SCHOOL OF INFORMATION SCIENCES AND TECHNOLOGY
DEPARTMENT OF STATISTICS

UNDERGRADUATE STUDIES GUIDE
2018-2019

ATHENS, SEPTEMBER 2018
Athens University of Economics and Business Academic Authorities

The University’s Rectorate consist of the Rector and the Vice Rectors, as described below:

The Rector: Professor Emmanouil Giakoumakis
Vice Rector of Student and Administrative Affairs: Professor Dimitrios Bourantonis
Vice Rector of Research: Professor Dimitrios Gritzalis
Vice Rector of Financial Planning and Development: Associate Professor Georgios Ksilomenos

School of Information Sciences and Technology
Dean: Professor George Stamoulis

Department of Statistics
Head: Professor Vasileios Vasdekis
Vice Head: Professor Dimitris Karlis

Communication Information
Department of Statistics
Address: Athens University of Economics and Business, 76 Patision str, Athens, 10434
Website: https://www.dept.aueb.gr/el/stat
Telephone: +30-210-820111-113
Secretary e-mail: stat@aueb.gr

University: Athens University of Economics and Business (A.U.E.B)
Address: 76 Patision str, Athens, 10434
Website: https://www.aueb.gr
e-mail: webmaster@aueb.gr
Phone Center: +30-210-8203911
TABLE OF CONTENTS

A. INFORMATION ABOUT THE INSTITUTION
1. General Description of the University (page 5)
2. Academic Authorities and Services (page 5)
3. List of offered curricula leading to an academic title (page 7)
4. Studies Planning (page 8)
5. Admission/ Registration Procedures (page 8)
6. Basic Regulations of the University (including academic recognition procedures) (page 9)
7. University’s Staff (page 9)
8. Services (page 9)
9. ECTS Coordinator of the Foundation (page 9)
10. Academic Year/ Semester Important Dates (page 9)
11. Official Holidays (page 10)

B. DEPARTMENT OF STATISTICS
1. Establishment and Operation (page 11)
2. Department of Statistics Facilities (page 12)
3. Department of Statistics Personnel (page 15)
   i. Faculty (page 15)
   ii. Scientific Associates (page 17)
   iii. Special Teaching Laboratorial Staff (page 17)
   iv. Special Technical Laboratorial Staff (page 18)
   v. Administrative Staff (page 18)
4. Statistics Department Studies Program (page 18)
   i. Learning Outcomes (page 19)
   ii. Studies Regulation (page 19)
   iii. Courses Categories (page 19)
   iv. Educational Support (page 20)
   v. General Rules (page 21)
   vi. Transitional Provisions (page 22)
   vii. Procedure of conducting the Bachelor Thesis (page 25)
   viii. General Structure of the Studies Program (page 27)
   ix. Optional Courses offered by other departments (page 28)
5. Course Descriptions (page 32)

C. GENERAL INFORMATION FOR THE STUDENTS
1. Cost of Living (page 77)
2. Housing (page 77)
3. Feeding (page 77)
4. Medical Services, Insurance/ Healthcare (page 77)
5. Services for students with special needs (page 77)
6. Financial Support for Students (page 78)
7. Office of Student Affairs – Student Counselors (page 78)
8. Study Centers – Reading Rooms – Libraries (page 79)
9. International programs and practical information regarding international student mobility (page 80)
10. Language lessons (page 80)
11. Practical Training (page 80)
12. Sports Facilities (page 81)
13. Student Clubs (page 81)
14. Career Office (page 81)
15. Unit of Innovation and Entrepreneurship (page 82)
1. General Description of the University

The Athens University of Economics and Business (AUEB), as a Higher Educational Institution, is a legal entity governed by public law and supervised by the Ministry of Education, Research and Religious Affairs.

AUEB is, in order of seniority, the third Higher Education Institution of the country and the first in the field of Economics and Business Administration. The scientific fields of Informatics and Statistics were added later. Since its foundation in 1920 up to today, AUEB has a rich history of significant scientific achievements that characterize presence and set excellent prospects for the future.

Founded in 1920 as “Higher School of Commercial Sciences” the School focused on offering university level education in the fields of Economic Sciences and Business. In 1926 it is renamed to “Higher School of Economics and Commercial Sciences”, widely known in Greece and abroad by the acronym “ASOEE”. Until 1955 the School functioned as a three year studies with a single program. In 1955 the duration of study at the School is increased from three to four years; in the fourth year, studies were divided into two streams: Economics and Commercial Sciences. In 1970, the departments’ separation takes place in the second year of studies. In 1984 the School is divided in three departments, The Department of Economics, the Department of Business Administration and the Department of Statistics and Informatics. The first postgraduate program in Economics started in 1979 while a similar program began in the Department of Business Administration in 1985.

The Athens University of Economics and Business (AUEB) has been historically established in the collective consciousness of the academic community - Greek students and society - as a leading University in its core areas of expertise. At an international level, the University's unwavering strategic goal is to actively participate in the global academic environment, to develop high-profile international collaborations, and to generally enhance its international impact and recognition through excellence in research and education.

Its reputation reflects, on the one hand, the high level of the scientific staff, the quality of its research and teaching work and the contemporary curricula and, on the other, the high scientific training of its graduates, which enables them to be professionally employed successfully, both in Greece and abroad.

2. Academic Authorities and Services

The organization and operation of the Foundation is governed by the applicable law N.4485/2017 (FEK 114/4-8-2017). The Athens University of Economics and Business is under the supervision of the Ministry of Education, Research and Religious Affairs.

SENATE
The Senate is the supreme governing body of the University and it consists of:
The Rector,
The Vice Rectors (until the elections for Rector take place, they do not participate or hold a voting right in the Senate),
The Deans,
The Heads of Departments,
A representative of the undergraduate students, one of the postgraduate students and one of the doctoral candidates,
One representative per staff category, EEP, EDIP, ETEP and Administrative staff

THE SCHOOLS
The Athens University of Economics and Business consists of three Schools:

1. **SCHOOL OF ECONOMICS:** Oversees and coordinates the operation of the Department of International and European Economic Studies and the Department of Economics.

2. **SCHOOL OF BUSINESS:** Oversees and coordinates the operation of the Department of Management Science and Technology, the Department of Business Administration, the Department of Accounting and Finance and the Department of Marketing and Communication.

3. **SCHOOL OF INFORMATICS:** Oversees and coordinates the operation of the Department of Informatics and the Department of Statistics.

According to Law 4485/2017 (FEK 114/4-8-2017), the Institutions of the School are: a) the General Assembly, b) the Deanship, and c) the Dean

THE DEPARTMENTS
The Department is the Foundation's main educational and academic unit. It promotes science, technology or arts in the relevant scientific field, organizes teaching within the curriculum and ensures the continuous learning improvement. The Department consists of members of Academic Staff, members of the Special Educational Staff (EEP), members of the Laboratory Teaching Staff (EDIP) and members of the Special Technical Laboratory Staff (ETEP).

The Departments of the University are:

1. International and European Economic Studies
2. Economics
3. Management Science and Technology
4. Business Administration
5. Accounting and Finance
6. Marketing and Communication
7. Informatics
8. Statistics

According to Law 4485/2017 (FEK 114/4-8-2017), the Institutions of the Department are: a) the General Assembly, b) the Board of Directors and c) the Head of the Department
### 3. List of offered curricula leading to an academic title

The following programs, leading to an academic title, are offered at the Athens University of Economics and Business:

<table>
<thead>
<tr>
<th>A/A</th>
<th>DEPARTMENT’S STUDY PROGRAM</th>
<th>CYCLES(*)</th>
</tr>
</thead>
</table>
| 1.  | Department of International and European Economic Studies | 1. International Economics and Finance  
2. International and European Political Economy |
2. Business Economics and Finance  
3. International and European Economics |
| 3.  | Department of Management Science and Technology | 1. Operations Research and Business Analytics  
2. Operations and Supply Chain Management  
3. Software and Data Analysis Technologies  
4. Information Systems and Electronic Business  
5. Strategy, Entrepreneurship and Human Resources |
| 4.  | Department of Business Administration | 1. Management  
2. Information Systems Management  
3. Accounting and Financial Management  
4. Marketing |
| 5.  | Department of Accounting and Finance | 1. Accounting  
2. Finance |
| 6.  | Department of Marketing and Communication | 1. International Management, Innovation and Entrepreneurship  
2. Human Resource Management  
3. Business Analytics  
4. Digital Marketing |
| 7.  | Department of Informatics (*) | 1. Theoretical Computer Science  
2. Computer Systems and Networks  
3. Information Systems and Information Security  
4. Databases and Knowledge |
Management
5. Operational Research and Economics of Information Technology
6. Computational Mathematics and Scientific Calculations

8. Department of Statistics

The Department of Statistics does not offer studies directions and the Informatics Department offers, instead of directions, the above mentioned study cycles, of which the students must choose two.

More detailed information is provided at the corresponding course guides and the departments’ websites.

4. Studies Planning

Undergraduate studies at the Departments of the Athens University of Economics and Business are conducted on the basis of the system of six-month courses and according to the Undergraduate Studies Program prepared by the Assembly of each Department. The academic year starts on September 1st and ends on August 31st of the following year. The educational work of each academic year is structured in two semesters, the winter and the spring semester. The duration of undergraduate studies is four years (eight semesters).

The courses of each semester last 13 weeks and are interrupted during the Christmas and Easter periods. At the end of each semester, the exam period lasts four weeks.

After completion of the June exam period and until the end of the academic year, there are no courses.

In the last week of August begins the exam period of September (repetitive examination period), which lasts four weeks and ends before the start of the winter semester.

The exact starting and ending dates for the semesters and exams periods are proposed by the Department of Education of the Directorate for Education, approved by the Senate and announced in the academic journal of the University.

