



UNIVERSITY OF MACEDONIA
ECONOMIC AND SOCIAL SCIENCES
DEPARTMENT OF TECHNOLOGY MANAGEMENT

Student's Guide
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**University of Macedonia
Economic and Social Sciences**

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156, Egnatia st.

P.O. Box 1591

540 06 Thessaloniki-GR

T +30 2310 891.743, 891.730

F +30 2310 891.731

E uompress@uom.gr

W www.uom.gr/uompress/

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■ **The Temporary Administrative Committee of the Technology Management Department**

Athanasios Noulas

Professor, Head of the Temporary Administrative Committee

Konstantinos Tarabanis

Professor, Deputy Head of the Temporary Administrative Committee

Vassiliki Manthou

Professor

Maria Satratzemi

Professor

Konstantinos Paparrizos

Professor

Andreas Pombortsis

Professor

Manos Roumeliotis

Professor

Eftichios Sartzetakis

Associate Professor

Theodoros Kaskalis

Associate Professor

Department of Technology Management secretariat

Naousa:

tel: +30 23320 52.460

e-mail: tmsecr@uom.gr

Thessaloniki:

tel: +30 2310 891.461

e-mail: finsecr@uom.gr

■ **Message from the Head of the Temporary Administrative Committee of the Department**

In an environment in which competition is intensifying day after day, businesses and organizations ought to be characterized by managerial and technological knowledge par excellence, so that they are efficiently run and able to perform. The mission and aim of the Technology Management Department is to cultivate and promote knowledge of business administration and technology, the emphasis being on the areas of telecommunications and digital systems.

The objective is to prepare executives who will combine managerial/financial and technological knowledge in order to deliver immediately applicable solutions, thus responding to the increased needs of the labour market in the fields of Business Administration and Information & Communication Technologies. The graduates of the Department, by combining managerial/financial and technological knowledge, have the necessary skills that will ensure their career development as scientists and/or businessmen, owing to their mastery of technological products design and standardization, marketing, sales and support of pertinent services, administration and quality control of technology departments in businesses and organizations, innovation and technology change management.

At this point it is worth underlining the great significance and instrumentality of the finance received from the 3rd CSF (Community Support Framework), through the implementation of the second Operational Program for Education and Initial Vocational Training actions “Expansion of Tertiary Education – University of Macedonia (2004-2006)” and “Creation and upgrading of infrastructure so as to facilitate the implementation of measures financed by the ESF (European Social Fund) Phase III (2004-2006)”. The aforementioned actions have contributed enormously to the Department’s high-standard organization, in terms of administrative and academic operation as well as building facilities and equipment.

Professor Athanasios Noulas
Head of the Temporary Administrative Committee of the Department

■ 1. University of Macedonia

1.1. History of the University of Macedonia

The University of Macedonia was established in 1990 and is the successor to the renowned Graduate Industrial School of Thessaloniki – GIST. GIST operated for the first time during the academic year 1957/'58 as the Higher School of Industrial Studies.

“The Higher School of Industrial Studies in Thessaloniki” was founded in 1948 by article 5 of law No 800/1948 under the supervision of the Ministry of National Economy. In 1956, the royal decree approving the Statutes of the GIST, which regulated the organization and operation of the School, was published in the Gazette. This decree was based on article 7 of law No 800/1948. In 1958 the School was renamed the Graduate School of Industrial studies of Thessaloniki and became equivalent to all the other universities in Greece. At the same time, the curriculum changed from a three-year program to a four-year one. These alterations were based on article 15 of legislative decree 3876/1958. The same article provided that New Statutes would be issued.

In 1966 with article 4 of legislative decree 4578/1966 the School was renamed the Graduate Industrial School of Thessaloniki and became a legal person governed by public law.

From the academic year 1971/1972 the Graduate School of Industrial Studies offered a program of Economics and a program of Business Administration, awarding two different bachelor and doctor degrees, respectively.

With presidential decree 436/1985 the School was divided into two Departments: a) the Department of Financial Sciences and b) the Department of Business Administration. Each department awarded a different degree.

With legislative decree 147/1990 the Graduate School of Industrial Studies of Thessaloniki was renamed the “University of Macedonia, Economic and Social Sciences” and simultaneously three new departments were established, the Department of International and European Economic Sciences, the Department of Accounting and Finance and the Department of Applied Informatics. The Department of Business Administration was renamed the Department of Business Organization and Administration. In 1993 by presidential decree 122/93 the Department

of International and European Economic Sciences was renamed the Department of International and European Economic and Political Sciences. By presidential decree 267/93, the Department of Educational and Social Policy was subsequently established.

In 1996 two new departments were founded: a) the Department of Balkan, Slavonic and Oriental Studies and b) the Department of Music Science and Art. Finally, by decree No 3255/2004, two more departments were added: a) the Department of Technology Management, based in Naousa, and b) the Department of Marketing and Operations Management, based in Edessa. The latter departments started enrolling students during the academic year 2004/2005.

In addition to the above, the University of Macedonia has developed three interdepartmental postgraduate programs leading to the degrees below:

- Master's Degree in Economics from the Departments of Economics, Business Administration, and Accounting & Finance. This program was first launched in 1994/95, based on Ministerial Decision B1/710, published in FEK (The Hellenic Republic Gazette issue) 799/6-10-93.
- Master's Degree in Business Administration (MBA) from the Departments of Business Administration and Accounting & Finance. This course has been offered since February 1995, in accordance with Ministerial Decision B1/713, FEK 787/6-10-93.
- Master's Degree in Information Systems (MIS) from the Departments of Economics, Business Administration, Accounting & Finance, and International & European Economic & Political Sciences. This program has been running since February 1997, based on Ministerial Decision B1/717, FEK 786/6-10-93.

Moreover, there are another four postgraduate programs (Master's degrees).

- a. MSc in Applied Informatics offered by the eponymous Department, which has been organized and administered since 2003/2004 in accordance with articles 10 and 12 of law 2082/92.
- b. MA in Educational and Social Policy
- c. MSc in Accounting and Finance
- d. MA/MSc in European Economic and Political Studies.

