ba	Ba
AICS04	Logic Programming	3	1		6	AIK12	6º	AB	E	E	E	E
AIOP05	Strategy and Economics of Information Systems	3	1		6	AIK03	6º	AB	Ba	E		E
AICS05	Technology for web applications	2	1	1	6	AIK11	6º	AB	E	Ba	E	Ba
AICS06	Pattern recognition - Machine Learning	3	1		6	AIK06	6º	AB		E	E	
AIOP06	Scientific Computing	3	1		6	AIK18	6º	AB	E	E	E	
AIOP07	Electronic Commerce	3	1		6	BUSN100	6º	AB	E	E	E	E

Table 7 – Electives of 7th semester

Electives of 7th semester												
Course ID	**Course**	**Lecture hours**	**Tutor hours**	**Lab hours**	**ECTS**	**Prerequisite**	**Semester**	**Orient**	**E1**	**E2**	**E3**	**E4**
AIAL04	Cryptography	3	1		6	AIK12	7º	AB	E	E	E	Ba
AIAL05	Design of Virtual Spaces	3		1	6	AIK11	7º	AB		E	E	E
AICS08	Human Computer Interaction	3	1		6	AIK07	7º	AB	E	Ba	Ba	E
AICS09	Compilers	3	1		6	AIK11	7º	B			E	E
AICS10	Digital Communications	3		1	6	AIK13	7º	AB	E			Ba
AIOP08	Decision Support Systems	3	1		6	AIK22	7º	AB	Ba	Ba	Ba	
AICS11	Information Theory and Coding	3	1		6	AIK06	7º	B				E
AIOP09	Linear and Non Linear Optimization	3	1		6	AIOP02	7º	AB	Ba	E	E	E
AIOP10	Econometrics I	3	1		6	AIOP02	7º	A	E	E		

Table 8 – Electives of 8th semester

Electives of 8th semester												
Course ID	**Course**	**Lecture hours**	**Tutor hours**	**Lab hours**	**ECTS**	**Prerequisite**	**Semester**	**Orient**	**E1**	**E2**	**E3**	**E4**
AIAL06	Programming multicore architectures	3	1		6	AIK17	8º	B			E	Ba
AICS12	Constraint Satisfaction Problems	3	1		6	AIK22	8º	AB	E	Ba	Ba	E
AICS13	Speech and Natural Language processing	3		1	6	AIK10	8º	B		E	E	E
AICS14	Image processing	3		1	6	AIK11	8º	B			E	Ba
AIOP11	Time Series and Prediction	3	1		6	AIK06	8º	A	Ba	E		
AIOP12	Game Theory	3	1		6	AIK06	8º	A	Ba	Ba		
AIAL07	Theory of Computation	3	1		6	AIK12	8º	AB	E	E	Ba	E
AIOP13	Econometrics II	3	1		6	AIOP10	8º	A	E			
AIAL08	Graph Theory	3	1		6	AIK12	8º	AB	E	E	E	E
AIAL09	Computational Geometry	3	1		6	AIK12	8º	AB		E	E	

Table 9 lists the elective projects, one (1) of which is compulsory to complete studies. The student may select any of them irrespective of the taken specialization.

Table 9 – Elective Compulsory Project

Elective Compulsory Project												
Course ID	Course	Lecture hours	Tutor hours	Lab hours	ECTS	Prere-quisite	Semester	Orient	E1	E2	E3	E4
AIECP1	Software development for *Algorithmic problems*	1		3	8	AIK11 AIK12	7º	AB				
AIECP2	Software development for I*nformation Systems*	1		3	8	AIK10 AIK14	7º	AB				
AIECP3	Software development for *Embedded Systems*	1		3	8	AIK07 AIK14	7º	AB				
AIECP4	Software Development for *Operational Information Systems*	1		3	8	AIK08 AIK14	7º	AB				

The *Thesis* is **compulsory** and is equivalent to two (2) semester courses with 16 ECTS in total. One of the semesters may be replaced with a project at an organization subject to prior approval of the study advisor.

ECTS breakdown

Based on the above analysis the table below shows the ECTS structure of the Programme and the allowed number of free and other electives. Note that the table below lists the minimum requirements for completing the 240 ECTS requirement. A student in the course of securing a specialization may exceed the 240 ECTS barrier. In any case, all passed courses are taken into consideration for the calculation of the degree classification and are to be listed in the transcript of studies.

Course type	**Number**	**ECTS**
Introductory course	1	6
Core compulsory courses	17	110
Compulsory interdisciplinary courses	4	16
Compulsory orientation courses (Y)	4	24
Project	1	8
Basic per specialization electives (Ba)	4	24
Thesis	2	16
Electives	4 - 6	24 – 36
Free electives	0 - 3	0 – 12
Elective Labs	0 - 2	0 – 4
Total	39-41	240

Semester breakdown

1st Semester (30 ECTS)		ECTS
AIINTR	Introduction to Computer Science and networks	6
AIK01	Introduction to programming	7
AIK02	Linear Algebra	7
AIK03	Management Information Systems	6
ECON101	Introduction to Economics	4

2nd Semester (30 ECTS)		ECTS
AIK04	Discrete mathematics	6
AIK05	Calculus	7
AIK06	Data Structures and Programming techniques	7
AIK07	Computer Architecture I	6
BUSN100	Introduction to Business	4

3rd Semester (30 ECTS)		ECTS
FINA100	Finance	7
AIK09	Probability and Statistics	6
AIK10	Object-oriented programming	7
AIK11	Graphics I	6
PSYS100	Introduction to Psychology	4

4th Semester (30 ECTS)		ECTS
AIK12	Algorithms and Complexity	7
AIK13	Operations Research	6
AIK14	Design and usage of Data Bases	6
AIK15	Communication networks I	7
PEPS100	Language and Communication Skills	4

5th Semester - Orientation A (30 ECTS)		ECTS
AIK16	Operating Systems	6
AIK18	Numerical Analysis	6
AIK21	Analysis and Design of Information Systems	6
	Elective Courses	12

5th Semester - Orientation B (30 ECTS)		ECTS
AIK16	Operating Systems	6
AIK19	Implementation of Database Systems	6
AIK20	Computer Architecture II	6
	Elective Courses	12