5. Admission/ Registration Procedures

Admission to the department takes place through the Pan-Hellenic exams. Registration of the students that succeeded at the Pan-Hellenic Exams, at the Universities, and thus at AUEB, takes place every September through the system of compulsory electronic registration, according to the instructions of the Ministry of Education, Research and Religious Affairs.
6. Basic Regulations of the University (including academic recognition procedures)

The basic regulations of the University include, among others:
- The University’s Internal Rules of Operation
- Administrative Services Regulation
- The Rule of Operation for the Postgraduate and Doctoral Programs
- The Internal Rule for conducting postdoctoral Research
- The Exams Guide

7. University’s Staff

University’s staff consists of the following categories:

- **TEACHING STAFF:**
  - Academic Faculty: Teaching and Research faculty, which consist of: (a) Professors, (b) Associate Professors, (c) Assistant Professors and (d) Lecturers.
  - Special Teaching Staff (Ε.Ε.Π.).
  - Special Teaching Laboratorial Staff (Ε.ΔΙ.Π.).
  - Special Technical Laboratorial Staff (Ε.Τ.Ε.Π.).
  - Assistant Teaching Personnel (ΕΔΠ).
  - Academic Scholars
  - Adjunct instructors

- **ADMINISTRATIVE STAFF**

8. Services

The Athens University of Economics and Business provides both administrative and other services (catering, housing, library, sports, etc.) to cater its students as well as the administrative and teaching staff. More information on the organization and operation of the University’s services can be found at the website (http://www.aueb.gr).

9. ECTS Coordinator of the Foundation

The University’s ECTS Coordinator is the Chairman of the Quality Assurance Unit, who ensures compliance with the principles and rules of the European accumulation and transfer credit system supervises the compliance and implementation and is responsible for the full acknowledgment and transfer of credit units.

10. Academic Year/ Semester Important Dates*
- Fall Semester: October 1\textsuperscript{st} 2018 until February 8 2019
- Christmas Vacations: December 22 2018 until January 6\textsuperscript{th} 2019
- Fall Semester Exams Period: January 14\textsuperscript{th} 2019 until February 8\textsuperscript{th} 2019
- Spring Semester: February 11\textsuperscript{th} 2019 until June 21\textsuperscript{st} 2019
- Easter Holidays: April 20\textsuperscript{th} 2019 until May 5\textsuperscript{th} 2019
- Spring Semester Exams Period: May 27\textsuperscript{th} 2019 until June 21\textsuperscript{st} 2019

*According to the academic calendar 2018-19*

### 11. Official Holidays

- January 30 (The Three Patron Saints of Education Day)
- March 11 (Clean Monday)
- March 25 (Greek Independence Day)
- May 1\textsuperscript{st} (Labor Day)
- June 17\textsuperscript{th} (Pentecost Monday)
PART TWO
DEPARTMENT OF STATISTICS

A. GENERAL DESCRIPTION

1. Establishment and Operation

Under the 377/1989 PD, according to which ASOEE is renamed to Athens University of Economics and Business (AUEB), the Statistics Department is founded in June of 1989 and has been functioning since the academic year 1989-90. It was preceded by the establishment of the joint Department of Statistics and Informatics (PD 313/1984), while Statistics initially already appeared in the first ever AUEB Yearbook (1927-1928) as a curriculum course.

With the 78/2013 PD “Establishment – Foundation of Schools in the Athens University of Economics and Business”, the School of Information Sciences and Technology was founded, in which the Departments of Statistics and Informatics are included. Following a very contemporary trend of convergence that appears in some of the bigger US and European universities, the School brings these two departments together in order to promote their interaction and synergy, and to offer the greatest possible benefits to students and the most dynamic possible research environment. School activities aim at three scopes: education, research and contribution to society. In education, the objective is to create Statistics and Informatics executives with a complete professional sufficiency and training, such that enables them to closely follow the rapid technology advances. The undergraduate programs combine acquiring a full cognitive background with personalized expertise. Postgraduate programs offer specialization in specific areas of high demand. Renewing the programs every two or three years ensures that the offered scientific knowledge is always up to date, while the selection of the general thematic areas with the criteria of timelessness and the methodological depth gives the offered degrees the necessary durability. Our graduates are rapidly absorbed in the labor market, both in Greece and abroad, and are often distinguished as high ranking executives in companies, banks and organizations, while many of them have created their own businesses. Dynamism in education is linked to the cutting-edge research in the School, with extensive international collaborations, competitive funding, and a high degree of international recognition, awards, distinctions and patents. By constantly seeking to participate in international developments and the academic staff’s, students and graduates distinctions, the School of Information Sciences and Technology aims at a multidimensional excellence that contributes substantially to the general progress.

The Statistics Department of the Athens University of Economics and Business, is historically the first, and still remains the only, exclusively Statistics department in any Greek University. The degree offered by the Department is awarded from the School of Information Sciences.
and Technology and bears the name of the Department.

**Academic Title offered:**
Degree in Statistics

**Admission Requirements**
Students are admitted by the Department through the Pan-Hellenic Exam system and the rules defined regarding special student categories.

**Educational and Professional aims**
The aim of the Department is to promote and transmit knowledge in the field of statistical science and its related subjects, theoretical and applied, through research and education, by preparing graduate scientists with the ability to implement appropriate methods of statistical analysis in various fields of activity (e.g. economic, social, business, administrative, research, educational, etc.).

**Access to further studies**
Department graduates have access to postgraduate studies in a wide range of programs, both in Greece and abroad, with a comparative advantage their solid mathematical and statistical background of quantitative and computational methods of analysis, which, combined with the ability to choose courses from other departments, gives them access to a wide range of subjects and their orientation in their postgraduate studies.

## 2. Department of Statistics Facilities

### Department of Statistics Labs

In order to support the operation of the undergraduate and postgraduate programs of the Department of Statistics as well as promotion of research, there are three (3) research labs equipped with computers with a total capacity of 57 computers and one (1) educational lab at the Department of Statistics of a total capacity of 51 computers.

More analytically, the Statistics department laboratories are the following:

**Research Laboratories:**

i. **Laboratory of Statistical Methodology**, which is located at the 2nd floor of the Evelpidon 47A and Lefkados 33 building, and is available to the postgraduate students of the Department. The lab has one central computer and a local network of 27 pc's with a windows OS and internet connection, 1 pc for the instructor, 4 additional workstations and one server (a total of 32 pc's), 1 interactive table, 4 projectors and 4 laptops.

ii. **Stochastic Modeling and Applications Laboratory**, which is located at the 2nd floor of the Troias 2 and Kimolou str. building, room 208 (co-housed with the Computational and Bayesian Statistical Laboratory).

iii. **Computational and Bayesian Statistical Laboratory**, which is located at the 2nd floor of the Troias 2 and Kimolou str. building, room 208 (co-housed with the Stochastic Modeling and Applications Laboratory). They are equipped with 24 computers, 1
computer for the professor and one server (a total of 25 pc's).

Educational Laboratory:

i. Educational Laboratory of Applied Statistics, Probability and Data Analysis, which includes two separate spaces. The main space is located at the 3rd floor of the Antoniadou wing of the main AUEB building (room A35). Undergraduate students, PhD candidates and temporary teaching staff can work here. The laboratories equipment include 4 servers SUN workstations, 2 UPS, 1 DELL server with a local network consisting of 40 PC’s, 1 PC for the professor, 2 printers, 1 scanner, 1 overhead projector and projector connected to the PC. In a separate area of the lab, there are 10 workstations for the PhD candidates (a total of 51 POC’s).

The second space is located on the 4th floor of the Antoniadou wing (room A45) and is in common use with the Educational Lab of the Informatics Department.

Computer Centre

AUEB’s Computer Center (CE) is responsible for providing computer infrastructure to the University for educational and research applications.

The central IT systems of the CE are based on a stack of servers with sufficient and continuously increasing capacity. These servers, among other things, perform user authentication for controlled access to CE resources, are used as file servers for users to, they contribute to automated software reinstallation on the computers of the CE laboratories and finally, they control and prevent the invasion of malicious programs (viruses) on the above computers. All servers are connected to a high-speed network and are accessible from anywhere in the University.

There are three teaching and practice rooms available to all students and all departments. These computers operate in a Windows environment with centralized management of users’ accounts and resources. These computers have access to all applications installed in the central systems of the CE.

All members of the academic community, ie undergraduate and postgraduate students, the faculty and the university staff, can obtain access to CE’s resources. Those interested are registered to the e-services of the CE and the University via the URegister service.

Students can request a reminder of their password electronically, without being physically present in the CE. In addition to the direct access to the CE through the teaching and practice rooms which operate throughout the day, users can utilize central systems and email for 24 hours a day.

Network Operating Centre

AUEB’s Network Operating Centre (NOC) is responsible for is responsible for the network infrastructure of the entire institution, both in voice (ie telephony) and in data. NOC monitors, maintains and coordinates all University networks. It also hosts the servers of most of the University's services (websites, e-class, secretariats, etc.), except for the Computer Center, and network protection systems against attacks on the Internet.

A backbone fiber optic network of Gigabit Ethernet technology operates in all University buildings. The main buildings of the University are connected to the backbone through the University's fiber optic ring while some auxiliary buildings are connected either by wireless laser or microwave link. In all buildings of the University there is a horizontal (in-floor) and vertical (between floors) structured voice and data wiring that connects offices and
workshops with the backbone network at 100 or 1000 Mbps. The University provides wireless broadband access to the network from the classrooms and public areas of all buildings.

The University is connected to the Internet through the Greek Research and Technology Network (GNSS) with a Gigabit Ethernet optical fiber. Therefore, through access networks and the backbone network, all users have access to the Internet at extremely high speeds. Finally, through the Eduroam international system, all University users can connect to the wireless networks of hundreds of educational and research institutions around the world, and vice versa, users of these universities can connect to AUEB’s wireless network.