1.2. University Governing Bodies

According to the institutional framework for tertiary education (laws 1268/82 and 2082/92), the bodies vested with the authority to govern the University are:

- the Senate, which is the supreme body governing the University. In the context of University autonomy, academic, administrative and financial are within the Senate's jurisdiction. The Senate consists of the Rector (or Chancellor), the Vice-Rectors (or Vice-Chancellors) and the Heads of all Departments, a student representative from each department, two representatives of the postgraduate students, a delegate of assistants – scientific partners, a representative of the Special Educational Teaching Staff, a delegate of the Special Technical Laboratory Personnel and a representative of the administrative staff. Also participating in the senate are delegates of associate professors, assistant professors and lecturers, their number being equal to at least 1/3 of the university departments and greater than or equal to 6. The particular associate professors, assistant professors and lecturers that become senate members are designated by the general assemblies of their departments on an annual basis, taking turns in accordance with the rector's decisions regarding each rank and department separately. Besides, whenever the senate convenes, the Head of the University Secretariat, the Heads of subsidiary Departments and representatives of the latter's students are present at sessions, without the right to vote.
- the Rector, whose responsibilities include:
 1. governing the University and supervising the smooth operation of its services
 2. summoning the Senate and the Rector's Council
 3. issuing instruments of university staff appointmentsIn exercising his duties, the Rector is assisted by three Vice-Rectors, the Vice-Rector of academic affairs and personnel, the Vice-Rector of financial planning and development and the Vice-Rector of strategic planning and investments, whose charges are assigned to them by the Rector's Council.
- the Rector's Council (or Chancellor's Council), which consists of the Rector, the Vice-Rectors, a student representative, and the Head of the University Secretariat, who has the right to

propose motions and vote on administrative, economic and technical matters as well as at meetings concerning the administrative staff. In the latter case, a delegate of the administrative staff is also present, without the right to vote.

1.3. The Rector and the Vice-Rectors

Rector:

Professor Ilias Kouskouvelis

Telephone: +30 2310 891.240

Facsimile: +30 2310 844.536

e-mail: iliaskou@uom.gr

prytan@uom.gr

Vice-Rector of Academic Affairs and Personnel:

Professor Stylianos Katranidis

Tel: +30 2310 891.241

Fax: +30 2310 844.536

e-mail: katranid@uom.gr

Vice-Rector of Financial Planning and Development:

Professor Athanasios Noulas

Tel: +30 2310 891.242

Fax: +30 2310 844.536

e-mail: anoulas@uom.gr

Vice-Rector of Strategic Planning and Investments:

Professor Dimitrios Subeniotis

Tel: +30 2310 891.299

Fax: +30 2310 844.536

e-mail: subedim@uom.gr



2. The Department of Technology Management

2.1 Introduction

In a society and economy depending on knowledge, 'know-how', especially the comprehension of new emerging technologies, constitutes an invaluable asset of businesses or organizations wishing to gain a comparative advantage in the market or, simply, to be profitable and competitive in the public as well as in the private economic sector. Thus, Technology Management forms a critical compound of a modern enterprise or organization's strategic thought.

Technology Management focuses on enabling business companies and organizations to re-organize and to produce new or better products or services, acknowledging technology as a point of departure and reference. In other words, Technology Management promotes Innovation Technology Management in products and services that enterprises and organizations have to offer, as well as in every business body as a whole.

Technology Management executives combine strategic operations with managerial or transactional operations of an enterprise or organization by forming the bridge between strategic – enterprising logic on the one hand and the scientific – technological approach on the other.

Their major task is to link and systematically co-ordinate science and technology with managerial or operational strategy.

The Department of Technology Management specializes in training managerial staff and production executives to be employed by firms and organizations with a high technological orientation both in their structure and operation, as well as in the products and services they offer, digital and telecommunication technologies always being pivotal.

According to the constitution of the Technology Management Department, on successful completion of its full 4-year bachelor degree program, students should combine

- a) organizational and administrative skills for businesses and organizations, and
- b) technological skills with particular emphasis on the areas of telecommunications and digital systems.

Graduates will be particularly suited to domains of design and standardization, research and development of technological products, marketing, sales, and support of the services pertaining to the above, administration and quality management of IT departments in business companies and organizations, technological innovation and change management, entrepreneurial and technological feasibility studies, etc.

Therefore, a lengthier but more accurate designation of the Department could be “The Department of Production Management and promotion of innovative products and services, management of technological innovation in enterprises and organizations, with the support of digital and telecommunication technologies”.



2.2 Cognitive areas

The profile of the ideal graduate of the Department is that of a scientist who will be able to

- a) participate in the processes related to designing, producing and supporting an innovative (or improving an existent) technological product or service, whereby the term 'technological' refers to products or services of digital and telecommunication technologies.
- b) compile techno-economic studies, draw up strategic and managerial plans, conduct market research, do studies of production cost and configuration, quality control, promotion and support of a product or service of digital and telecommunication technologies.
- c) study and reinforce the processes of technological innovation at the level of an enterprise or organization, treating technology innovation as a combination of administrative and technological factors based on digital and telecommunication technologies.
- d) participate in the organization and administration of enterprises or organizations with a high technological orientation, specializing in digital and telecommunication technologies.

To achieve these goals, the graduate of the Department must employ a variety of managerial, scientific and technological skills in order to comprehend all the parameters related to both the manufacturing and the entrepreneurial practice in the life cycle of an innovative product or service.

Over the years, in Greece, as well as in Europe in general, there has been an ongoing effort to reinforce Technological Innovation and Entrepreneurship. In several relevant surveys it is acknowledged that one of the major predicaments in Europe and Greece is the delayed integration of technological innovations into products and services as well as enterprises and organizations, aggravated by the great difficulty in taking innovative entrepreneurial initiatives. Likewise, it is understood how slow the growth of Research and Development (R&D) in the private and public sector is. The Department of Technology Management anticipates contributing to the improvement of this situation to the best of its ability.

The knowledge of Organization and Administration is divided into three particular fields, which include

- a) the prerequisite theoretical knowledge of Production and Services Organization and Management
- b) basic techno-economic knowledge of business companies as well knowledge relevant to entrepreneurship and innovation, and
- c) the Management and Production Technologies in which the emphasis is on the contribution of emerging technologies
 - c1) business and organizational administration succeeded by the extended enterprise and e-business, and also
 - c2) the design, production and support of innovative products and services.