6th Semester – Orientation A (30 ECTS)		ECTS
AIK17	Software Engineering	6
AIK23	Macroeconomic Models and Policies	6
AIK24	Protection and Security of Information Systems	6
	Elective courses	12

6th Semester – Orientation B (30 ECTS)		ECTS
AIK17	Software Engineering	6
AIK22	Artificial Intelligence	6
AIK24	Network Management	6
	Elective courses	12

7th Semester – Orientations A and B (30 ECTS)		ECTS
AIECP	Orientation A Project AIECP2 or AIECP4	8
AIECP	Orientation B Project AIECP1 or AIECP3	
AIK24	Elective courses	14
AITHE1	Thesis	8

8th Semester – Orientations A and B (30 ECTS)		ECTS
AITHE2	Thesis	8
	Elective courses	22

Programme Flexibility

The structure of the Programme is such that it allows the following options:

A. **In-depth knowledge of one specialization area**: Students who wish to secure one (1) specialization and gain in-depth knowledge of one specialization area (say Ex), first choose the orientation A or B that contains the specific desired specialization area and then they have to take four (4) of the compulsory courses (i.e., Y) of that Orientation (of which two (2) are compulsory courses of the specialization Ex), one (1) of the two (2) project orientations which may be associated with the specialization and four (4) of the ten (10) basic courses (i.e., Ba) of the specialization Ex.

B. **Knowledge of two specializations within the same orientation**: Students who wish to secure two (2) specializations of the same orientation and to gain knowledge of the contents of two specialization areas (say Ex and Ey), first choose the orientation that contains the two fields and then they have to take four (4) of the compulsory courses (i.e., Y) of that Orientation (covering compulsory subjects of both skills), one (1) of the two (2) project orientations, which may be related to one of the two fields, four (4) of the ten (10) optional courses that are basic of Ex and four (4) of the ten (10) optional courses are basic of Ey.

C. **Knowledge of two different specializations of different orientations**: Students who wish to secure two specializations of different Orientations and to gain knowledge of the contents of two (2) specializations (say Ex and Ey), first choose one (1) orientation and then they have to take four (4) of the compulsory courses (i.e., Y) of the orientation (of which two (2) are compulsory courses of specialization Ex and two (2) are compulsory courses of specialization Ey), 2 Elective courses other than these, belonging to the other orientation (instead of free courses), 1 of the 2 project orientations, which can associated with one of the two fields, four (4) of the ten (10) optional courses that are basic for Ex, and four (4) of the ten (10) optional courses are basic of Ey.

D. **Horizontal without specialized knowledge (partly focus on an orientation):** Students who wish to gain knowledge horizontally, without securing any of the offered specializations, initially choose the orientation and then they have to take four (4) of the compulsory courses of the orientation, one (1) of the two (2) project and the orientation, and all four (4) elective courses, which is basic of the two specializations of the orientation, focusing thus partly their studies at the level of an orientation.

In all the above cases the student has to take additional courses up to 240 ECTS.

COURSE CONTENT

Compulsory Core courses

AIINTR - Introduction to Computer Science and Networks

Introduction. Turing model, von Neumann model, Computer components, Number System. Positional number systems, Nonpositional number systems, Storing Data. Data types, Storing numbers - text - audio - images – video, Operations on Data. Logic operations, Shift operations, Arithmetic operations, System organization. Central processing unit, memory, storing devices, peripherals, bus. Algorithms. Representation of Algorithms, Basic Algorithms, Recursion. Programming Languages. Historical Review, Compilers, Interpreters. Software Engineering. Life cycle of Software, Analysis Phase, Design Phase, Implementation Phase, Control Phase. Data Structures. Records, Lists, Stacks, Queues, Trees, Binary Trees, Graphs. Operation systems. Resource management. Files and databases. Relational databases. SQL. Computation theory. Abstract computation models. Turing machines. Artificial Intelligence. Search. Knowledge representation and reasoning. Machine learning. Robotics. Data compression. Lossless and lossy compression methods, Security. Security fundamentals - attacks - services – techniques.

AIK01 - Introduction to Programming

Software and programming languages. Requirements of a procedural programming language. Executable programs. Compiling and linking. The programming language C. Programming environments for C. The C compiler gcc. Examples of simple programs in C. Features and capabilities of C. Variables, constants, types, and declarations. Replacement commands, operators and performances. The control flow. Program structure, functions and external variables. Scope and lifetime of variables. Recursion. Address of memory locations, indicators and tables. Dynamic memory allocation. Strings. Table indexes ,indexes of indexes and multidimensional tables. Pointers to functions. Command arguments. Enumerations, structures, self referential structures (lists, binary trees), unions, bit fields and creation of new types of names. Input and output. File Handling. C pre-processor and macros. Algorithms for classification tables and query tables. guidelines for proper programming. Often programming mistakes in C.

AIK02 - Linear Algebra

Basic concepts: sets, relations and mappings, composition. Basics on algebraic structures. Groups, rings, fields. Polynomials. Linear Spaces (base, dimension, Euclidean). Determinants and matrices. Linear systems: basic concepts and proposals, methods of solution. Eigenvalues and eigenvectors of matrices (SVD, canonical form, Jordan). Linear and transformations. Bilinear quadratic. Conics.

AIK03 - Management Information Systems

Introduction to Information Systems (Explain the new role of information systems in organizations).
Key information systems in organizations (Define key information systems in organizations according to Functional areas, Management levels and clarify key challenges to Information Systems). Enterprise Applications (Explain the key characteristics of Enterprise Applications, ERP; SCM, CRM systems, Identify new opportunities and challenges). Data Management & Business Intelligence (Discuss Data management, Business Intelligence). Building Information Systems (Business process reengineering, IT development, IT Implementation). Process Improvement Exercise (Identify and analyze the information requirements for a new

student registration system, Design new processes). Managing IT projects (Explain key steps in information systems project management). E-commerce & m-commerce (Discuss the key principles of E-commerce, M-commerce). The Business of New Online Social Media (What are online social media? How do businesses utilize online social media to their benefit?)