E-class

In AUEB operates a complete Course Management System that supports Asynchronous eLearning Services via a simple web browser (https://eclass.aueb.gr). Through e-Class, lecturers distribute to students material related to their lessons, such as notes, presentations, exercises and announcements, while students can submit their work in electronic form. The e-Class is used in almost all courses of the Statistics Department to facilitate communication between students and teachers.
B. Department of Statistics Personnel

1. Faculty (D.E.P.)

Professors

**Vasdekis Vasileios**, holds a degree in Mathematics from the University of Athens (1988), MSc in Applied Statistics from Oxford University (1989) and a Ph.D in Statistics from Oxford University (1993). His research interests are focused on a) repeated and longitudinal measurements, b) models of latent variables, c) statistical inference with the use of composite likelihoods. URL: [http://stat-athens.aueb.gr/~vasdekis/](http://stat-athens.aueb.gr/~vasdekis/)

**Yannakopoulos Athanassios** (University of Athens 1989, Ph.D. Warwick, 1993). His research interests focus on Stochastic Analysis and Applications, Stochastic Differential Equations and Mathematical Modelling with the use of Random and Deterministic Dynamical Systems with applications in Insurance, Finance and Modern Technologies. URL: [http://www2.stat-athens.aueb.gr/~yanath/](http://www2.stat-athens.aueb.gr/~yanath/)

**Dellaportas Petros**, holds a PhD from the University of Plymouth, MSc from the university of Sheffield, and a degree in Mathematics from the University of Athens. His research interests are focused on MCMC theory, Bayesian Model Determination, Inference and Simulation methods for Stochastic Differential Equations, Time Series Forecasting, Financial Statistics, Sparsity. URL: [http://stat-athens.aueb.gr/~ptd/](http://stat-athens.aueb.gr/~ptd/)

**Zazanis Mihail**, He obtained the Engineering Diploma from the National Technical University of Athens (1982), the M.Sc. in Applied Mathematics from the Division of Applied Sciences, Harvard University (1983), and the Ph.D. in Applied Mathematics from Harvard University (1986). His research interests focus on Applied Probability Theory. URL: [http://stat-athens.aueb.gr/~mzazanis/](http://stat-athens.aueb.gr/~mzazanis/)

**Karlis Dimitrios** BSc. in Statistics from Department of Statistics, AUEB in 1992 and a PhD in Statistics from the same department in 1999. His research interest refer to mixture models, computational statistics and especially stochastic algorithms, multivariate count data analysis, models for statistical analysis for sports data and modeling dependent data via copulas. URL: [http://www.stat-athens.aueb.gr/~karlis](http://www.stat-athens.aueb.gr/~karlis)


**Kostaki Anastasia** obtained a basic degree in Mathematics, Statistics and Computer Science from the University of Lund, Sweden. She then received MSc, PhL and PhD in Statistics from the same University. Her research interests focus on the development of statistical techniques for population analysis and modeling of mortality and birth rates as well as on the methodology of analysis of demographic, social and biomedical data URL: [http://stat-athens.aueb.gr/~akostaki/](http://stat-athens.aueb.gr/~akostaki/)

**Ntzoufras Ioannis**, Graduate of the Department of Statistics and Insurance Science (1994). He received his M.Sc. in Statistics with Application in Medicine (with distinction) from the University of Southampton (1995) and his Ph.D. from the Department of Statistics at Athens University of Economics and Business (1999). His research interests focus on topics of Bayesian and computational statistics, categorical data analysis, statistical modeling, model and variable selection methodology. He is also highly motivated by applications of...
sophisticated models in problems related with Medical research, Psychometrics, and sport analytics. URL: http://stat-athens.aueb.gr/~jbn/

**Frangos Nikolaos**, holds a degree in Mathematics from the University of Athens, M.Sc. in Mathematics and PhD in Probabilities, Stochastic Processes from Ohio State University. Research Interests: Statistics, Probability, Stochastic Analysis and Modeling, Actuarial Science, Pension Funds Evaluation. URL: http://www.stat-athens.aueb.gr/~frangos/

**Psarakis Stylianos**, holds a degree in Mathematics from the University of Crete (1986) and a PhD from the Department of Statistics at AUEB (1993). His research interests focus on: a) Statistical Quality Control, b) Distribution Theory and c) Multivariate Statistical Analysis. URL: http://www.stat-athens.aueb.gr/~psarakis/

Associate Professors

**Vrontos Ioannis**, He has studied at the Athens University of Economics and Business, from where he obtained his B.Sc. in Statistics (1995), his M.Sc. in Statistics (1997) and his Ph.D. is Statistics (2001). His research interests include Bayesian Methodology, Time Series Modeling, Issues of applied finance, Optimal Asset Portfolio Allocation and alternative forms of investing high risk assets. URL: http://stat-athens.aueb.gr/~vrontos/

**Kandilorou Eleni**, studied Economics in AUEB (1975) and obtained a MSc in Economics and a PhD in Applied Econometrics (1990) from Leeds University (1989). Her research interests focus on econometrics, sampling techniques, demography and statistical packages.


**Merkouris Panagiotis**, holds a BSc degree in Mathematics from the National and Kapodistrian University of Athens, an MSc degree in Statistics from McGill University, and a PhD degree in Statistics from the University of Waterloo. His research interests include sampling surveys statistics, official statistics, estimating functions and stochastic processes inference.URL: https://www.aueb.gr/sites/default/files/cv/gr/1132.pdf


**Pavlopoulos Haralambos**, Recieved his B.Sc. degree in Mathematics from the University of Patras, Greece (1985), and subsequently his M.A. (1988) and Ph.D. (1991) degrees in Statistics from the University of Maryland, College Park, Maryland, USA. His research interests focus on stochastic modeling of rainfall processes, scaling statistical properties of spatio-temporal rainfall fields, time series models, spatial and environmental statistics. URL: http://www.stat-athens.aueb.gr/~hgp/

**Tsiamyrtzis Panagiotis**, holds a degree in Mathematics from the Aristotle University of Thessaloniki (1994), an M.Sc (1997) and a Ph.D. (2000) in Statistics from the Statistics department of the University of Minnesota, USA. His research interests focus on a) Bayesian statistical process and quality control and b) statistical problems in computational
physiology. URL: https://www.aueb.gr/sites/default/files/cv/gr/1275.pdf

Assistant Professors

Demiris Nikolaos, studied Mathematics in the University of Patras and received his MsC in AUEB and his PhD in Nottingham. His research interests mainly concern Bayesian Statistics and its applications in Biostatistics, health economics and epidemic patterns. URL: http://www.aueb.gr/users/nikos/

Zymbidis Alexandros, received a first class honors degree in Mathematics from the University of Athens, Master of Science (MSc) with distinction and Doctor of Philosophy (PhD) in Actuarial Science from the City University of London. His basic research interests include a) stochastic modeling of insurance and pension systems and b) applications of the fractional brownian motion and H∞ optimal control. URL: http://www.stat-athens.aueb.gr/~zimb/

Ioannidis Evanggelos, obtained in 1987 his degree in Mathematics from the University of Heidelberg, Germany, with a diplom-thesis in non-parametric Statistics. In 1993 he obtained his Ph.D. in Mathematics from the same University. His thesis concerned spectral analysis of time series. His current research interests concern co-integration methods, application of bootstrap to Unit-root-testing and Multivariate Spectral Analysis and their application to the analysis of economic data, as well as Official Statistics, and, in particular, survey sampling.URL: http://stat-athens.aueb.gr/~eioannid/

Papageorgiou Ioulia, has a B.Sc. in Mathematics (2.1) from University of Ioannina, Department of Mathematics with major in Statistics and Ph.D. in Statistics, University of Ioannina, and Department of Mathematics. Her research interests are in the field of Sampling Theory, Model Based Clustering, Mixture Models, Applications to Archaeometry. URL: http://stat-athens.aueb.gr/~ioulia/

Penteli Xanthi - Xantipi, Graduate of the Department of Statistics at Athens University of Economics and Business (2003). She received her M.Sc. in Biostatistics from the University of Athens (2006) and her Ph.D. from the Department of Statistics at Athens University of Economics and Business (2011). Her research interests are focused on statistical modeling and inference for time series, discrete data and biostatistics. URL: https://scholar.google.com/citations?user=xGuRkNQAAAAJ&hl=en

B2. Scientific Associates

Aifanti Maria received her B.Sc. in Economic Sciences from National and Kapodistrian University of Athens (1977). She has participated as co-author in various academic books related to Statistics. Her academic research interests mainly focus on Economic topics.

B3. Special Teaching Laboratorial Staff

Tsombanaki Evgenia, holds a BSc in Mathematics with major field in Statistics and Operational Research, Department of Mathematics, University of Patras, an M.Sc. in Statistics, Department of Statistics, Athens University of Economics and Business and also a PhD in Statistics, Department of Statistics, Athens University of Economics and Business. Her main research interests are in the areas of Multivariate Analysis, Latent Variable Models, Categorical Data, Missing and Influential Data, Applications to health and social sciences.

Mamaloukas Christos, holds a degree in Applied Mathematics (1984) from the Aristotle University of Thessaloniki and a PhD (2000) from the Polytechnic School of the Aristotle
University of Thessaloniki. His research interests focus on a) Applied Mathematics, b) Computational Mathematics, c) Differential Equations and d) PC Programming and Mathematical Software.

URL1: http://www.cs.aueb.gr/el/content/mamaloykas-xristos
URL2: http://scholar.google.co.in/citations?user=fZuGhmQAAAAJ&hl=en&cstart=0&pagesize=20

B4. Special Technical Laboratorial Staff (E.T.E.P.)

B5. Administrative Staff

Laboratorial Infrastructure Support Staff (Antoniadou Building, 3rd floor)
- Moraitis Nikolaos

Secretariat Personnel (Derigni Building, Ground Floor)
- Anastasiou Sofia, Graduate of the School of Physical Education and Sport Science (2000), Democritus University of Thrace.
- Spyropoulou Aliki, graduate of ATEI of Halkida in Business Management (2000), postgraduate degree from th Greek Open University in Business Management (2010).