The Department concentrates on two new technologies, namely Digital Systems and Telecommunications. Undoubtedly, these technologies are not only at the centre of economic and manufacturing activity, but are increasingly being involved in other important aspects of social life, such as education, entertainment, information, health, governance, etc. This has resulted in laying down an important infrastructure, which tends to be comparable to similar infrastructures in transport or in energy production and distribution. This infrastructure is constantly evolving and attempts are being made to make it as intangible (invisible) and user-friendly as possible, ultimately aimed at developing totally human-centred systems, namely systems where user interfaces will be integrated with objects of everyday use and communication with humans will occur in terms of everyday activity. This effort has led to

- a) a significant increase of vertically organized applications which embody microcomputers, interfaces, and customized, embedded system, and
- b) the development of complex programmable telecommunications systems, which manage the information interchange and the integration of particular systems into a distributed system.

The survey “New ICT Curricula for the 21st Century” by Career-Space is typical of the trends within the European Union and Greece, for it examines the perspectives of the labour market

by presenting a spectrum of specialities, the existing curricula, and by emphasizing the gaps that appear in the educational needs of new specialities. Finally, it gives some guidelines for adjusting or developing curricula. It should be noted that the foregoing study refers to issues of management, innovation and entrepreneurship, but fails to define them accurately. Nevertheless, according to these guidelines of the study, the Department of Technology Management should be positioned in the forefront of the IT Networks specialities field whereas IT Systems and IT Electrical Engineering are to be considered its subsidiary areas. It is clear that the aforementioned specialities include a significant percentage of management, entrepreneurship and innovation courses, not comprised in the survey conducted by Career-Space.



2.3 Curriculum and sections

The curriculum of the Technology Management Department is arranged in eight semesters and encompasses six courses per semester.

The available taught courses are organized in thematic areas aimed at co-ordinating course content and avoiding overlap or fragmentation of knowledge. The thematic areas analyze and specialize the cognitive areas discussed in the previous paragraph in order to provide a seamless set of subjects and to accurately determine the expected outcome, namely the profile of the Department's graduate. These subject areas do not imply a compartmentalized program, viz. students are not expected to choose a pathway between Management and Technology or Digital and Telecommunication Technology. As a general rule, all courses are compulsory and the specific goal of the curriculum is familiarization with different kinds of knowledge. Even in the future, when with the Department's growth it will only be natural to include optional courses or even optional circles of courses, the main concern will remain the combination of diverse areas of knowledge as provided in the constitution of the Department.

The thematic areas are the following:

<i>Thematic Area</i>	<i>General Description</i>
Management and Entrepreneurial Innovation	Students acquire the necessary knowledge that is related to the modern entrepreneurial and administrative environment.
Management and Production Technologies	Students examine the impact of technology on business administration itself and on generating products and services.
Technology	Students delve into certain technologies, in accordance with the background and the goals of the Department.

A more specific analysis of the thematic axes, with emphasis on the final learning outcomes per thematic area ensues below.

<i>Thematic Area</i>	<i>Particular Thematic Categories, Goals</i>	<i>%</i>	<i>#</i>
Management and Business Innovation (43%)	Operational Management. Personnel Management, Production Management, Services Management, Quality Management, Strategic and Entrepreneurial Planning, Marketing and Sales, Distribution and Support, Business Law Issues, Technology and Innovation	26	10
	Entrepreneurial Innovation. Techno-Economic Surveys and basic Financial Management, Evaluation and Financing of Technological Investments, Entrepreneurship and Innovation, Research and Development of Products and Services, Technological Change Management.	17	7
Management and Production Technologies (17%)	Management and Production Technologies. Information Systems in Management and Business, Planning Business Processes, Electronic Administration and Business, Design Systems and Design of Products and Services.	17	7
Technology (40%)	Digital Technologies. Hardware and Software Management of Digital Systems, Distributed Systems, Embedded Systems.	17	7
	Telecommunication Technologies. Telecommunication Systems, Internet and Applications, Wireless–Mobile–Broadband Telecommunications.	23	9

#: number of courses

The particular thematic categories presented above, also constitute the Department's Sections.

Sections of the Technology Management Department

- a) Operational Management (OM)
- b) Business Innovation (BI)
- c) Management and Production Technologies (MP)
- d) Digital Technologies (DT)
- e) Telecommunication Technologies (TT)

The curriculum consists of 48 courses in total. The curriculum provides for 8 foundation courses, namely 4 courses in Mathematics (MA) and 4 in Information Technology (IT).

Therefore, the subject areas analyzed above cover a total of 40 semester-long core courses. The weight (%) each particular thematic area carries is shown in the previous table, and so is the number of the corresponding courses.

It is evident that the inclusion of a course into a thematic area contributes to the specification of the course's material, especially in several cases of knowledge domains that could be approached by different aspects, depending on the point of view of the Department, the Section, or the Instructor. The foundation courses are covered mainly by instructors of the Sections.

Foreign Language (FL) courses run through each academic year as elective courses, besides the core courses of a typical semester. Successful examination in two semester courses is obligatory for obtaining the degree. It is recommended that students take them in semesters 1 and 2 of their studies.

The distribution of courses per semester (across the 4-year course of studies) is presented in the table below.

1	2	3	4	5	6	7	8
FL	FL						
MA	MA	MA	MA				
IT	IT	IT	IT				
OM	OM	OM	OM	OM	OM	OM	OM
						OM	OM
BI	BI	BI		BI		BI	BI
							BI
			MP	MP	MP	MP	MP
				MP	MP		
DT	DT	DT		DT	DT	DT	DT
TT	TT	TT	TT	TT	TT	TT	
			TT		TT		

The weight of all courses, regarding credits, is the same, i.e. 5 credits; hence, as every semester offers 30 credits, the sum of the curriculum amounts to 240 credits. The Foreign Language courses offer no credits, but students must take and pass both of them. All courses last three hours or teaching periods per week, apart from the Mathematics and Information Technology ones, which last four hours.