AIK04 - Discrete mathematics

Sets, propositions, induction, binary relations, functions, permutations, combinations, discrete probability, conditional probability, independent events, Bayes theorem, arithmetic functions, asymptotic behavior of numerical functions, generators of functions, graphs, Euler paths, Hamilton cycles, trees, trees with root, theory of numbers.

AIK05 - Calculus

Basic topological concepts. Real numbers, Sequences, Series. Functions (limit, then elementary functions). Definite integral. Derivative. Indefinite integral. Power series, functions of several variables, partial derivatives, differential. Taylor Series. Implicit functions. Extrema of functions with several variables. Multiple integrals. Line integrals. Vector analysis (theorems of Stokes, Gauss, and Green).

AIK06 - Data Structures and Programming Techniques

Introduction. The concept of abstract data types (ADT). The ADT Table, Structure, Total. Strings (strings). Stacks, recursion, queues, lists, trees (binary trees, binary search trees), balanced trees (AVL). Graphs (implementation algorithms). Applications.

AIK07 - Computer Architecture I

Introduction, abstract concepts, and computer technology. Evaluation of the performance measures used. Instruction set architecture (Instruction Set Architectures) and the microprocessor MIPS. Symbolic language (assembly language) and machine language. The hardware interface and software. From the high-level programming languages to machine language of the computer. Computer arithmetic for integers and real numbers (representations, acts, orders and material). Design of central processing unit (CPU) without pipelining. Data paths and control units. The basic design of the CPU with pipelining.

FINA100 / AIK08 - Finance

Basic concepts in finance and the financial environment. Comparative analysis of financial statements. Sources and uses of funds. Working capital-revenue-cost planning and control. Time value of money and capital budgeting. Money and capital markets (sources of funds). Use of spreadsheets (MS Excel type) in solving problems in finance. Preparing and completing a case study (use of web based financial databases and presentation of a financial analysis for a specific enterprise.

AIK09 - Probability and Statistics

Axioms of probability. Conditional probability and stochastic independence. Terminology: population, sample, random variable, etc. Data collection: enumeration, sampling techniques. Graphical and numerical presentation of data. Frequency distribution. Measures of Central Tendency and Dispersion. Basic terminology of probabilities: trial, sample space, simple and complex events, etc. Conditional probability. Rule of Bayes. Probability functions. Discrete distribution: Binomial, Poisson, etc. Continuous distribution: Normal, Exponential, etc. Sampling distributions. Central limit theorem. Point estimation. Properties of estimators. Confidence interval estimation. Determining sample size. Hypothesis testing theory and applications. Testing for goodness of fit.

AIK10 - Object Oriented Programming

Overview of object-oriented programming and classes. The programming language C ++. Basic elements, namespaces, overloading, classes, objects, inheritance, composition, patterns, abstract classes, exception handling, description of the standard library, a description of the STL. Design and programming with C ++. General description of the Java language and the language C #. Other object-oriented programming languages. Theoretical issues related to the objects.

AIK11 - Graphics I

Introduction scenic line output, input and output graphics. Algorithms performance line segments, circles, conic sections and polygons, antialiasing. Affine transformations, transformations two-and three-dimensional homogeneous coordinates, composition transformations, transformations window to viewport. Algorithms for clipping line segments and polygons in two and three dimensions. Views. Concealment algorithm z-Graphics.

AIK12 - Algorithms and Complexity

The concept of algorithms and complexity. Complexity average and worst-case complexity. Recursive algorithms and recursive equations. Priority Queues and Heaps, Heapsort. Search techniques: search trees, key transformation (hashing), union and find. Technical traversal in graphs: Breadth first (BFS), Depth first (DFS), connected components. Techniques for designing algorithms. Divide and conquer: selection and sorting algorithms, binary search, the master theorem. Greedy algorithms: resource allocation - the maximum independent set in interval graphs, minimum cost spanning tree, optimal paths, the knapsack problem, minimum set cover. Dynamic programming: minimal paths in graphs (algorithm Bellman), maximum common subsequence, 0-1 Knapsack. Tree algorithms: the problem of n-queens, the travelling salesman problem (TSP). Easy and difficult combinatorial optimization problems, decision problems, the classes P and NP, NP-complete problems and NP-hard, reductions.

AIK13 - Operations Research

Formulation of problems in operations research. Linear programming: formulation of problems, Simplex (phase I and phase II), introduction to the dual theory. Nonlinear programming: optimization without constraints, optimization with equality constraints (theory and algorithms), optimization with inequality restrictions (conditions Karush-Kuhn-Tucker), algorithmic implementation. Theory of inventories/stocks: deterministic models (order quantity), probabilistic models, policies (s, S). Dynamic programming: features, implementations, deterministic models, and probabilistic models. Applications to dynamic inventory control models, the algorithm Wagner-Whitin.

AIK14 Designing and Using Databases

Entity-Relationship (E/R) model, design of bases schemes with the E/R model, relational data model, a translation of the E/R to the relational, study of relational schemas based on functional dependencies, normal forms of relational schemas, the language SQL, the language QBE, contact forms, report writing, system lists, views, constraints, developing applications with embedded SQL,

application development over standard communication interfaces to databases (ODBC, JDBC), distributed databases, client-server architecture, databases and the Internet, object-oriented databases.

AIK15 - Communication Networks I

Introduction to basic concepts and definitions of communication networks, basic design principles and technologies. Internet structure, Internet History. Application Layer (HTTP, FTP, e-mail). Modes of transport layer (TCP, UDP, reliable data transfer in TCP, flow control, congestion control). Network layer (Routing, Addressing, IP protocol, packet structure IP). Link layer (reliable transport of bits, retransmission protocols). Multiple access protocols for local area networks (Ethernet, IEEE 802.11), Local Peer Networks. ATM networking (objectives, principles, cells, quality of service, routing-switching).

AIK16 - Operating Systems

Introduction to Operating Systems and Structures of Computer Systems. Basic Structures of Operating Systems. Processes and main methods of process communication. Scheduling and scheduling techniques. Process synchronization, critical sections, semaphores, monitors. Deadlocks, recovering and methods of avoiding deadlocks. Memory management, paging, segmentation, swapping. Virtual Memory and implementation methods. Methods for page swapping and metrics for monitoring them. File systems, directories, file system implementation, security and protection. Input-Output units, disks, CD-ROMs, peripherals, I/O interfaces, tapes, scheduling functions in the memory hierarchy. Using the Unix operating system to implement programming assignments.