Postgraduate Studies Support Staff (Evelpidon Building, 47A Evelpidon & 33 Lefkados str., 7th floor)
- Smyrnaki Argyro, holds a degree in Statistics, Department of Statistics, Athens University of Economics and Business (1996), MSc in Human Resources Management (2016).
C. Statistics Department Studies Program

C1. Learning Outcomes

Upon successful completion of their studies at the Department of Statistics, the graduates will be able:

- To demonstrate understanding of the basics of probability theory and the mathematical foundations of statistics, statistical reasoning and inferential methods.
- To understand the notion of uncertainty and how statistics, probability and modern data science can improve decisions when faced with uncertainty,
- To design, collect and analyze real data and draw appropriate conclusions knowing the limitations of the analysis
- To interpret and communicate the results of a statistical analysis.
- To develop data-analyzing skills using statistical computing tools and software
- To demonstrate knowledge of ways to avoid misuse of statistical methods and wrong interpretation of the results.
- To understand how research questions are translated into a form that can be addressed with statistical methods
- To read publications that use statistical methods and to evaluate the validity of the statistical arguments.

C2. Studies Regulation

Basic principles and rules of the program are as follows:

1. The program is in accordance with the philosophy of the curricula of European Universities with which the Department cooperates, since it is based on the European Credit Transfer System (ECTS). The basis of this system is the Credit Unit (ECTS). Each course corresponds to a number of ECTS’s referred in the program.
2. To determine each course’s ECTS, the total demands of the course are taken into consideration (lectures, assignments, required preparation, etc)
3. To obtain the degree of the Department, the student must acquire a total of 240 ECTS’s. All of the program’s courses account for 8 ECTS and the lectures are 4 hours per week (the course ‘Introduction to Computerized Accounting and Finance’ is excluded, as it accounts for 6 ECTS and is offered from the department of Accounting and Finance).
4. The program offers 14 compulsory courses.

C3. Courses Categories

1. The program’s courses are divided into 2 basic categories:
   a) **14 compulsory courses** which must be attended by all of the Department’s students
   b) **Optional courses** which are of two categories:
      - Courses offered by the Statistics Department
      - Courses offered by other Departments

2. Compulsory courses are offered during the first 6 semesters (8 in the first year, 4 in the second year and 2 in the third year), so the student establishes the necessary background in order to make his following choices.
3. In the last two semesters, no compulsory courses are offered. This way the student has the flexibility to form a studies program, which will cover the basic Statistics knowledge (as provided by the compulsory Statistics courses), while at the same time is given the chance to develop a program that meets his individual interests.

4. During the first two semesters the student may enroll in lessons with a maximum of 32 ECTS.

5. In the remaining semesters (3rd to 8th) the student may enroll in lessons with a maximum of 40 ECTS per semester. For the last two semesters there can be an excess only for the “Practical Training”.

6. After the 4th year the student may enrol in lessons with a maximum of 48 ECTS per semester.

7. When the student chooses courses to attend each semester, the obligatory courses of previous semesters which the student has not passed and are offered in the specific semester must precede all other courses.

8. There is the concept of prerequisite courses. Especially, “Estimation – Hypothesis Testing” of the 3rd semester is a prerequisite for “Linear Models” of the 4th Semester. “Linear Models” is a prerequisite for “Generalized Linear Models” of the 5th Semester as well as “Data Analysis” in the 6th Semester.

9. Apart of the 14 compulsory courses that amount to 112 ECTS, the student must collect at least 72 ECTS from optional courses offered by the Statistics Department. The remaining 56 ECTS necessary for the degree can come either from optional courses offered by the Statistics Department, or by courses offered by other Departments in the University.

10. The table of the offered courses is announced each year and is depended on the availability of the corresponding teaching personnel. Some optional courses may not be offered if there is no available professor.

11. By getting the degree, the student can obtain a computer certificate equivalent to ECDL in the public sector, if during his studies he successfully attended four of the following courses:

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRODUCTION TO PROGRAMMING WITH R</td>
<td>STAT</td>
</tr>
<tr>
<td>INTRODUCTION TO PROBABILITY AND STATISTICS WITH R</td>
<td>STAT</td>
</tr>
<tr>
<td>DATA ANALYSIS</td>
<td>STAT</td>
</tr>
<tr>
<td>SIMULATION</td>
<td>STAT</td>
</tr>
<tr>
<td>DATABASES</td>
<td>DET</td>
</tr>
<tr>
<td>COMMUNICATION NETWORKS</td>
<td>INF</td>
</tr>
<tr>
<td>COMPUTER NETWORKS</td>
<td>INF</td>
</tr>
<tr>
<td>DATABASE DESIGN</td>
<td>INF</td>
</tr>
</tbody>
</table>

12. Lastly, the students are given the chance to attend one semester in a similar department in a University abroad through the ERASMUS+ program. The courses that are successfully completed by the student are matched to courses of the Department and are included in the student’s analytical total grade.

C4. Educational Support

1. In the courses offered by the Department of Statistics (other than the theoretical) and mostly in the compulsory ones, part of the teaching time is dedicated to the students practicing on appropriate statistical packages. There is a lab functioning in the
department which is used by the undergraduate students to prepare their assignments, and for researching and collecting information and bibliography related to the assignments. For this reason, there are many statistical packages installed, and many other applications, such as word processor software, graphics packages, databases etc. In the lab, there are also available copies of the Practical Training assignments undertaken by the students, as well as copies of the Department’s pre-publications. The lab also occasionally hosts seminars relative to the Department’s subjects, as well as courses of the undergraduate program, following communication with the person responsible for the lab.

2. Educational support (Tutorials) is offered, when necessary. The time and place of the tutorials are announced on the Department’s announcement board and on the University’s website (www.aueb.gr). During the tutorials the students can ask for assistance in exercise solving, can have their questions answered or helped to understand specific concepts.

C5. General Rules

1. There are no “directions” in the studies program in the strict sense of the term. Actually though each student can form his own “direction” and specialization according to his particular interests.
2. Each student may also extend his knowledge to other subjects offered by the University (economics, management, marketing, informatics etc.) by choosing the relative optional courses. The selection is done in collaboration with the Study Advisor. This manner of planning one’s studies grants the student with a freedom of choice.
3. In regard to the optional courses, semesters are indicative. Of course, students of later semesters can enroll to these courses.
4. The Statistics Department optional courses are offered according to the program’s needs, the faculty’s availability and the student’s interest.
5. The minimum number of students enrolled in a course in order for it to be offered is 8. In exceptional cases, a course with fewer enrolled students may be available after a decision by the Department’s Assembly.
6. In addition to the courses included in the studies program, the students of the Department may choose other courses of interest that are offered by other departments of the University, based on the respective list. The number of ECTSs corresponding to these courses is determined by the Curriculum Committee and approved by the Department’s Assembly.
7. Within the framework of the ECTS transfer system, students of the Department may also enroll in courses offered by Departments of other Universities in Greece and abroad (in addition to those with which the Department cooperates as part of the Erasmus program). For the attendance and performance of these courses to be recognized, there must be an agreement with the course’s instructor, the Study Advisor and the Department’s President. The number of ECTSs corresponding to these courses is determined by the Curriculum Committee and approved by the Department’s Assembly.
8. The degree’s grade is the weighted average of the individual courses with ECTS’s of the courses used as weighting factors.
9. All of the Department announcements are posted to the Departments website.
10. For each course the respective instructor is obliged to have an updated page on the University’s e-class.
11. Exams grades are (optionally) posted in the department’s website and/ or in the e-class. Official announcement of the grades is on e-Grammateia.
12. In the Studies Program are included the titles of the compulsory and optional courses, their syllabus, the weekly teaching hours which include any form of teaching work done, and the sequence or interdependence of the courses.

13. The above provisions are part of the Internal Regulation of the Department of Statistics. These provisions are communicated to the students through the Undergraduate Course Guide which is made available at the beginning of each academic year. In this guide there are recorded the Study Program’s courses, the semesters on which they are offered, their characterization and the respective ECTS’s. This information is of advisory nature.

14. The Bachelor Thesis is established. It can take place only on the 4th year (or later). In order for a student to take it, he must have successfully completed all compulsory courses and hold an average of at least 7 in these courses. The thesis has a duration of one semester. A supervisor is assigned, and to other faculty members as examiners. The thesis is presented on a predefined date and time defined for all thesis during or just before the exams period. For more details, see the corresponding section of this Study Guide.

15. The current Studies Program applies to those students enrolled in the academic year 2015-2016 and after.

16. Lastly, revision of the Studies Program takes place each April, according to the current legislation.


1. Students enrolled before 2015 continue with the current program for 4 more years (until the 2018-19 academic year). If they haven’t concluded their studies until then, they must continue with the new studies program.

2. Regarding students of older semester that have not successfully attended the compulsory course "Analysis of Variance and Experimental Design", which is not offered anymore, they must successfully attend the compulsory course "Generalized Linear Models".

3. In regard to the compulsory courses, the correspondences are as follows:
   - "Linear Algebra" is matched with "Linear Algebra I"
   - "Introduction to Statistics" is matched to "Introduction to Probability and Statistics with R".

4. In the following table there are listed the correspondences of the non-abbreviated courses of the old program to the respective courses of the new program (per semester). Noted with an asterisk (*) are the courses that remain as they are in both programs.

5. Regarding the number of courses that can be declared by the students: for students already in the department, the same continues to apply for 4 more years (2015-16, 2016-17, 2017-18, 2018-19). After that, they switch to the new program and its limitations.

6. The students that have successfully attended courses of the old curriculum retain the corresponding ECTS’s from the time they passed.