Table of courses at the Department of Technology Management

1st semester

Mathematics I
Information Technology and Applications
Management and Technology
Introduction to Economics
Digital Systems and Applications
Computer Networks
English I

1st

2nd semester

Mathematics II
Computer Programming
Products and Services Marketing
Accounting and Finance for Managerial Decisions
Micro-processors and micro-computers
Telecommunication Systems and Applications
English II

2nd

3rd semester

Statistics – Probability

Object-oriented Design and Programming

Human Resources Management

Financial Management

Digital Telecommunications

Operational Systems

3rd

4th semester

Operational Research

Data Organization and Management

Production and Operations Management

Management Information Systems

Internet Technologies

Web Technologies

4th

5th semester

Supply Chain Management
Managerial Economics and Business Decision-Making
Information Systems Analysis and Design
Design and Production Technologies
Telecommunication Systems Administration and Security
Embedded Systems

5th

6th semester

Total Quality Management
Enterprise Information Architecture
Systems Development Technologies
Digital Interfaces
Wireless Communications
Mobile Communications

6th

7th semester

Project Planning and Management
Legal and Professional Issues
Entrepreneurship and Technology Innovation
Electronic Business
Distributed Systems
Broadband Communication Technologies and Services

7th

8th semester

Business Policy and Strategy
Legal Aspects of Technology and Innovation
Technology Innovation Management
Research and Development of Products and Services
Electronic Governance
Parallel Processing

8th

2.4 Brief analysis

Foreign Language

Only English courses (I & II) are currently available, and they are compulsory. Topics covered include terminology (EAP/ESP: English for Academic Purposes/English for Specific Purposes), reading skills, academic writing and oral presentations.

Mathematics

Mathematics I-II cover selected syllabi of differential and integral calculus and linear algebra, based on the use and applications of mathematics in management and economics on the one hand, and in digital and telecommunication technologies on the other. The next course introduces the principles of statistics and probability so as to enable inference, estimating and forecasting on techno-economic issues. The last course covers the fields of operational research, simulation, and other quantitative methods of supporting managerial decision-making.

Information Technology

The sequence starts with an introduction to personal computers, the applications of information technology and the basic working environment; it continues with two programming courses, an elementary one and an advanced one, whereby issues of software design with contemporary methods are covered, and it concludes with a course on databases.

Operational Management

The introductory course studies the basic knowledge concerning management and operation of enterprises and organizations, and their relation to technology. Later, the areas of products and services marketing are covered. Manufacturing and operational management is divided into successive courses, starting with a general course and continuing with supply chain management and logistics, and project planning and management. Coming next are human resources issues, and total quality control both in management and production. Afterwards, there are legal and broader institutional aspects of business operations and legal issues of innovation and technology (patents, intellectual rights, etc.). In the last semester issues of business strategy and policy are covered, namely the formation and implementation of business plans.

Business Innovation

Initially, there are two courses on the inner and outer economic environment of a business. Following that, there is a course discussing the financial administration of a business and the current forms of financing. The next course studies the methods of business forecasting and business risk assessment. The ensuing course covers professional and practical issues of entrepreneurship and implementation of innovative ideas, scilicet the organization, management and initial financing of a small firm. In the last semester, a course thoroughly discussing issues of management and implementation of technological innovation is offered. Also, there is a course that refers to research and development of innovative products and services.

Management and Production Technology

The introductory course explains the concepts of information systems as applied to management and business. The next course studies the design and modelling of information systems interrelated with the overall structure and operation of an enterprise or organization. As a follow-up, issues of implementation and remodelling or maintenance of an information system are discussed. In parallel, there are two courses concerning the principles and technologies of designing products and services (CAD technologies), and, afterwards, manufacturing technologies (CAM/CAE). Finally, the two remaining courses deal with issues of electronic commerce and entrepreneurship, and with electronic business and electronic governance, respectively.

Digital Technology

Relevant courses first present the primary principles and applications of digital systems, that is specialized microprocessor systems, covering issues of logical design of digital circuits. Next, the architecture and organization of microprocessors and microcomputers are presented. A programming and hardware-software interface course follows in combination with the operating systems used in microcomputing systems. The course of the 4th semester discusses basic issues of distributed systems (client-server model) and middleware. The next course studies the design and development of distributed applications. The two remaining courses deal with embedded systems and digital interfaces.

Telecommunication Technology

The first course presents a broad introduction to telecommunication systems and their applications. The next course discusses the physical and theoretical background of digital telecommunications and data transmission. After that, issues of computer networking are covered, once again from a physical and theoretical viewpoint. Following are two courses on the Internet, the former discussing primary protocols, and the latter regarding information management in the World Wide Web protocols. The ensuing course studies the administration and security of telecommunication systems, whereas, next, the wireless and mobile telecommunication standards and their applications are discussed. Finally, broadband networks are examined in terms of technology as well as functional requirements and applications (transmission and management of high bandwidth multimedia data).



2.5 Course descriptions

1st Semester

Mathematics

Introduction to Differential Calculus, functions. Limits and continuity. Exponential and logarithmic functions. Trigonometric functions and their inverses. Rate of change and the derivative of a function. Differentiation, the chain rule. Introduction to Integral Calculus. Indefinite and definite integral. Integration by substitution. Integration by parts and partial fractions. First order differential equations. Linear differential equations. Difference equations. Complex numbers. Basic Properties and operations, polar form. Euler's formula and exponential form. Roots. Complex functions. Differentiation and integration of complex functions.

Information Technology and Applications

The historical course of computer science and technology. The covert uses of information technology and the penetration of computers into everyday activities. Data representation and processing. Presentation of the particular units of a computer system. Organization and operation of processors. Memory organization. Peripheral units. Operating systems. File management in operating systems. Algorithms: definition, representation, three structures (sequential, decisive, repetitive) – problems, classification and detection algorithms. Introduction to Glosomatheia, an educational programming environment for novices. Program development.

Management and Technology

Business forms and environment. Managerial operations. The social responsibility of a business. Basic management operations. Planning and decision-making, Organization, Recruitment, Human Resource Management, Control, Information Systems – New technologies in Management (information systems, internet, tele-employment, virtual business-organization, electronic business and synergies), total quality management. Practice.

Introduction to Economics

The purpose of this course is to familiarize students with basic microeconomic and macroeconomic concepts that will allow them to understand how economic units (e.g. a consumer, a firm) and the economy as a whole function. The first part of the course (microeconomics) describes and analyzes the behaviour of the individual decision making unit. Demand theory, consumer and production theory. The various forms of markets are analyzed. The second part (macroeconomics) examines and analyzes the factors that affect the national product, employment levels, price levels, interest rates, fiscal and monetary policies.

Digital Systems and Applications

Digital computers and digital systems. Binary, octal, hexadecimal numbers, conversions, numeral systems. Representation of signed binary numbers and 2's complement. Codes: ASCII and Unicode. Binary operations and digital gates. Boolean algebra, truth tables, function generation. Combinatorial logic: adders, multiplexers, demultiplexers, encoders, decoders. Clocks and three-state logic gates. Sequential logic: latches, flip-flops, processor registers. Data buses and address buses. ALU and microprocessing unit organization. Types of memory. Issues of computing units timing and communication.