AIK17 Software Engineering

Methods, tools, and procedures for the development and maintenance of large-scale software systems. Existing life-cycle models (e.g. waterfall model). Introduction to Agile development. Requirements analysis and specification techniques. Software development methodologies. Unified Modelling Language (UML) and supported static and dynamic diagrams. Code transformation. Practical experience with CASE tools for modeling data and procedures (ArgoUML, StarUML). Prototyping for Web applications (HTML, CSS). Architectural Design patterns (Model View Controller etc.). Software verification and validation. Unit testing and frameworks (JUnit etc.). CASE tools. Project planning and management. Agile software development. Model driven engineering. Legacy systems. Sociotechnical systems. Software reuse. Component Based systems. Distributed software engineering. Service oriented architectures. Embedded software. Aspect oriented software engineering.

Compulsory Interdisciplinary Introductory Courses

ECON101 - Introduction to Economics

Fundamental concepts and methodological approaches, economic failure and social choice, the framework and the operation of the market mechanism, the role of the state - national product, unemployment, inflation, consumption, savings and investment, the determination of income, balance income - Monetary Policy, Outside area, economic policy, theory choice and consumer demand, production and cost - market structure.

BUSN100 - Introduction to Business

Introduction to the concept of entrepreneurship. Development and innovation management. Patent, copyright. Uncertainty, risk and performance. Get business - investment decisions. S.W.O.T. Analysis. Strategic planning business. Preparation of business plan. Sustainability and competitiveness. Harnessing ICT businesses. Internet and entrepreneurship. Management and quality certification, Benchmarking. Administration and management of resources (material and human). Organizational culture. Business skills. Social Entrepreneurship - Corporate social responsibility and ethics. Entrepreneurship and sustainable development. National policies for entrepreneurship - Community actions. Case Studies.

PSYC100 - Introduction to Psychology

Survey the major principles of psychology. History of psychology and scientific thought, biological basis of behavior, research methodology, statistics, sensation and perception, states of conscious, memory, language and intelligence, developmental psychology, personality, and learning.

AICIC4 - Language and Communication Skills

English Language: concerning the teaching / learning of English language for specific purposes. This course aims students who like to develop communication skills and language knowledge required for better and more effective communication. The teaching will be based on cultivation of the following language options: Grammar, Listening, Reading, and Speech.

Greek Language: The teaching of Modern Greek that is based on the cultivation of the following: (a) Hearing-listening (b) reading-reading comprehension (c) Speaking (d) Writing (e) Learning language structures.

Compulsory Standalone Laboratories

AIK03L - Workshop Logic Design / Architecture

The digital signal and its creation in the laboratory. The operational characteristics of integrated circuits (ICs), how to recognize them and use them on the board of implementation of laboratory exercises. Experimental verification of the operation of logic gates Design and implementation of combinational circuits using MSI integrated circuits (7442, 74151 and 74153). Exercises in the MIPS ISA and programming in assembly language using the simulator SPIM. Introduction to SPIM. Arithmetic and logic functions. Memory accesses. System calls and I / O in SPIM. Bifurcation. Comparisons. Loops. Tables. Calling procedures. Recursive procedures.

AIK15L - Communication Networks Laboratory

Construction of Cable for Ethernet - Configuration and connectivity testing of a local computer network - Using the Wireshark tool for capture of data movement (tracking filters and display) - Remote access to H / PC (Remote Desktop, Telnet) - ARP protocol - IP, MAC addresses - Use the command ping, netstat - Static routing - Function / PC as a router - Cisco router Configuration - Application routing tables.

Compulsory Courses of Specialization

AIK18 - Numerical Analysis

Elements of error analysis. Numerical solution of non-linear equations (the fixed point method, Newton-Raphson). Numerical methods for solving linear systems (direct and iterative). Numerical methods for calculating eigenvalues-eigenvectors. Interpolation. The least squares method. Numerical differentiation. Numerical integration. Introduction to the numerical solution of ordinary differential equations.

AIK19 - Implementation of Database Systems

Introduction to Database Systems, differences from the file management system, the physical characteristics of external storage devices (e.g., disks), organization of data on disks, the concept of file management, buffer, primary file organizations, secondary file organization, static and dynamic data structures, ISAM, B+ trees, static and dynamic fragmentation (hashing), sorting files located on disks, relational algebra, relational algebra operators processing and corresponding algorithms, cost/overhead depending on the available indexes, query optimization, the concept of transaction, concurrency control (concurrent access), recovery from damage.

AIK20 - Computer Architecture II

General principles of computer architecture, pipelined implementation, pipeline processor MIPS, data path design with forwarding, controller design, data hazards, control hazards, data forwarding (bypassing), delays, control/branch, static branch prediction, reducing branch delay, dynamic branch prediction, delayed branching, exceptions and exception handling in pipelines, basic concepts, advanced pipelines, instruction-level parallelism, static and dynamic multi-initiation, the concept of speculation, exploiting the memory hierarchy, the basics of caches, measuring and improving the performance of cache memory, virtual memory, a common framework for memory hierarchies, disk storage and reliability, channels and other connections between processors, memory and input / output interface of input / output processor, memory and operating system design input / output.

AIK21 - Analysis and Design of Information Systems

Basic concepts of General Systems Theory (structure, boundaries, entropy, etc.). Way of describing a system. Problems in the study of systems. The role of information in the system. Information Systems (IS) and organizations. Strategies to develop an IS. Lifecycle of ISs: determination problem, feasibility study, requirements analysis, conceptual design, technical design, organizational design, implementation, operation-maintenance. Technical description and analysis of the structure of an IS. Methods development of IS: Information Engineering, SSADM, Merise, Jackson System Development, ETHICS, Object-Oriented Analysis and Design, etc. Comparative annotation methods. The UML language. Examples and applications.