7. If a student has passed a course of the old studies program, he cannot attend again the course that corresponds to it in the new program.
<table>
<thead>
<tr>
<th>1st Semester</th>
<th>TITLE</th>
<th>Corresponding Course in the new Program</th>
<th>2nd Semester</th>
<th>TITLE</th>
<th>Corresponding Course in the new Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>6001</td>
<td>Introduction to Probability</td>
<td>Probability I</td>
<td>6142</td>
<td>Distribution Theory</td>
<td>Probability II</td>
</tr>
<tr>
<td>6031</td>
<td>Introduction to Statistics</td>
<td>Introduction to Statistics using R</td>
<td>6012</td>
<td>Estimation – Hypothesis Testing</td>
<td>*</td>
</tr>
<tr>
<td>6041</td>
<td>Calculus I</td>
<td>*</td>
<td>6042</td>
<td>Calculus II</td>
<td>*</td>
</tr>
<tr>
<td>6051</td>
<td>Linear Algebra and Applications</td>
<td>Linear Algebra I</td>
<td>6122</td>
<td>Introduction to Programming with R</td>
<td>*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3rd Semester</th>
<th>TITLE</th>
<th>Corresponding Course in the new Program</th>
<th>4th Semester</th>
<th>TITLE</th>
<th>Corresponding Course in the new Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>6033</td>
<td>Sampling Techniques and Sampling Surveys</td>
<td>Sampling</td>
<td>6014</td>
<td>Analysis of Variance and Experimental Design</td>
<td>cancelled</td>
</tr>
<tr>
<td>6023</td>
<td>Introduction to Linear Regression</td>
<td>Linear Models</td>
<td>6144</td>
<td>Theoretical Statistics</td>
<td>*</td>
</tr>
<tr>
<td>6143</td>
<td>Calculus III – Introduction to Optimization</td>
<td>Mathematical Methods</td>
<td>6134</td>
<td>Demographic Statistics</td>
<td>*</td>
</tr>
<tr>
<td>6113</td>
<td>Non Parametric Statistics</td>
<td>*</td>
<td>6124</td>
<td>Actuarial Mathematics and Life Insurance</td>
<td>Actuarial II</td>
</tr>
<tr>
<td>6123</td>
<td>Statistical Quality Control</td>
<td>*</td>
<td>6114</td>
<td>Indices and Official Statistics</td>
<td>Official Statistics</td>
</tr>
<tr>
<td>6103</td>
<td>Statistical Decision Theory</td>
<td>cancelled</td>
<td>6112</td>
<td>Introduction to Economic Theory</td>
<td>*</td>
</tr>
<tr>
<td>6163</td>
<td>Introduction to Computerized Accounting and Finance</td>
<td>*</td>
<td>6266</td>
<td>Actuarial Statistics</td>
<td>cancelled</td>
</tr>
<tr>
<td>6133</td>
<td>Introduction to Mathematical Analysis</td>
<td>*</td>
<td>6256</td>
<td>Introduction to Measurement and Integration Theory with regard to Probability Theory</td>
<td></td>
</tr>
<tr>
<td>6153</td>
<td>Introduction to Operational Research</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6727</td>
<td>Statistical Assignment</td>
<td>cancelled</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5th Semester</th>
<th>TITLE</th>
<th>Corresponding Course in the new Program</th>
<th>6th Semester</th>
<th>TITLE</th>
<th>Corresponding Course in the new Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>6005</td>
<td>Data Analysis I</td>
<td>*</td>
<td>6126</td>
<td>Stochastic Processes</td>
<td>Stochastic Processes I</td>
</tr>
<tr>
<td>6145</td>
<td>Time Series Analysis</td>
<td>*</td>
<td>6136</td>
<td>Multivariate Statistical Analysis</td>
<td>*</td>
</tr>
<tr>
<td>6225</td>
<td>Applied Linear Models</td>
<td>*</td>
<td>6106</td>
<td>Bayesian Statistics</td>
<td>*</td>
</tr>
<tr>
<td>6125</td>
<td>Stochastic Models and Simulation</td>
<td>Simulation</td>
<td>6116</td>
<td>Probability Theory</td>
<td>*</td>
</tr>
<tr>
<td>6175</td>
<td>Econometrics</td>
<td>*</td>
<td>6176</td>
<td>Generalized Linear Models</td>
<td>*</td>
</tr>
<tr>
<td>6235</td>
<td>Risk Theory</td>
<td>cancelled</td>
<td>6246</td>
<td>Biostatistics and Epidemiology</td>
<td>Biostatistics I</td>
</tr>
<tr>
<td>6135</td>
<td>Actuarial Mathematics of Non-Life Insurance</td>
<td>Actuarial I</td>
<td>6276</td>
<td>Applied Econometrics</td>
<td>Econometrics</td>
</tr>
<tr>
<td>6607</td>
<td>Special Issues in Sampling Surveys</td>
<td>cancelled</td>
<td>6648</td>
<td>Biostatistics II</td>
<td>cancelled</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>7th Semester</th>
<th>TITLE</th>
<th>Corresponding Course in the new Program</th>
<th>8th Semester</th>
<th>TITLE</th>
<th>Corresponding Course in the new Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>6127</td>
<td>Multivariate Statistical Techniques</td>
<td>Statistical Learning</td>
<td>6118</td>
<td>Survival Analysis</td>
<td>Biostatistics II</td>
</tr>
<tr>
<td>6137</td>
<td>Environmental Statistics</td>
<td>Statistical Methods for the Environment and Ecology</td>
<td>6108</td>
<td>Categorical Data Analysis</td>
<td>*</td>
</tr>
<tr>
<td>6617</td>
<td>Applied Statistical Models in Finance</td>
<td>cancelled</td>
<td>6128</td>
<td>Sampling Surveys Models</td>
<td>Advanced Sampling Methods</td>
</tr>
<tr>
<td>6627</td>
<td>Risk Management I</td>
<td>cancelled</td>
<td>6158</td>
<td>Data Analysis II</td>
<td>cancelled</td>
</tr>
<tr>
<td>6607</td>
<td>Special Issues in Sampling Surveys</td>
<td>cancelled</td>
<td>6618</td>
<td>Risk Management II</td>
<td>cancelled</td>
</tr>
</tbody>
</table>
**C7. Procedure of conducting the Bachelor Thesis**

Within the framework of the educational process, students currently on their 4th year (or more) are able to conduct a Bachelor Thesis on a wide range of cognitive areas covered by the Statistics Department. This specific guide aims at determining the procedure for assigning, conducting and evaluating the thesis, thus ensuring the studies caliber and the Department’s reliability.

**General Rules for Applying**

- In order for a student to be able to apply for the thesis, he must have successfully attended all compulsory courses and hold an average on these courses, of (at least) 7 (seven).
- Successfully conducting the thesis is awarded with 8 ECTS.
- The thesis is conducted under the supervision of a Statistics Professor.
- The thesis can be declared after the 7th semester, electronically during the appropriate period.
- The student must complete and submit to the Department’s Secretariat the form labeled “Submission of Proposal for Bachelor Thesis”, in which the thesis’s subject is determined, the supervisor and the subject’s summary.

Special Teaching Staff (E.DI.P) that hold a PhD or are currently in the conclusive rank, are eligible to participate in the thesis supervision, as long as there is support from a Department’s Professor.

**Assignment Procedure**

The department’s Professors declare their proposals for Bachelor Thesis that they can supervise, either through the department’s website, the labs or by informing the department’s secretariat. The students contact the professors in order to be better informed about the available subjects. The department’s Assembly then will be informed about the assignment of the thesis and will appoint a Triennial Inquiry Committee, after the supervisor’s proposal. Said supervisor will chair the Committee.

**Conducting the Thesis**

Conducting the thesis is realized based on the accepted Thesis Proposal. Work progress is regularly monitored in cooperation of the student with the supervisor.

**Writing Procedure**

The thesis must definitely contain the following:

- Full Bibliographical Review
- Description of the procedure and the methodology
- Description of the Computational Process and the Methodology
- Presentation and Discussion of the outcomes
Conclusions and suggestion for future work

The Thesis must also contain all data that document the conclusions, in the form of appendices, such as tables etc.

It must also contain a summary in Greek and English for documentation purposes.

Presentation Procedure

The student delivers an electronic copy of his thesis to the members of the Inquiry Committee and to the department’s Secretariat at least 7 days prior to the thesis presentation.

The presentation takes place at a specific time and place, during or just before the respective exams period.

For the examination date to be set the student must agree with his supervisor and the secretariat. Other members of the academic community can attend the presentation. At the end of the presentation the student first answers questions by the Inquiry Committee and then by the audience. The presentation must last less than 20 minutes, and 15 minutes are given for the questions.

Evaluation Procedure

After completing the thesis presentation, and after the student has answered the questions, the Committee meets and after examining all the data, proceeds to evaluate the thesis and grant the final grade. Then the Committee completes the respective minutes, which is submitted to the secretariat. The final grade is recorded into the secretariat’s information system for the current examination period.

Thesis Submission

The student submits the thesis in electronic and printed form to the department’s secretariat, incorporating corrections/observations that may occurred after the presentation.
## C8. General Structure of the Studies Program

The general structure of the program is presented in the below table:

<table>
<thead>
<tr>
<th>A' Semester</th>
<th>B' Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Probability I (C)</td>
<td>• Probability II (C)</td>
</tr>
<tr>
<td>• Calculus I (C)</td>
<td>• Calculus II (C)</td>
</tr>
<tr>
<td>• Linear Algebra I (C)</td>
<td>• Linear Algebra II (C)</td>
</tr>
<tr>
<td>• Introduction to Programming with R (C)</td>
<td>• Introduction to Probability and Statistics with R (C)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C' Semester</th>
<th>D' Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Estimation and Hypothesis Testing (C)</td>
<td>• Linear Models (C)</td>
</tr>
<tr>
<td>• Stochastic Processes I (C)</td>
<td>• Time Series Analysis (C)</td>
</tr>
<tr>
<td>• Introduction to Mathematical Analysis</td>
<td>• Sampling</td>
</tr>
<tr>
<td>• Demographic Statistics</td>
<td>• Mathematical Methods</td>
</tr>
<tr>
<td>• Introduction to Economic Theory</td>
<td>• Actuarial Science I</td>
</tr>
<tr>
<td>• Introduction to Computerized Accounting and Finance</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>E' Semester</th>
<th>F' Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Generalized Linear Models (C)</td>
<td>• Data Analysis (C)</td>
</tr>
<tr>
<td>• Applied Linear Models</td>
<td>• Simulation</td>
</tr>
<tr>
<td>• Bayesian Statistics</td>
<td>• Multivariate Statistical Analysis</td>
</tr>
<tr>
<td>• Statistical Quality Control</td>
<td>• Biostatistics I</td>
</tr>
<tr>
<td>• Theoretical Statistics</td>
<td>• Probability Theory</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>G' Semester</th>
<th>H' Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Statistical Learning</td>
<td>• Categorical Data Analysis</td>
</tr>
<tr>
<td>• Biostatistics II</td>
<td>• Advanced Sampling Methods</td>
</tr>
<tr>
<td>• Econometrics</td>
<td>• Statistical Methods for the Environment and Ecology</td>
</tr>
<tr>
<td>• Introduction to Operational Research</td>
<td>• Numerical Methods in Statistics</td>
</tr>
<tr>
<td>• Stochastic Processes II</td>
<td>• Non Parametric Statistics</td>
</tr>
<tr>
<td>• Actuarial Science II</td>
<td>• Official Statistics</td>
</tr>
<tr>
<td>• Research Methodology*</td>
<td>• Bayesian Inference Methods</td>
</tr>
<tr>
<td>• Special Topics in Probability and Statistics</td>
<td>• Special Topics in Probability and Statistics</td>
</tr>
<tr>
<td>• Bachelor Thesis</td>
<td>• Bachelor Thesis</td>
</tr>
<tr>
<td>• Practical Training</td>
<td>• Practical Training</td>
</tr>
</tbody>
</table>