Computer Networks

This course aims at students' mastering basic knowledge of computer networks and their applications. First, there is an introduction into the use of networks and the concepts of several network layers. Covered next are topics of computer network analysis and design, including aspects such as network structures and architectures, OSI and TCP/IP, network examples, topologies, the physical layer, data connection layer, protocol analysis, sliding window protocols, ALOHA and CSMA/CD protocols, network layer, routing algorithms, flow control, network congestion, transmission layer. This module also features major Internet applications (DNS, email, www, etc.). Internet protocols are studied in the laboratory, too, with the aid of appropriate software.

English I

(English for Specific Purposes – ESP / English for Academic Purposes – EAP)

Fast, effective reading comprehension techniques. Encyclopædia entries, searching the Net. Research/surveys and report writing. Academic texts on Greece. Note taking. Basic financial, technology management and Information Technology (IT) terms. Lexis memorising ways – derivatives. Presentations.

2nd Semester

Mathematics II

Sequences and series. Trigonometric polynomials and series. Fourier Series. Complex Fourier series. Fourier cosine and sine series. Convergence. Fourier transformation. Vectors. Operations, inner product. Matrices and matrix operations. Linear systems. Gaussian Elimination, augmented matrix. Canonical form of a matrix, taxonomy of linear systems. Inverse matrix. Vector form of linear systems, geometric interpretation. Homogenous linear systems. Linear transformation. Determinants.

Computer Programming

Introduction to programming in the C language. Syntax, preliminary data types and operators. The memory model and variables in C. Control structures: ramifications, repetitions. Functions, scope and lifetime of variables. Functions: function calls, parameter parsing, prototypes and definition. Complex data types: tables, alphanumerics, pointers. Data files. Programming realization of typical algorithms and data structures (queries, classifications, lists, trees).

Products and Services Marketing

Marketing defined. Marketing management, marketing research, marketing strategy, marketing plan, marketing mix. Marketing application fields. Marketing management process. The role of marketing in a business. Impact of technological progress, deciding on a target market, market segmentation, product placing, consumer behaviour. The marketing mix: product strategy, pricing, promotion, distribution. Preparation of a marketing plan. Marketing models, Customer Relationship Management systems, E-marketing, Internet marketing. Practice.

Accounting and Finance for Managerial Decisions

Entrepreneurship and the role of Accounting and Finance. Accounting: definition, distinctions, annual financial statements, legal status of a business. Inventory, Valuation and Writing of annual financial statements. Costing and managerial decision-making. Financial planning.

Microprocessors and Microcomputers

Micro-architecture design, design aspects, decoding and instruction execution. Micro-instructions and instruction set. The fetch-execute cycle. Introduction to programming in Assembly. Assembling, executing, debugging low-level programs. Addressing modes. Stacks and sub-routines. Input/output of microprocessor systems: polling, interrupt-driven, DMA. Interruption mechanisms in microprocessor systems, extending the fetch-execute cycle. Introduction to system software: assemblers, compilers.

Telecommunication Systems and Applications

This course will offer the basic theoretical tools required for understanding and evaluating a telecommunications system (TS). Starting from the well-known Shannon's capacity theorem, it will explain the main functions of a TS and will go on to provide students with fundamental knowledge of signals and systems, analysing basic analog and digital modulation. It will also explain how modulated signals are transmitted over channels and will present a plethora of examples of modern systems (e.g. ADSL). The course is completed with an introduction to networks and wireless technologies, concentrating on assisting future executives with evaluating any emerging telecommunications technology.

English II

(English for Specific Purposes – ESP / English for Academic Purposes – EAP)

Commercial (electronic) correspondence. Writing a CV and covering letter. Research papers and publications (topic selection, bibliography evaluation, documentation). Oral presentations. Marketing, technology and management terms. Argumentative writing (eloquence, cohesion and coherence, linking devices). Précis. The language of promotion.

3rd Semester

Statistics - Probability

Fundamental concepts: population, sample, statistic, etc. Statistical data collection: enumeration, sampling techniques. Classification of statistical data using classes and/or graphs. Frequency distribution. Typical position and distribution values. Basic terminology of the probability theory: trial, (universal) sample space, simple and complex events, etc. Conditional probability. Bayes' theorem. Probability functions. Discrete distribution: binomial, Poisson, etc. Continuous distribution: normal, exponential, etc. Sampling distributions. Central limit theorem. Point estimates. Properties of estimating parameters. Confidence intervals. Determining sample size. Hypothesis testing theory and applications.

Object-oriented Design and Programming

Basic principles of object-orientated design using the Java programming language as a tool. Definition of classes: fields, constructors, methods, parameters in Java programming. Scope and lifetime of variables, operators, conditional commands, selection structures. Object communication: abstraction, modular programming, class type, method invocation, overloading. Static methods, the main method, the Java Virtual Machine (JVM), bytecode. Grouping objects, collections, tables, packages, casting. Using class libraries, class design. Inheritance, polymorphism and overriding. Abstract classes and interfaces. Multilevel and multiple inheritance.

Human Resources Management

Human Resources' Strategic Role, Human Resources Planning, Recruitment, Remuneration Policy and Reward Systems, Performance Appraisal, Training and Human Resources Development, Health and Safety of Employees, Labour Relations, Special Topics in Human Resources Management, Leadership, Organisational Culture, Work Redesign and New Technologies, Organizational Change.

Financial Management

This course analyzes financial management in the context of business activity, financial

statements and the role of cash flow in the context of financial decisions, the time value of money, valuation of bonds and stocks, investment and funding decisions, methods of evaluating investment in capital equipment, capital cost and its importance in evaluating investment, feasibility studies and technical/economic analyses.

Operating Systems

Introduction to Operating Systems: history, typical kinds, fundamental concepts. Processes: models, creation, termination, hierarchy, states, implementation. Inter-process communication: race conditions, critical regions, mutual exclusion, sleep and wakeup, semaphores, message passing, classical problems. Scheduling: policies and mechanisms. Deadlocks, deadlock prevention, safe and unsafe states. Memory management, monoprogramming, multiprogramming, modelling, memory swapping, memory usage with linked lists. Virtual memory: paging, page tables, page replacement algorithms.