AIK22 - Artificial Intelligence

The purpose of Artificial Intelligence. Search Methods. Blind and heuristic search. First search and depth-first width. Iterative deepening and widening repetitive. Search the best first. Hill climbing and simulated annealing. Methods A * and IDA *. Two-player games. Methods minimax and alpha-beta. Knowledge representation and inference procedure through logic. Propositional logic and first-order logic. Suggestions and Horn normal form formulas. Skolemization. Inference rules. Modus ponens rule and resolved. Applications of generating new knowledge from existing knowledge. Check reasoning. Systems of conservation truth. Non-monotonic reasoning. Reasoning with uncertainty. Networks Bayes. Frames and semantic networks.

ECON102/ AIK23 - Macroeconomic models and Policies

The module studies the factors of development of various macroeconomic indicators, as well as the effect of the budgetary, fiscal, income and monetary policy in the macroeconomic level of an economy. In this module we examine the economic system, the macroeconomic environment, the real or nominal GDP, the economic growth, the black economy, the real or nominal income, the inflation rate, the consumer price index, the deflation, the savings, the consumption, the nominal and real interest rate, the investments, the labour market, the unemployment, the fiscal deficit, the debt, the state budget, the government revenues and expenses. The objectives of macroeconomic policy, the means of exercise budgetary and monetary policy, the estimation and forecast of total demand, the determination of relation of total demand and the factors that influence total demand are also examined.

AIK24 - Protection and Security of Information Systems

Introduction to security. Basic definitions, common security threats, requirements for specific network environments. Approaches to achieve security. Mechanisms of protection, identity verification, access control, security techniques. Protection of computational resources on the Web. Firewalls, wrappers and related techniques. Introduction to cryptography and key management. Cryptography, symmetric and asymmetric algorithms, validation of public keys, key management, digital signatures, references to cryptanalysis techniques. Security Internet users. Dangers from active content moving online and ways of protection. Security Framework for Languages JavaScript and Java. The problem of viruses. What is a virus, viral species, ways of infection techniques used by viruses, software and methods for the treatment of viruses. Vulnerability detection tools. General definitions, their role, control methods, examples. Intrusion Detection Systems. Reasons of using them, the general model, system architecture, special features and techniques, ways of response.

AIK25 - Network Management

Introduction to the management of computer networks, standardized management, organization of management systems and platform management, introduction and drafting of the ASN.1 standard. Structure of management information, managed object classes and tree management information. Design the classification of the object under management through GDMO and ASN.1. Management services and the protocol CMIP. Functional areas and network management functions. Design methodology of a network management system. New technologies for network management, distributed CORBA management, management via Web, and use of Java.

Compulsory Elective Projects

AICEP1 - Software Development for Algorithmic problems

Extended implementation of an algorithmic problem by using a main programming language, according to the material of other courses (mainly in the area of Algorithms and Scientific Computing) which takes place by one of the following ways: (a) Implementation of a simplified form of the algorithmic problem (b) Implementation in the context of an application.

AICEP2 - Software Development for Information Systems

Extended implementation of software systems using some main programming language, according to the material of other subjects (mainly in the area of Databases), which takes place by one of the following ways: (a) Implementation of a simplified form of the various levels of a system Database: organization and blocks to disk, static data structure to disk file (e.g., hash tables), dynamic data structure in disk file (e.g., B + tree) lists system, a naive query processing language databases, query optimization, user management, aspects and limitations, etc.. (b) an implementation over an industrial database system or internet software or other technology.

AICEP3 - Software Development for Embedded Systems

Embedded Systems (ES) are gaining momentum in the IT market. Progress of ES in Europe and the world. Building blocks of ES: Microcontrollers, components of intellectual property (IP cores), memory systems, bridges, peripherals. Implementation technologies of ES. Systems with low energy consumption.

Embedded Software development: processes, process scheduling, nucleus of real-time operating systems. Designing Embedded Systems, ES with processors of general and special purpose in the same integrated circuit (Systems on Chip). Co-design of software-hardware. ES prototyping technologies. Applications of embedded systems in telecommunications (Wireless sensor), signal processing (eg. Intelligent cameras), automatic control, automotive, biomedical, etc. Required skills: digital systems design with VHDL. Computer architectures. C Programming language.

AICEP4 - Software Development for Operational Information Systems

Extended systems implementation of operational software using any major programming language, according to the material of other subjects (mainly from the areas of Economy, Management, Accounting and Entrepreneurship), which takes place by one or more of the following ways: (a) Implementation of a simplified form with various levels of an operational database system: block and record structure on disk, static data structure on disk file (e.g., hash tables), dynamic data structure to disk file (e.g., B + tree), system directories, query processing of a simple database language, query optimization, user management, aspects and limitations, etc. (b) an implementation over an industrial database system or internet software or other software of some other technology.

Elective Courses (Algorithms)

AIAL01 - Analysis and Design of Business Applications

The environment of business applications. The role of modelling information in the development of computer applications and general business applications in particular. The natural language as a tool for representation of reality. Data conceptual modelling: objects, entities, attributes, abstraction mechanisms, integrity constraints and productive rules. Concepts of the model and condition. Events. The knowledge representation language Telos. Mechanisms of abstraction: classification, generalization - specialization. Inheritance. Using multiple channels classification. Meta-models. Constraints through attributes. General business models: personal and company structure, resources and products, processes and activities, transactions and contracts, accounting, planning, continuous processes, documents. Methodological issues, quality models. Ontologies and thesauri. Environments, languages, development tools and business applications.

AIAL02 - Graphics II

Models and structures representation of objects and images. Transformations Observed in three dimensions. General concealment algorithms. Models and algorithms for illumination. Selections from the following topics: curves and Bezier surfaces and B-Spline, properties, and representation of terrain texture, shadow generation algorithms, ray tracing, game.

AIAL03 - Data Mining Techniques

Introduction to data mining techniques: data, problems, applications. General techniques of analysis and data processing. Data classification algorithms (decision trees, statistical techniques). Data classification algorithms for multidimensional data and time series. Techniques for data clustering. Techniques for finding correlations in multidimensional data and relational data. Applications of data mining to problems for searching on the internet and large databases of specific purpose (e.g., biomedical databases).