(C): compulsory courses

### Notes:

- Courses not offered on the academic year 2018-2019 are denoted with *.
- Optional courses are offered only if there is an available instructor.
- For all compulsory courses there are tutorials. Tutorial will also take place, according to availability, and to optional courses.
- All courses are taught 4 hours weekly, plus 2 hours tutorials (where applicable)
- Each course examination is determined by the instructor and may involve assignments, exercises, intermediate exams, etc.
- The student can choose from a list of courses offered by other departments.
### Winter Semester

<table>
<thead>
<tr>
<th>Semester</th>
<th>CODE</th>
<th>ECTS</th>
<th>COURSES Cat.</th>
<th>COURSE TITLE</th>
<th>DEPARTMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1131</td>
<td>6</td>
<td>E.E.</td>
<td>GENERAL ECONOMIC HISTORY</td>
<td>SCHOOL OF ECONOMIC SCIENCES</td>
</tr>
<tr>
<td>Γ</td>
<td>1193</td>
<td>6</td>
<td>E.E.</td>
<td>PRINCIPALS OF SOCIOLOGY</td>
<td>SCHOOL OF ECONOMIC SCIENCES</td>
</tr>
<tr>
<td>Γ</td>
<td>1311</td>
<td>6</td>
<td>E.E.</td>
<td>MACROECONOMIC THEORY I</td>
<td>SCHOOL OF ECONOMIC SCIENCES</td>
</tr>
<tr>
<td>Γ</td>
<td>1313</td>
<td>6</td>
<td>E.E.</td>
<td>MICROECONOMIC THEORY I</td>
<td>SCHOOL OF ECONOMIC SCIENCES</td>
</tr>
<tr>
<td>E</td>
<td>1550</td>
<td>6</td>
<td>E.E.</td>
<td>PUBLIC FINANCE I</td>
<td>SCHOOL OF ECONOMIC SCIENCES</td>
</tr>
<tr>
<td>Z</td>
<td>2612</td>
<td>6</td>
<td>E.E.</td>
<td>COST ACCOUNTING</td>
<td>BUSINESS ADMINISTRATION</td>
</tr>
<tr>
<td>Z</td>
<td>3070</td>
<td>6</td>
<td>E.E.</td>
<td>TEACHER TRAINING INTERNSHIP I</td>
<td>INFORMATICS</td>
</tr>
<tr>
<td>Z</td>
<td>3074</td>
<td>6</td>
<td>E.E.</td>
<td>INTRODUCTION TO PEDAGOGY</td>
<td>INFORMATICS</td>
</tr>
<tr>
<td>Z</td>
<td>3075</td>
<td>6</td>
<td>E.E.</td>
<td>ORGANIZATION AND MANAGEMENT OF EDUCATION AND EDUCATIONAL INSTITUTIONS</td>
<td>INFORMATICS</td>
</tr>
<tr>
<td>Z</td>
<td>3076</td>
<td>6</td>
<td>E.E.</td>
<td>INTRODUCTION TO METHODOLOGY OF TEACHING - ANALYTICAL PROGRAMMS</td>
<td>INFORMATICS</td>
</tr>
<tr>
<td>Z</td>
<td>3078</td>
<td>6</td>
<td>E.E.</td>
<td>EDUCATIONAL EVALUATION</td>
<td>INFORMATICS</td>
</tr>
<tr>
<td>A</td>
<td>3117</td>
<td>6</td>
<td>E.E.</td>
<td>DISCRETE MATHEMATICS</td>
<td>INFORMATICS</td>
</tr>
<tr>
<td>A</td>
<td>3125</td>
<td>6</td>
<td>E.E.</td>
<td>INTRODUCTION TO PROGRAMMING</td>
<td>INFORMATICS</td>
</tr>
<tr>
<td>Γ</td>
<td>3230</td>
<td>8</td>
<td>E.E.</td>
<td>COMPUTATIONAL MATHEMATICS</td>
<td>INFORMATICS</td>
</tr>
<tr>
<td>Γ</td>
<td>3321</td>
<td>8</td>
<td>E.E.</td>
<td>COMPUTER PROGRAMMING WITH C++</td>
<td>INFORMATICS</td>
</tr>
<tr>
<td>Γ</td>
<td>3335</td>
<td>7</td>
<td>E.E.</td>
<td>DATA STRUCTURES</td>
<td>INFORMATICS</td>
</tr>
<tr>
<td>E</td>
<td>3531</td>
<td>7</td>
<td>E.E.</td>
<td>ARTIFICIAL INTELLIGENCE</td>
<td>INFORMATICS</td>
</tr>
<tr>
<td>E</td>
<td>3541</td>
<td>8</td>
<td>E.E.</td>
<td>SOFTWARE ANALYSIS AND DESIGN</td>
<td>INFORMATICS</td>
</tr>
<tr>
<td>E</td>
<td>3571</td>
<td>8</td>
<td>E.E.</td>
<td>COMMUNICATION NETWORKS</td>
<td>INFORMATICS</td>
</tr>
<tr>
<td>Z</td>
<td>3743</td>
<td>6</td>
<td>E.E.</td>
<td>DATA MINING FROM LARGE DATABASES AND THE WORLD WIDE WEB</td>
<td>INFORMATICS</td>
</tr>
<tr>
<td>Z</td>
<td>3745</td>
<td>6</td>
<td>E.E.</td>
<td>MECHANICAL LEARNING</td>
<td>INFORMATICS</td>
</tr>
<tr>
<td>A</td>
<td>4107</td>
<td>6</td>
<td>E.E.</td>
<td>FINANCIAL LAW</td>
<td>INTERNATIONAL &amp; EUROPEAN ECONOMIC STUDIES (PLIAKOS)</td>
</tr>
<tr>
<td>Semester</td>
<td>Code</td>
<td>ECTS</td>
<td>Course Category</td>
<td>Course Title</td>
<td>Department</td>
</tr>
<tr>
<td>----------</td>
<td>------</td>
<td>------</td>
<td>-----------------</td>
<td>--------------</td>
<td>------------</td>
</tr>
<tr>
<td>Z</td>
<td>4137</td>
<td>6</td>
<td>E.E.</td>
<td>PORTFOLIO MANAGEMENT <em>(will not be offered in the academic year 2018-19)</em></td>
<td>INTERNATIONAL &amp; EUROPEAN ECONOMIC STUDIES (BLAVOUKOS)</td>
</tr>
<tr>
<td>A</td>
<td>4110</td>
<td>6</td>
<td>E.E.</td>
<td>INTRODUCTION TO POLITICS AND INTERNATIONAL RELATIONS</td>
<td>INTERNATIONAL &amp; EUROPEAN ECONOMIC STUDIES (PD)</td>
</tr>
<tr>
<td>Γ</td>
<td>5634</td>
<td>6</td>
<td>E.E.</td>
<td>MARKETING RESEARCH</td>
<td>MARKETING</td>
</tr>
<tr>
<td>Γ</td>
<td>5636</td>
<td>6</td>
<td>E.E.</td>
<td>MARKETING</td>
<td>MARKETING</td>
</tr>
<tr>
<td>A</td>
<td>5411</td>
<td>6</td>
<td>E.E.</td>
<td>INTRODUCTION TO BUSINESS ADMINISTRATION</td>
<td>MARKETING</td>
</tr>
<tr>
<td>A</td>
<td>5622</td>
<td>6</td>
<td>E.E.</td>
<td>INTRODUCTION TO MARKETING</td>
<td>MARKETING</td>
</tr>
<tr>
<td>Γ</td>
<td>6163</td>
<td>6</td>
<td>E.</td>
<td>INTRODUCTION TO ELECTRONIC LOGISTICS AND FINANCE</td>
<td>ACCOUNTING &amp; FINANCE</td>
</tr>
<tr>
<td>Γ</td>
<td>8117</td>
<td>6</td>
<td>E.E.</td>
<td>DATABASES</td>
<td>MANAGEMENT SCIENCE AND TECHNOLOGY</td>
</tr>
<tr>
<td>E</td>
<td>8123</td>
<td>6</td>
<td>E.E.</td>
<td>OPTIMIZATION METHODS IN MANAGEMENT SCIENCE</td>
<td>MANAGEMENT SCIENCE AND TECHNOLOGY</td>
</tr>
<tr>
<td>Z</td>
<td>8137</td>
<td>6</td>
<td>E.E.</td>
<td>BUSINESS INTELIGENCE AND BIG DATA ANALYSIS <em>(prerequisite is 8117 – Databases)</em></td>
<td>MANAGEMENT SCIENCE AND TECHNOLOGY</td>
</tr>
<tr>
<td>Z</td>
<td>8143</td>
<td>6</td>
<td>E.E.</td>
<td>COMBINATIONAL OPTIMIZATION</td>
<td>MANAGEMENT SCIENCE AND TECHNOLOGY</td>
</tr>
<tr>
<td>Z</td>
<td>8154</td>
<td>6</td>
<td>E.E.</td>
<td>ENTREPRENEURSHIP</td>
<td>MANAGEMENT SCIENCE AND TECHNOLOGY</td>
</tr>
</tbody>
</table>