Digital Telecommunications

This course focuses on digital telecommunication systems. It discusses topics such as: Fourier analysis, representation of signals in the time and frequency domains, baseband data transmission, intersymbol interference, eye diagrams, filters, sources and examples of channel-noise reduction, AM and FM systems, conversion of analogue to digital signal, PCM, delta modulation, digital modulations ASK, FSK, PSK, multi-level digital modulation, multi-user digital modulation techniques, FDMA, TDMA, CDMA.

4th Semester

Operational Research

Introduction to the modelling procedure of a problem and to the basic principles of linear programming. Graphical solution of a linear model, applications – case studies, optimization software packages (e.g. LINDO, WinQSB, DS for Windows, Excel), the Simplex algorithm, duality theory and its economic interpretation, sensitivity analysis, introduction to graph theory, transportation and assignment problems, the minimum cost network flow problem, the maximum

flow problem, the minimum spanning tree problem, game and queuing theory, dynamic programming, simulation.

Data Organization and Management

Introduction to Databases. Entity-Relationship model (E-R model). Relational model. Transformation of an E-R diagram into a relational scheme. Relational Algebra. Structured Query Language (SQL). Functional dependencies. Normalization. Client-server architecture. Introduction to Online Databases and Decision Support (OLAP). Introduction to Data Mining.

Production and Operations Management

This course will introduce students to topics related to design, analysis, redesign, optimization and operational management of companies manufacturing products, and services companies. The subject areas include problem solving of major managerial procedures of the above-mentioned companies, e.g. product-service design, demand forecasting, time and quantitative planning of resources, selection of location and land-planning design, as well as quality control.

Management Information Systems

Studying the notion of information systems, types of contemporary information systems, transaction processing systems, management information systems, decision support systems, enterprise resource planning systems, knowledge management systems, e-business information systems.

Internet Technologies

Students examine Internet topics at the level of protocols and server-side services. This course takes as a starting point TCP/IP protocols. The IP address assignment method. Protocol hierarchy of IP addresses. Subnetting, address matching and the ARP (Address Resolution Protocol). IP encapsulation, fragmentation and reassembly. The IP v6 protocol. The error report tool and the ICMP (Internet Control Message Protocol). The UDP and TCP protocols. NAT (Network Address Translation). Email protocols (SMTP, POP3, IMAP). Naming and DNS structure, the DHCP

protocol. The world wide web and the HTTP and FTP protocols. Use and management of Internet services workshop (Apache web server). Script programming at the server level (PHP) using web-based databases.

Web Technologies

This course includes the following subject areas: introduction to the HTML programming language, Website structure, lists, website links, types of graphics, incorporating images into web pages, images as links, the XHTML language, cascading style sheets, embedded, external and inline style sheets, tables, forms, margins, sound and Video, imagemap images and forms, document object model, essential javascript structures, javascript objects, properties and methods, handling events, user interaction, handling forms and several objects, javascript and DHTML, CSS, images and animation using javascript, dynamic representation of web pages, security issues, interaction with Java.

5th Semester

Supply Chain (Logistics) Management

Planning, operation and control of the supply chain for enterprises and organizations. Organization and design demands of the supply chain. Solving complex problems in supply chain management (i.e. supplies, stock management, organization of distribution network etc.), as well as introduction to, and evaluation of, telematic technologies and Information Systems in the management of a supply chain.

Managerial Economics and Business Decision-Making

Historical development and business environment. Market types. Types of entrepreneurial activity – legal forms of companies. Basic economic concepts: capital, investment, funding, etc. Capital composition and types of funding. Self-financing. Shares and stock exchanges. Reserve funds. Venture Capital. Bank and bond lending. Leasing. Factoring. Franchising. Risk, , Property Control and Corporate Administration. Business Goals, risk, uncertainty and decision-making. Demand Analysis and Consumer Behavior.

Information Systems Analysis and Design

Life cycle models (waterfall model, spiral model etc), requirement specification, structured analysis and software design, object-oriented analysis and software design, UML language, software check (operational check, structural check).

Design and Production Technologies

Product design and development cycle. Key principles for designing and manufacturing a product. Concepts of CAD, CAM, CIM, and CAE technologies. CAD (Computer Aided Design) tools for design studies, product concepts, reverse design, modelling, designing, simulation, computer-aided engineering tools (CAE). Edge models, surface models, solid models, solid models and parametric design, modelling examples. CAM tools for manufacturing a product. Workshop exercises in CAD, CAM, and CAE programs. New trends in Product Design and Manufacture Systems.

Embedded Systems

Definition, characteristics, applications, requirements of Embedded Systems. General and special purpose microprocessors. Micro-controllers, ASIC circuits. Embedded Programmable Gate Array (EPGA), Complex Programmable Logic Devices (CPLDs). Design, development, control and production methods. Tools for circuit design, validation checks, end-product design. Hardware description languages. Peripherals. Timing and power saving issues. Communication, Input/Output. The hierarchical organisation of the memory. Interruptions. Solving communication problems. Operating Systems issues (Complexity, Real-Time Operating System).

Telecommunication Systems Administration and Security

This course discusses the development and administration of local and wide networks, by particularly emphasising security issues. It includes areas such as network design, network administration (SNMP, SNMPv2, SNMPv3), remote control (RMON, RMON2), error checking and network performance, encryption, public and private keys, security architectures, blocking attacks, firewalls and proxy services installation as well as distributed systems security. Parallel issues

of network administration and security are studied in the module workshop, too, with the help of appropriate diagnostic tools (hardware and software ones). In order that students better understand security and administration, Windows, Linux, and FreeBSD (VMWARE) operating systems that have been adapted accordingly are employed.

6th Semester

Total Quality Management

Presenting the meaning and importance of quality, quality assurance and quality audit, quality control systems, the notion of total quality management as well as the stages of its development, its techniques and application. Analysis of enterprises that adopt programs to improve their quality.

Enterprise Information Architecture

This course presents a holistic framework of managerial analysis and modelling, which unifies the technological with the managerial. It is an essential methodological tool for the analysis and design of multi-complex information systems. Within the course scope CASE tools will be demonstrated, which automate the formulation procedure of an overall managerial model.

Systems Development Technologies

Software engineering principles and methods, with emphasis on developing information systems that will cover specific business needs. Practice in configuring open software and services as software that are freely available on the web. Indicative examples of application areas are business portals, content management systems, business processes systems using BPEL and workflow systems.