AIAL04 - Cryptography

Introduction: Data complexity theory, algebraic structures, number theory, probability algorithms. Concept of security, message hiding, privacy and accuracy. Random and pseudorandom bit sequences. Unidirectional (one-way) functions and functions Secrets reversible (trapdoor). How can cryptography based on factoring numbers, finding discrete logarithms, decoding codes, solving systems of polynomial equations, execution and other combinatorial optimization problems. Cryptographic tools including key exchange (Diffie Hellman) electronic signatures (RSA), public-key encryption (ElGamal, Cramer Shoup). The random oracle model as a way for the safety argument for cryptosystems. The methodology of simulation as a way of defining security cryptosystems. Applications in point-to-point secure communication channels, e-commerce and money, elections, transmitting digital content of various kinds etc.

AIAL05 Design of Virtual Spaces

Introduction to graphics and virtual reality, imaging process information input and output graphics. Algorithms performance, conic sections and polygons, antialiasing. Affine transformations, transformations two-and three-dimensional homogeneous coordinates, composition transformations, transformations imaging (viewport). Algorithms for clipping line segments and polygons in two and three dimensions. Views. Stereoscopic vision. Concealment algorithm z-buffer. Shadows, texture. Basic principles of lighting. Color systems. Ray tracing algorithms overall lighting, synthetic traffic, avatars, virtual reality simulations.Virtual augmented and mixed reality.

AIAL06 - Programming of multicore architectures

Overview of parallel architectures, multicore processors with homogeneous cores, multicore processors with heterogeneous cores, Graphics Processing Units, Memory system and inter-process communication, Synchronize core hardware and software, Functional parallelism, Vector parallelism, Parallelism of flows and data filters, Parallelism transactions, Parallel Programming with memory management hardware, Parallel Programming with memory management software, Technical processes and flow routing, Techniques to improve the locality of accesses to memory, alignment, dynamic replication and data movement, Technical channel management and inter-process communication networks, Translators issues, Issues of runtime systems, Performance analysis, Examples of applications implementation

AIAL07 - Theory of Computation

Regular grammars and languages - finite automata. Grammars and context-free languages- stack automata. Recursive languages –Turing machines. Decidability. Determinism. Reduction. Relationship Classes of deterministic polynomial time (P) and non-deterministic polynomial time (NP). Theory of NP-completeness (NP-completeness).

AIAL08 Graph Theory

Basic parameters of graphs, modeling problems using graphs. Special classes of graphs: complete, bilateral, planar graphs, interval graphs, chordal graphs. Isomorphism of graphs. Connected components, Euler cycles, Hamilton cycles: applications in telecommunications networks. Scheduling problems, critical paths. Flows in networks, maximum flow theorem, max flow - min cut, networks with upper and lower bounds of capacity. Maximum flow of minimum cost - applications in network design. Crossings of Euler, conditions of existence, directed and undirected case. The Chinese postman problem. Matching problems and transmission networks. The problem of the maximum independent set (stability graph) - applications: applications satisfaction networks. Problems coloring (chromatic number, chromatic index) - applications: parallel and distributed systems. Problems maximum clique and dense subgraph. Polynomial cases in special graph topologies (Chordal, interval, perfect graphs).

AIAL09 - Computational Geometry

Convex hull points two, three and more dimensions, wrapping algorithm, divide and conquer methods, incremental algorithm and computation volume polyhedron. Worst-case complexity and sensitive output, lower bounds, upper bound theorem sized convex hull geometric duality. Linear optimization algorithm Simplex, randomized algorithms and complexity expected. Graph Voronoi, scanning method, triangulation Delaunay, connection to the convex hull. Point set triangulation in two and more dimensions, simple polygon triangulation and museum surveillance, visibility problems in the plane. Vertical subdivision identification sign, nearest neighbor, geometric data structures and geometric searching. Provisions and straight-line segments. Implementation problems, degenerative disorder of the data entry. Applications to the design of mobile robots, in the study of the structure of macromolecules in geometric design with a computer (CAD) and graphics. Implementing geometric algorithms in geometric software library CGAL or Python.

Elective Courses (Computer Systems and Networks)

AICS01 - Parallel Systems

Introduction: general, parallel programming, parallel architectures, performance measures. Overview of parallel architectures and deepening classes in SIMD, MIMD shared and distributed memory. Parallel programming - tools: MPI Programming and laboratory. Principles of programming parallel shared memory SIMD and case study BLITZEN. Parallel algorithms for processing matrices, lists, sorting, searching, etc. for different architectures. Calculation of the parallelism complexity (processing, communication).

AICS02 - Communication Networks II

Queuing system (M / M / 1 and variants, M / G / 1, systems and priorities, queuing networks), Wireless / Mobile Networks (WLANs, support mobility in the Internet, mobile networks 3G), Networking and Multimedia, Network Security.

AICS03 - Systems Programming

Key features and user interaction with Unix. Programming in kernel and utilities. Management processes and system files. Creation and termination of processes, sending and receiving signals, input and output low-level communication between processes through pipes and sockets. Communication between processes via message queues, shared memory and semaphores. Creating, scheduling, synchronization and communication with thread mutexes and condition variables. Website programming and the client server model. Application interface with the communication protocols. API for sockets. Design considerations of client / server software. Servers with UDP and TCP. Servers of multiple services and servers concurrency. Creation of distributed programs with RPCgen customers and telnet.

AICS04 - Logic programming

The course is an introduction to the original idea of declarative programming, with emphasis on logic programming. To understand the students approach problem solving through logic programming, introduced gradually the programming language Prolog. Emphasis on technology logic programming with constraints, which is ideal for troubleshooting search in which the phenomenon of the combinatorial explosion in the number of solutions might be. At the same time, and given programming assignments, which must be handed in by the students at regular periods during the semester. Then topics presented in the lectures on the theory of logic programming, technical implementation logic programming systems and parallel logic programming. Finally, following a chapter on the use of logic programming for knowledge representation, expert systems, the deductive databases and the application of logic programming on topics related to the Web.

AICS05 - Web Applications technologies

Architecture Client / Server and its correlation with the WWW, several architectural layers (n-tier), the role of WEB Server, Application Servers, middleware (middleware - corba, activeX, transaction servers, message passing, message queues). Design and modeling, protocols and programming (Client Side Programming: HTML, DHTML, XML, scripting languages, Server Side Programming: JSP, ASP, contact databases), design and development of relevant application.