**Spring Semester**

<table>
<thead>
<tr>
<th>Semester</th>
<th>Code</th>
<th>ECTS</th>
<th>Course Category</th>
<th>Course Title</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Δ</td>
<td>1402</td>
<td>6</td>
<td>E.E.</td>
<td>MICROECONOMIC THEORY II</td>
<td>SCHOOL OF ECONOMIC SCIENCES</td>
</tr>
<tr>
<td>Δ</td>
<td>1412</td>
<td>6</td>
<td>E.E.</td>
<td>MACROECONOMIC THEORY II</td>
<td>SCHOOL OF ECONOMIC SCIENCES</td>
</tr>
<tr>
<td>Δ</td>
<td>2410</td>
<td>6</td>
<td>E.E.</td>
<td>ADVANCED FINANCIAL ACCOUNTING</td>
<td>BUSINESS ADMINISTRATION</td>
</tr>
<tr>
<td>Δ</td>
<td>2416</td>
<td>6</td>
<td>E.E.</td>
<td>FINANCIAL MANAGEMENT I</td>
<td>BUSINESS ADMINISTRATION</td>
</tr>
<tr>
<td>ΣΤ</td>
<td>2610</td>
<td>6</td>
<td>Ε.Ε.</td>
<td>OPERATIONAL POLICY AND STRATEGY</td>
<td>BUSINESS ADMINISTRATION</td>
</tr>
<tr>
<td>ΣΤ</td>
<td>2622</td>
<td>6</td>
<td>Ε.Ε.</td>
<td>INVESTMENT MANAGEMENT</td>
<td>BUSINESS ADMINISTRATION</td>
</tr>
<tr>
<td>Η</td>
<td>3080</td>
<td>6</td>
<td>Ε.Ε.</td>
<td>TEACHER TRAINING INTERNSHIP II</td>
<td>INFORMATICS</td>
</tr>
<tr>
<td>Η</td>
<td>3084</td>
<td>6</td>
<td>Ε.Ε.</td>
<td>GENERAL AND EVOLUTIONARY PSYCHOLOGY</td>
<td>INFORMATICS</td>
</tr>
<tr>
<td>Η</td>
<td>3085</td>
<td>6</td>
<td>Ε.Ε.</td>
<td>QUALITY IN EDUCATION AND TEACHING</td>
<td>INFORMATICS</td>
</tr>
<tr>
<td>Η</td>
<td>3086</td>
<td>6</td>
<td>Ε.Ε.</td>
<td>INTRODUCTION TO COMPUTERS - EDUCATIONAL APPLICATIONS</td>
<td>INFORMATICS</td>
</tr>
<tr>
<td>Η</td>
<td>3087</td>
<td>6</td>
<td>Ε.Ε.</td>
<td>SPECIAL EDUCATION METHODOLOGY - TEACHING ECONOMIC COURSES</td>
<td>INFORMATICS</td>
</tr>
<tr>
<td>Β</td>
<td>3222</td>
<td>6</td>
<td>Ε.Ε.</td>
<td>COMPUTER PROGRAMMING USING JAVA</td>
<td>INFORMATICS</td>
</tr>
<tr>
<td>Δ</td>
<td>3432</td>
<td>7</td>
<td>Ε.Ε.</td>
<td>ALGORITHMS</td>
<td>INFORMATICS</td>
</tr>
<tr>
<td>ΣΤ</td>
<td>3513</td>
<td>7</td>
<td>Ε.Ε.</td>
<td>APPLIED NUMERICAL ANALYSIS</td>
<td>INFORMATICS</td>
</tr>
<tr>
<td>ΣΤ</td>
<td>3543</td>
<td>7</td>
<td>Ε.Ε.</td>
<td>DATABASE DESIGN</td>
<td>INFORMATICS</td>
</tr>
<tr>
<td>Η</td>
<td>3644</td>
<td>6</td>
<td>Ε.Ε.</td>
<td>INFORMATION RETRIEving SYSTEMS</td>
<td>INFORMATICS</td>
</tr>
<tr>
<td>ΣΤ</td>
<td>3672</td>
<td>7</td>
<td>Ε.Ε.</td>
<td>NETWORKS</td>
<td>INFORMATICS</td>
</tr>
<tr>
<td>ΣΤ</td>
<td>3515</td>
<td>7</td>
<td>Ε.Ε.</td>
<td>LOGIC</td>
<td>INFORMATICS</td>
</tr>
<tr>
<td>Η</td>
<td>3612</td>
<td>6</td>
<td>Ε.Ε.</td>
<td>SPECIAL TOPICS OF DISCRETE MATHEMATICS</td>
<td>INFORMATICS</td>
</tr>
<tr>
<td>Η</td>
<td>3713</td>
<td>6</td>
<td>Ε.Ε.</td>
<td>GAME AND DECISION THEORY</td>
<td>INFORMATICS</td>
</tr>
<tr>
<td>Η</td>
<td>3814</td>
<td>6</td>
<td>Ε.Ε.</td>
<td>INFORMATION THEORY</td>
<td>INFORMATICS</td>
</tr>
<tr>
<td>Δ</td>
<td>5414</td>
<td>6</td>
<td>Ε.Ε.</td>
<td>HUMAN RESOURCES MANAGEMENT</td>
<td>MARKETING</td>
</tr>
<tr>
<td>ΣΤ</td>
<td>5626</td>
<td>6</td>
<td>Ε.Ε.</td>
<td>DIGITAL MARKETING</td>
<td>MARKETING</td>
</tr>
<tr>
<td>Η</td>
<td>7138</td>
<td>6</td>
<td>Ε.Ε.</td>
<td>RISK MANAGEMENT</td>
<td>ACCOUNTING &amp; FINANCE</td>
</tr>
<tr>
<td>Β</td>
<td>8106</td>
<td>6</td>
<td>Ε.Ε.</td>
<td>PROGRAMMING I</td>
<td>MANAGEMENT SCIENCE AND TECHNOLOGY</td>
</tr>
<tr>
<td>ΣΤ</td>
<td>8132</td>
<td>6</td>
<td>Ε.Ε.</td>
<td>FOOD SUPPLY CHAIN MANAGEMENT</td>
<td>MANAGEMENT SCIENCE AND TECHNOLOGY</td>
</tr>
<tr>
<td>ΣΤ</td>
<td>8134</td>
<td>6</td>
<td>Ε.Ε.</td>
<td>PRODUCTION AND OPERATIONS MANAGEMENT</td>
<td>MANAGEMENT SCIENCE AND TECHNOLOGY</td>
</tr>
</tbody>
</table>

Note: After application to the Program in Educational Sciences eligible students can attend the department of Informatics course titled: “Creating and Using Digital Educational Material in Contemporary Education Methodologies”, 6 ECTS

Final Exams
Exams take place at the end of each semester, as well as in the repetitive exams period in September. The department does not support any extra exam periods.
Exams and Evaluation/ Grading Rules
As defined by the University regulations.

Departments ECTS Coordinator
The Department’s ECTS Coordinators are Professor D. Karlis with Associate Professor A. Livada.
# D. COURSES DESCRIPTION

## 1º YEAR

### 1ST SEMESTER

<table>
<thead>
<tr>
<th>Probability I (code: 6001)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course type: Compulsory</td>
</tr>
<tr>
<td>Course level: First studies cycle</td>
</tr>
<tr>
<td>Instructor: Professor E. Kyriakidis, Department of Statistics</td>
</tr>
<tr>
<td>E.C.T.S.: 8</td>
</tr>
</tbody>
</table>

**Desired Learning Outcomes:** Upon successful completion of the course the students should be able to understand the different ways to calculate probabilities of events, solve problems by using the laws of probability, revise probabilities by using Bayes’ rule, use random variables with realistic applications, and choose the appropriate probability model.

**Prerequisites:** none


**Recommended Reading**
- Κουτράς Μ., Εισαγωγή στη Θεωρία Πιθανοτήτων και Εφαρμογές, Εκδόσεις ΤΣΟΤΡΑΣ ΑΝ ΑΘΑΝΑΣΙΟΣ, 2016.

Teaching Method: Face to Face
Teaching includes: Class lectures. Tutorial. Assignments. Self Study.

32
**Calculus I (code: 6041)**

Course type: Compulsory  
Course level: First studies cycle  
Instructor: Assistant Professor Al. Zymbidis, Department of Statistics  
E.C.T.S.: 8  

**Desired Learning Outcomes:** Fundamental concepts of Differential and Infinite Calculus that are basic prerequisites for the Statistical Science.  

**Prerequisites:** none  

**Syllabus:** Axiomatic foundation of the system of real numbers. Axioms of domain and order, axiom of the least upper bound and the Archimedean property. Monotonic and bounded functions, continuity of a function, Bolzano’s theorem, Mean-value theorem, extreme value theorem and uniform continuity. Elements of set theory. Derivative of a function, calculus of derivatives and derivatives of higher order, theorems of Rolle, Mean-Value and L'Hospital, local extremes. Riemann's integral, properties of the integral (additivity, triangular inequality, linearity), continuity and differentiability of the integral function, integrability of continuous functions, Mean-value theorem for integrals, indefinite integral of a function, Fundamental theorem of Infinitesimal Calculus. Techniques of integration (change of variable, integration by parts, etc.), logarithm and the exponential function, generalized integrals, examples and applications. Subsets of R, points of accumulation, sequences of real numbers, monotonic sequences, subsequences and the Cauchy criterion of convergence, Bolzono-Weierstrass theorem, theorems of sequence convergence. Series of real numbers, series with positive terms, criteria of convergence and absolute convergence of series. Taylor’s theorem and Taylor series.  

**Recommended Reading**

- Αθανασιάδης Χ.Ε, Γιαννακούλιας Ε., Γιωτόπουλος Σ.Χ. (2009). Γενικά Μαθηματικά, Απειροστικός Λογισμός, Τόμος 1, Εκδόσεις Συμμετρία.  