Digital Interfaces

Interfaces and communication technologies at the level of hardware and verticalised applications. Characteristics of digital interfaces. Historical development. The effect of digital interfaces on hardware selection, systems cost and extensibility. Serial interfaces, virtual serial ports,

programming. Interfaces with the motherboard: SCSI, ATA, DIMM, AGP, ISA, PCI, PCIe. USB interface. Parallel interfaces, output and use preview. Sound interfaces. Digital Video Interfaces (DVI). TV connection, STB types. Wireless interfaces: infra red, bluetooth. Interfaces for using low voltage distribution networks. Interfaces for using coaxial cables. Expected future developments.

Wireless Communications

Radio-communications, signal transmission and signalling, features of wireless channels, multiplex access and spectrum management, satellite communications, Wireless Personal Area (PAN), Local Access (LAN) and Wide Access (WAN) Networks, WiFi (802.11b,a,g,i) protocols, Ultra-Wideband (802.15.3a) and Bluetooth (802.15.1), wireless networks security, managerial and regulatory issues.

Mobile Communications

The aim of this course is to introduce students to the basic concepts of Mobile Telecommunications Cellular Systems so that they can conduct capacity, coverage, cost and communications quality studies of such systems.

7th Semester

Project Planning and Management

Presenting and analysing topics of project planning and auditing such as time planning methods, techniques of cost estimation and available resources use, and mechanisms of monitoring/auditing projects (Project Management Information Systems).

Legal and Professional Issues

Commercial and Economic Law. Commercial acts and contracts. Banking and Stock Market Transactions. Commercial books. Industrial Property. Competition Law. New patterns of collaboration between Enterprises. Mergers. Personal Companies: General Partnership, Registered Partnership, Silent Partners. Corporations: Stock Company (Establishment, Corporate Govern-

ance, Administration-Representation). Limited Partnership. Securities Law. Labour relations: introduction to private and collective labour law, the function of the individual labour contract, collective labour agreements, and trade unions.

Entrepreneurship and Technology Innovation

Studying the procedures of generation, development and application of innovative entrepreneurial strategies and processes with the use of emerging technologies in management and production with a view to gaining a competitive advantage within the internationalized business environment. Analysis of case studies.

Electronic Business

Basic principles, evolution and application areas of Electronic Commerce, Electronic Business. The formation of a new environment of managerial procedures. Technologies and business models in electronic commerce / business. Electronic Business Models. The extended enterprise – the virtual enterprise.

Distributed Systems

Introduction to Distributed Systems. E-commerce applications. Ports and sockets. Java network programming. Middleware. File, name, catalogue, timing, and duplication services. Transaction, synchronisation check, and security services. Message exchange/passing: protocols, synchronicity and asynchronicity. Distributed objects technology. Event-driven bus architectures. Remote procedure call. The constellation architecture. Distributed Databases: data distribution types and problems. XML utilisation. Developing object-oriented remote systems. The RMI architecture. CORBA services, interface definition languages. Internet security issues: attack types, encryption, digital signatures, authentication.

Broadband Communication Technologies and Services

This module offers a comprehensive introduction to Broadband Technologies, providing basic operation principles as well as technical details that will come in handy in understanding and

evaluating relevant systems. The first part of the module covers Backbone networks technologies and protocols such as SONET, ATM, ETHERNET, TCP/IP along with wired (DSL) or wireless Access Technologies (WIMAX, WIFI). The course also includes a review of active or passive optical fibre networks elements and satellite access technologies, the accent being on HellasSat, the Greek satellite. The second part of the module describes Applications of Broadband Technologies, citing particular examples from international (e.g. NT Docomo/Felica) or Greek (e.g. the metropolitan networks under construction in central Macedonia and their significance) experience. Pricing examples of telecommunications services are given, too. The course is completed with a brief review of emerging broadband technologies (MIMO, 4G) and applications (wide-scale RFID).

8th Semester

Business Policy and Strategy

Structured market analysis, competition factors, value chains and competitive advantages, basic competition strategies, long-term goals and general strategies, shaping and implementing strategic decisions, outer and inner environment analysis, risk and strategic option, strategy analysis and evaluation, strategic planning. Preparation of strategic and managerial plans. Case studies.

Legal Aspects of Technology and Innovation

Society and Economy of Knowledge, intellectual rights (copyright, e-patents), privacy and (personal) data protection, legal aspects of electronic commerce and governance, legal aspects of the Internet and telecommunications, accountability of hardware and software manufacturers, technological service contracts.

Technology Innovation Management

Analysis of the impact of technology on the structure, organization and production of an enterprise or organization. Analytical approach of technological change impact on the domains of marketing, human resources, product development and production, organizational structure,

finance management, technological infrastructure. Synthetic presentation of a managerial implementation plan for effecting changes. Case analyses.

Research and Development of Products and Services

The importance of new products and services, organization for new products and services, parallel mechanics, product planning, customer demands, products and services specifications, generation and benchmarking of new ideas, product architecture, designing and manufacturing technologies, product life cycle management, promotion and advertisement of new products and services. Case analyses.

Electronic Governance

Use of peak technologies and digital connection of governmental information infrastructures intended for modernizing Public Administration, conserving resources and upgrading quality services to citizens and enterprises. The technological and organizational background of Electronic Governance is discussed along with tendencies prevailing internationally, and especially within the context of the European Union.

Parallel Processing

This module presents and analyses parallel processing technologies as regards both hardware and software. It comprises a historical review of parallel processors and explores interconnection network topologies, like the mesh, the hypercube, the perfect shuffle, Omega, Butterfly, the common bus, etc. Also examined are inter-processor communication methods (direct, via an intermediate processor or via shared memory). Finally, the course analyses the MPI model for programming parallel systems.

At the tables below the teaching hours for each class (theory / laboratory) are presented, as well as the ECTS credits.