AICS06 - Pattern Recognition – Machine Learning

Pattern recognition systems. Classifiers Bayes, nearest neighbor classifiers. Parametric probability density estimation (Maximum Likelihood, Maximum Aposteriori), nonparametric probability estimation methods (windows Parzen). Linear classifiers: algorithm perceptron, classifiers least squares Support Vector Machines (SVM). Non-linear classifiers: multilayer neural networks, kernel trick and SVMs. Birth characteristics: shape representation and description forms, contours, shapes representation and description of contour chain code, polygons, signatures, transformations Fourier, description schemes interior image area, moments, texture.

AICS08 - Human Computer Interaction

Introduction to Human-Computer Interaction (HCI), human characteristics relating to communication with computers, senses and sense organs, vision and visual perception, hearing, movement, human memory, consciousness and working memory, long term memory functions, transport , characteristics of computer related communication with people, topics of people communicate with machines, ergonomics, design box, screen design, usability principles that affect learning ability, flexibility, and robustness, development and life cycle software man-machine communication, iterative design and prototyping, design methodologies (information systems based on analysis design space), requirements analysis and reporting standards, guidelines and standards, usability engineering, systems design SCM user modeling (model GOMS and KLM model), design type interfaces Windows-Icons-Mouse-selectors (PEPE) and the Global Information Grid, HTML elements and JavaScript, evaluation systems, data visualization, future trends.

AICS09 - Compilers

Basic structure of a compiler. Formal languages: regular languages, context-free languages, attribute grammars. Verbal analysis compilers use to create word analysts. Parsing: parser from top to bottom (top-down) and bottom-up (bottom-up), recovery from errors, use compilers to create syntactic analyzers. Table of symbols. Semantic analysis: types of semantic verification, type systems, dynamic type checking. Production of intermediate code. Code optimization. Production of the final code. Compiling non-conventional programming languages.

AICS10 - Digital communications

Quantitative and qualitative analysis of the transmission of analog signals from digital communications systems, practice problems and sample reconstitution of signal quantization techniques and quantization noise, PCM, bandwidth requirements, noise systems PCM, PCM systems and differential effect of channel noise in systems PCM, Delta modulation systems, bandwidth requirements and signal-to-noise ratio (S / N) of the Transmitted Signal, introduction to communication dispersed spectrum (CDM), comparison of PCM and DM systems with TDM, AM, and FM and the ideal system, coding for error control, linear block codes, Binary cyclic codes, burst error codes, convolutional codes, performance of the correction codes and error detection.

AICS11 - Information Theory and Coding

Overview. First concepts. Define and measure the amount of information. Useful sizes and functions. Study sources distinct messages (entropy, redundancy, source codes, flow rate information). Sources and memoryless sources Markov. Channel capacity of discrete messages. Sources consecutive messages and reduction in discrete. Sampling theorem. Fantastic canal Ideal system, noisy channel, channel continuous message. Compare communication systems. Data error control coding.

AICS12 - Constraint Satisfaction Problems

Definition of constraint satisfaction problems. Representing constraints. Complexity. Various forms of consistency. Regression techniques and look-ahead. Smart setback and conditions for finding solutions. Description of the available commercial software. Study of problems of different applications, the modeling and behavior of different algorithms of solving.

AICS13 - Speech and Natural Language Processing

Key features of speech signals. Mechanisms and patterns of speech production. Hearing and speech perception. Methods of digital analysis of speech signals. The method of linear prediction. Digital speech coding. Methods for synthesizing speech. Convert text to speech. Methods for Speech Recognition. Talking to Human - Computer Interaction. Applications in information systems and communications.

AICS14 - Image Processing

Elements of digital image processing and basic concepts. Basic two-dimensional image representations and transformations (Fourier, Walsh Hadamard, KL discrete cosine transform (DCT), fast implementations, image representation in MATLAB, basic image manipulation commands in MATLAB. Improving image (intensity transformations, histogram equalization, spatial filters, frequency selection, homomorphic filters). Editing image color (basic color models, pseudocoloring, full color processing, basic commands in MATLAB). Restoring image (model deformations, conversely filters and filter Wiener, adaptive filter Wiener, basic commands in MATLAB). Compression and Encoding (Forms IT surplus and conformity criteria, design quantization Max Loyd, Designs compression and coding (predictive coding, DPCM, Ms, compression / lossless, standards basic commands in MATLAB). Partition Image (discontinuity detection point straight edges, transform Hough, thresholding, segmentation with regions encoding chain, boundary descriptors, texture, morphological processing).

Elective Courses (Operational Informatics (OI))

ACCN100 / AIOP01 - Financial Accounting

Essentials of accounting, general accepted accounting principles (G.A.A.P), Objective and accounting branches. Accounting recording methods: "Aplografiko" and Double entry system. Analysis of the Greek general chart of accounts. Valuation of inventories. Fixed assets and their depreciation. Development and analysis of the financial statements (Journal entries, general ledger, trial balance, balance sheet, profit and losses statement). Adjustments. Accounting process for the measuring, reporting and announcement of the financial annual results. Book keeping of the first and second classes of accounting classification, using manuscript method and by the use of software. Exercises related to the different classes of book keeping (mainly B' and C'). Questions and answers related to the subject of code for books and records as well as value added tax and intersection of tax records.

AIOP02 - Digital Economy

Introduction to the Digital Economy (From industrial economics to digital economic, differences between old and new economy, rules and characteristics of the new economy), Productivity and new technologies (Measuring productivity change, the "productivity paradox" Integration of digital goods measurement productivity), pricing policies on the Internet (Factors that affect pricing on the Internet, Forms pricing on the Internet, Online auctions, Pricing Web services), Information and

Communication Technologies and Digital Divide (determinants of the digital divide, forms the digital divide, Measurement the digital divide), Economic impact of digital technologies on the environment (analysis of the economic impact of e-waste, Environmental pollution by dumping or recycling of electronic waste, Methods of estimating the quantity produced electronic waste).