1st semester

Code	Module	C/O/E¹	Theory	Workshop	Total	Credits	Prerequisite modules
TM-MA01	Mathematics I	C	5		5	5	
TM-IT01	Information Technology and Applications	C	2	2	4	5	
TM-OM01	Management and Technology	C	3		3	5	
TM-BI01	Introduction to Economics	C	3		3	5	
TM-DT01	Digital Systems and Applications	C	2	1	3	5	
TM-TT01	Computer Networks	C	2	1	3	5	
TM-FL01	English I	C	1	2	3		
Total			18	6	24	30	

2nd semester

Code	Module	C/O/E	Theory	Workshop	Total	Credits	Prerequisite modules
TM-MA02	Mathematics II	C	5		5	5	
TM-IT02	Computer Programming	C	2	2	4	5	
TM-OM02	Products and Services Marketing	C	3		3	5	
TM-BI02	Accounting and Finance for Managerial Decisions	C	3		3	5	
TM-DT02	Microprocessors and microcomputers	C	2	1	3	5	
TM-TT02	Telecommunication Systems and Applications	C	2	1	3	5	
TM-FL02	English II	C	1	2	3		
Total			18	6	24	30	

1. C / O / E = Compulsory / Optional / Elective module

3rd semester

Code	Module	C/O/E	Theory	Workshop	Total	Credits	Prerequisite modules
TM-MA03	Statistics – Probability	C	5		5	5	
TM-IT03	Object-oriented Design and Programming	C	2	2	4	5	
TM-OM03	Human Resources Management	C	3		3	5	
TM-MP03	Financial Management	C	3		3	5	
TM-DT03	Digital Telecommunications	C	2	1	3	5	
TM-TT03	Operational Systems	C	2	1	3	5	
Total			17	4	21	30	

4th semester

Code	Module	C/O/E	Theory	Workshop	Total	Credits	Prerequisite modules
TM-MA04	Operational Research	C	5		5	5	
TM-IT04	Data Organisation and Management	C	2	2	4	5	
TM-OM04	Production and Operations Management	C	3		3	5	
TM-MP04	Management Information Systems	C	3		3	5	
TM-TT04-1	Internet Technologies	C	2	1	3	5	
TM-TT04-2	Web Technologies	C	2	1	3	5	
Total			17	4	21	30	

5th semester

Code	Module	C/O/E	Theory	Workshop	Total	Credits	Prerequisite modules
TM-OM05	Supply Chain Management	C	3		3	5	
TM-BI05	Managerial Economics and Business Decision-Making	C	3		3	5	
TM-MP05-1	Information Systems Analysis and Design	C	2	1	3	5	
TM-MP05-2	Design and Production Technologies	C	2	1	3	5	
TM-TT05	Telecommunication Systems Administration and Security	C	2	1	3	5	
TM-DT05	Embedded Systems	C	2	1	3	5	
Total			14	4	18	30	

6th semester

Code	Module	C/O/E	Theory	Workshop	Total	Credits	Prerequisite modules
TM-OM06	Total Quality Management	C	3		3	5	
TM-MP06	Enterprise Information Architecture	C	3		3	5	
TM-MP06	Systems Development Technologies	C	2	1	3	5	
TM-DT06	Digital Interfaces	C	2	1	3	5	
TM-TT06-1	Wireless Communications	C	2	1	3	5	
TM-TT06-2	Mobile Communications	C	2	1	3	5	
Total			14	4	18	30	

7th semester

Code	Module	C/O/E	Theory	Workshop	Total	Credits	Prerequisite modules
TM-OM07-1	Project Planning and Management	C	3		3	5	
TM-OM07-2	Legal and Professional Issues	C	3		3	5	
TM-BI07	Entrepreneurship and Technology Innovation	C	3		3	5	
TM-MP07	Electronic Business	C	2	1	3	5	
TM-DT07	Distributed Systems	C	2	1	3	5	
TM-TT07	Broadband Communication Technologies and Services	C	2	1	3	5	
Total			15	3	18	30	

8th semester

Code	Module	C/O/E	Theory	Workshop	Total	Credits	Prerequisite modules
TM-OM08-1	Business Policy and Strategy	C	3		3	5	
TM-OM08-2	Legal Aspect of Technology and Innovation	C	3		3	5	
TM-BI08-1	Technology Innovation Management	C	3		3	5	
TM-BI08-2	Research and Development of Products and Services	C	3		3	5	
TM-MP08	Electronic Governance	C	3		3	5	
TM-DT08	Parallel Processing	C	2	1	3	5	
Total			17	1	18	30	

Total of ECTS credits = 240

5 credits are equivalent to 136 work hours per semester course. There is a total sum of 816 hours per semester and 1632 hours per year. The 136 hours are detailed below, as regards 5-period², 4-period or 3-period courses, respectively.

12 weeks	X 5 hours of attendance	= 60 hours
12 weeks	X 3 hours of studying	= 36 hours
5 days	X 8 hours of examination preparation	= 40 hours
Total		= 136 hours

or

12 weeks	X 4 hours of attendance	= 48 hours
12 weeks	X 4 hours of studying	= 48 hours
5 days	X 8 hours of examination preparation	= 40 hours
Total		= 136 hours

or

12 weeks	X 3 hours of attendance	= 36 hours
12 weeks	X 5 hours of studying/homework	= 60 hours
5 days	X 8 hours of examination preparation	= 40 hours
Total		= 136 hours

2.6 General information on undergraduate studies

1. The academic year commences on the 1st of September and ends on the 31st of August annually. The educational work of every academic year is carried out in two semesters. Each

2. A teaching period lasts one hour.

semester consists of at least 13 full weeks allocated for instruction and up to 4 weeks allotted for examinations. The autumn semester starts in early October and the spring semester finishes in late June.

2. Autumn semester courses begin within the first week of October, their total duration being 14 weeks (or 13 full weeks per course), i.e. they run until 20-1-2006. The instruction timetable is announced in September.
3. Spring semester courses begin on the Monday following completion of the autumn semester examinations (January-February examination period), their total duration also being 14 weeks (or 13 full weeks per course). The instruction timetable is announced in January.
4. No courses are held during examination periods, from Christmas Eve until the day following Epiphany, and from Holy Monday until the Sunday after Easter Sunday. Neither courses nor examinations take place at weekends or on the following occasions.

The liberation of Naousa Day (17 October)

The national celebration of 28th October

The anniversary of the Polytechnic uprising (17 November)

The Three Hierarchs' Day (30 January)

Annunciation Day (25 March)

Clean Monday

Whit Monday

Furthermore, courses do not take place on the day student elections are held.

5. There are three examination periods:
 - a. the January-February one, for autumn semester courses.
 - b. the June one, for spring semester courses, and
 - c. the September re-sits one, for courses of both semesters.

The examinations timetable for each semester is announced in the middle of the semester in question. Should for any reason whatsoever an extension of the instruction period be decided, the examinations timetable is altered accordingly, and is posted relatively later. The September examination period timetable is announced in July.