AIOP03 - Algorithmic Operations Research

Operations research models, algorithms, complexity, problems NP-hard. Linear programming: algorithm simplex, dual theory, the transportation problem. Integer programming: branch and bound - the problem of partitioning, the problem of minimum total coating (minimum set covering), dynamic programming - the knapsack problem (knapsack problem), generalized knapsack, heuristic algorithms and performance measurement techniques, the problem of vertex covering, maximum independent subset of upper and lower bounds, empirical evaluation heuristic methods. Local Search Method: neighborhood structure, neighborhood search techniques, PLS-completeness, the travelling salesman problem (k-OPT), partitioning graphs. Simulated annealing: the algorithm of Metropolis, applications, the problem of intersection of the maximum (max cut).

AIOP04 - Marketing Information Systems

Conceptual approaches. E-marketing, Internet marketing, Online Marketing, digital marketing, differences traditional and Internet Marketing scopes. Typology management information systems marketing. Management Systems Customer / Partner CRM / PRM (Customer / Partners Relationship Management) and knowledge management marketing. The use of GIS in marketing. Electronic identification and marketing intelligence. ON E / online marketing plan, online marketing mix strategy and e-marketing. Research based on innovative marketing tools and internet, electronics buyer behavior, segmentation strategy and targeting customers strategic differentiation and positioning, online invoicing, sales, advertising, politics brand on the internet, viral marketing, Social media / networks and marketing. Marketing management website. Measuring effectiveness email marketing actions. Practical applications.

AIOP05 - Strategy and Economics of Information Systems

Business strategy. The strategic importance of Information Systems (IS). Methods of assessment strategies PS The strategic role of IS in-house Linking business strategy and PS Methodologies design strategies IS Redefining business functions and IS Evaluation of proposals and tenders for new projects IS Methods for replacement and maintenance of IS Accounting and cost accounting services handled by IS.

AIOP06 - Scientific Computing

Introduction. Elements of error analysis. Direct methods of solution of linear systems (elimination, factorization). Iterative methods for solution of linear systems, semi-iterative methods. The conjugate gradient method. Numerical computation of eigenvalues and eigenvectors: iterative methods (power method), transformation methods (Jacobi, Givens, Householder, LR and QR). Introduction to the numerical solution of partial differential equations.

AIOP07 - Electronic Commerce (e-C)

It involves the study of the infrastructure, activities, and programming techniques involved in sound design, development and support of distributed Internet applications e-C. It covers current topics of advanced technologies, including specifics on mobile commerce applications, the issues of effective presence - usability of Web services on the WWW and concerns relating to the security of the transactions e-C and digital payment systems.

The Internet as a technological infrastructure of Electronic Commerce (e-C), mobile commerce (m-Commerce) and transactions through mobile / wireless devices, e-C Security transactions and digital payment systems, creating an effective presence in the PI: personalization systems (personalization) and production recommendations (recommendations).

AIOP08 - Decision Support Systems

Decision making, systems, models and support. Overview of a Decision Support System, its basic subsystems and their classification. Methods and tools for building DDS, repeat and adapt to these methods. Designs and applications of DSS (Eg simulation, multi-criteria analysis). Construction and management models.. Data management subsystem, User interface and build models with visual interaction. The technical analysis of "what-if" (what-if). Decision support systems for groups. Implementation and integration of an DSS with other technologies and information systems.

AIOP09 - Linear and Nonlinear Optimization

Optimization models: linear equations, non-linear programming. Feasibility and optimization. Derivative and curvature. The overall optimization algorithm. Speeds convergence. Optimization without constraints: method Newton. Ensuring convergence: linear search methods, methods Quasi-Newton. Conditions optimization for linear and non-linear constraints. Multipliers Lagrange, methods feasible point. Methods of penalty and barrier.

AIOP10 - Econometrics I

Simple regression (Introduction, regression function, the method of least squares regression line properties underlying assumptions of the model regression, sampling distributions of least squares estimators, properties of least squares estimators, Statistical inference: the regression coefficients, statistical inference: The regression line, Estimates). Multiple regression: (Introduction, regression function, the method of least squares regression plane Properties, The basic assumptions of the model of multiple regression, sampling distributions of least squares estimators, properties of least squares estimators, Statistical inference: The coefficients regression Statistical inference: the regression line, Investigation of the function regression, Statistical inference: Special occasions, Statistical inference: Sensitivity of the regression line, forecasts). VIOLATION three key assumptions: NON sphericity errors: (Introduction, The generalized method of least squares, generalized method of maximum likelihood, generalized attainability assessment methods, Heteroskedasticity, Autocorrelation, Normality). Four violations of basic assumptions: Problems of Sample: (e.g., Introduction, Errors Specialization).

AIOP11 - Time Series and Forecasting

Purpose and use of the analysis of time series and forecasting methods. Statistical techniques for time series analysis and forecasting. Linear and nonlinear models of trend. Stochastic time series. Autoregressive model (AR), moving averages Designs (MA) and mixed (ARMA). The Box-Jenkins methodology in time series analysis (models ARIMA). Forecasting methods with ARIMA models and evaluation criteria of predictions. Unit Root Tests and applications. Vectors auto regression (VAR) and causality tests. Examples of time series analysis. Internship computers and experiential exercises.

AIOP12 - Game theory

Strategic games: Original and mixed strategies, benefits, best responses. Balances: Genuine and mixed equilibrium Nash, the refinements and generalizations thereof. Classic equilibrium existence theorems and algorithmic aspects. Algorithms and complexity for finding equilibriums. The computational classes PLS and PPAD and their relation to the problem of calculating balances, and algorithms for the calculation of approximate equilibrium. The cost of anarchy and their variants. Analysis of the cost of anarchy for general and specific games (e.g., games for selfish routing, congestion games, gaming security). Applications to realistic situations (e.g., social networks, selfish formation Internet).

AIOP13 - Econometrics II

Models with dummies (Shift function, Rotate function, simultaneous translation and rotation function, simultaneous use of several qualitative explanatory variables, Seasonal dummies). Combination of laminar and longitudinal data (Stratified, layered and timeless independence, Stratified, temporal correlation and cross sectional autocorrelation). Models distributed lags (KCHY) (Assessment models KCHY, Evaluation models KCHY restricted to finite or infinite number of lags, Empirical models KCHY Methods of assessment models KCHY infinite number of lags, Diagnostics, Applications). Designs systems of equations (Error dependence, Identification, estimation methods (Indirect method, method in two steps), Models seemingly uncorrelated equations Diagnostics Analysis models).