Teaching Method: Face to Face.  
Student Assessment Method: Written exam at the end of the semester.  
Teaching Language: Greek

---

**Linear Algebra I (code: 6051)**

Course type: Compulsory  
Course level: First studies cycle  
Instructor: Assistant Professor E. Ioannidis – D. Pappas, Instructor PD 407, Department of Statistics
E.C.T.S.: 8

**Desired Learning Outcomes:** In depth understanding of the concepts introduced in the course, so that the students are able to answer questions demonstrating this understanding, obtaining a geometric insight in concepts such as projection, and finally, applying this knowledge to solving exercises such as: obtaining the LDU factorization of a matrix, inverting a matrix and calculating a projection matrix.

**Prerequisites:** none


**Recommended Reading**
- Gilbert Strang (1999), Ενισχυμένη Ανακατάληψη και Εφαρμογές, Πανεπιστημιακές Εκδόσεις Κρήτης.
- Ε. Ξεκαλάκη & Ι. Πανάρετος (1993), Ενισχυμένη Ανακατάληψη για Στατιστικές Εφαρμογές, Αθήνα.
- Η. Φλυτζάνης (1999), Ενισχυμένη Ανακατάληψη & Εφαρμογές, Τεύχος Α: Πεδία Ανακατάληψης, Το Οικονομικό.
- Γ.Αγγελάτος-Μ.Αδάμ (2008), Ενισχυμένη Ανακατάληψη Θεωρία και Εφαρμογές, Gutenberg.

**Teaching Method:** Face to Face.
**Teaching includes:** Class lectures. Tutorial. Assignments. Self Study.
**Student Assessment Method:** Written exam at the end of the semester. Home Assignment.
**Teaching Language:** Greek

---

**Introduction to Programming with R (code: 6122)**

Course type: Compulsory
Course level: First studies cycle
Instructor: Professor I. Ntzoufras, Department of Statistics
E.C.T.S.: 8

**Desired Learning Outcomes:** Upon successful completion of the course students should be able to manage and import data to R, perform basic R operations, create and analyze simple functions in R.

**Prerequisites:** none

**Syllabus:** Introduction to computers. Basic principles of programming. Introduction to R: basic elements of R; command and window environment. Arithmetic operations. Graphs and figures, multiple graphs.

Objects and object types. Loop Commands and Syntax (for, while, repeat). Creating Scripts and Programs. Simple Functions & Functions with multiple output. Lists of results. Special functions and commands.

**Recommended Reading**

- Ντζούφρας Ι., Καρλής Δ., Εισαγωγή στον Προγραμματισμό και στη Στατιστική Ανάλυση με R, Εκδόσεις Ελληνικά Ακαδημαϊκά Συγγράμματα και Βοηθήματα-Αποθετήριο “Κάλλιπος”, 2016.

**Teaching Method:** Face to Face

**Teaching includes:** Class lectures. Lab exercises. Tutorial. Assignments.

**Student Assessment Method:** Written exam at the end of the semester (80%). Written assignments (20%). Lab exercises (extra small bonus).

**Teaching Language:** Greek

---

**B’ Semester**

**Probability II (code: 6142)**

Course type: Compulsory

Course level: First studies cycle

Instructors: Professor M. Zazanis – Assistant Professor Ι. Papageorgiou, Department of Statistics

E.C.T.S.: 8

**Desired Learning Outcomes:** Upon successful completion of the course, students will have a fuller and deeper understanding of the concepts learned in the introductory probability course. They will have understood the basic concepts underlying multidimensional probability distributions and obtained the necessary mathematical skills in order to use them in the context of statistical problems.

**Prerequisites:** Introduction to Probability.

**Syllabus:** Joint distributions of discrete random variables, marginal and conditional

Recommended Reading
- Ross, S., Βασικές Αρχές θεωρίας πιθανοτήτων, Εκδόσεις Κλειδαριθμός ΕΠΕ, 2011.
- Κούτρας, Μ., Εισαγωγή στη θεωρία Πιθανοτήτων και Εφαρμογές, Εκδόσεις Τσότρας, 2016.
- Παπαϊωάννου, Τ., Θεωρία Πιθανοτήτων και Στατιστικής, Εκδόσεις Σταμούλης Α.Ε., 1997.

Teaching Method: Face to Face.
Teaching includes: Class lectures. Tutorial. Assignments. Self Study.
Student Assessment Method: Written exam at the end of the semester.
Teaching Language: Greek

Calculus II (code: 6042)

Course type: Compulsory
Course level: First studies cycle
Instructor: Professor A. Yannacopoulos, Department of Statistics
E.C.T.S.: 8

Desired Learning Outcomes: Upon successful completion of the course, students will be able to understand and use basic concepts related (a) series of functions and (b) function of more than one variables (partial derivatives, optimization with or without constraints, including techniques such as Lagrange multipliers or the Kuhn-Tucker conditions, multiple integrals, etc.). The course emphasizes on future application of these concepts to statistics, probability, computer science and various fields of study related to economic or management sciences.

Prerequisites: none

Syllabus: Series of functions (power series, Taylor series, Fourier series) and applications. Pointwise and uniform convergence and applications. Geometry of R^n. Functions of more than one variables. Limits and continuity. Derivatives of functions on R^n. Integration of
functions on $\mathbb{R}^n$. Transformations and Jacobian. Optimization, Lagrange multipliers and applications.

**Recommended Reading**

- Αθανασιάδης Χ.Ε, Γιαννακούλιας Ε., Γιωτόπουλος Α. (2010) Γενικά Μαθηματικά, Απειροστικός Λογισμός, Τόμος 1, Εκδόσεις Συμμετρία.
- Κατερίνης, Φλυτζάνης, (2010) Ανώτερα Μαθηματικά, Εκδ. Μπένου

Teaching Method: Face to Face.
Teaching includes: Class lectures. Tutorial. Assignments. Self Study.

---

**Linear Algebra II (code: 6082)**

Course type: Compulsory
Course level: First studies cycle
Instructors: Instructor PD 407/80
E.C.T.S.: 8

**Desired Learning Outcomes:** In-depth understanding of the concepts of the course so that students be able to answer questions demonstrating this understanding. The acquisition of a geometric oversight of concepts such as projection, determinant, eigenvalues and eigenvectors. Finally, applying this knowledge to solving exercises, such as calculating a projection matrix, solving a function interpolation problem with least squares, matrix diagonalization, calculating the square type contour lines. Applications of eigenvalues/eigenvectors also include an introduction to the Principal Component Analysis method and Dynamical systems.

**Prerequisites:** none


**Recommended Reading**

- Gilbert Strang (1999), Γραμμική Αλγεβρα και Εφαρμογές, Πανεπιστημιακές Εκδόσεις Κρήτης.
- Ε. Σεκαλάκη & Ι. Πανάρετος (1993), Γραμμική Αλγεβρά για Στατιστικές Εφαρμογές, Αθήνα.
- Η. Φλυτζάνης (1999), Γραμμική Αλγεβρά & Εφαρμογές, Τεύχος A: Γραμμική
Introduction to Probability and Statistics with R (code: 6031)

Course type: Compulsory
Course level: First studies cycle
Instructor: Professor D. Karlis, Department of Statistics – Assistant Professor X. Penteli, Department of Statistics
E.C.T.S.: 8

Desired Learning Outcomes: The student will be able to understand and make use of basic concepts about statistics and probability. They will be able to have sufficient knowledge of R program, as to be capable to implement basic programs in order to perform basic statistical methods, to create and understand basic descriptive visualization, to manage data of certain complexity and to extract them from large datasets. They will be also able to comprehend basic characteristics of real data and communicate them efficiently

Prerequisites: none

Syllabus: This course aims to introduce students to basic principles of statistics and probability using R. These tasks include: Data collection. Reading and organizing data. Data management. The basic idea of simulation. Probability games using computer and R. Law of large numbers and other probability results. Introduction and comparison of distributions. Basic principles of descriptive statistics. Describing data using the appropriate graphs and measures. Tabulating and presenting the data. Introduction to linear regression. Statistical terminology and the media, probabilities, inference. Case studies. Examples from everyday life.

Recommended Reading

Πετράκος, Γ. (2016) Εφαρμογές της Θεωρίας Πιθανοτήτων με τη χρήση της R. Εκδόσεις Τσότρας.

Teaching Method: Face to Face.
Student Assessment Method: Written exam at the end of the semester. Home assignment. Written exam (Project).
Teaching Language: Greek.

2ND YEAR

C’ Semester

Estimation and Hypothesis Testing (code: 6012)

Course type: Compulsory
Course level: First studies cycle
Instructors: Professor St. Psarakis, Department of Statistics
E.C.T.S.: 8

Desired Learning Outcomes: After successfully completing the course, students will be able to estimate unknown parameters using the appropriate methodology, to build confidence intervals that contain the unknown parameters with the desired probability and to carry out statistical tests regarding the specific problems.

Prerequisites: none

Syllabus: Point estimation, properties of point estimators (consistency, unbiasedness, efficiency, sufficiency), point estimation methods (moment method, least squares, maximum likelihood). Sampling and sampling. Confidence intervals for means, rates, variances and their differences for normal and non normal populations.

Hypothesis testing, statistical hypotheses, hypothesis testing for parameters such as mean values, variations, comparing parameters in two different samples, statistical significance level, p-value, power of a test, sample size calculation.

Recommended Reading


Stochastic Processes I (code: 6126)

Course type: Compulsory
Course level: First studies cycle
Instructor: Associate Professor H. Pavlopoulos, Department of Statistics

E.C.T.S.: 8

Desired Learning Outcomes: Upon successful completion of the course, students should be able to: classify stochastic processes according to the state space and the parameterization set, determine whether a stochastic process is stationary or non-stationary, know the basic properties of a simple random walk process on the integers, Poisson and Wiener processes in continuous time, Markov chains in discrete time, renewal and branching processes.

Prerequisites: Probability I, Probability II, Linear Algebra I, Calculus I.


Recommended Reading
- Χρυσαφίνου Ουρανία (2008) Εισαγωγή στις Στοχαστικές Ανελίξεις. Εκδόσεις Σοφία.
Instructor: Associate Professor P. Tsiamyrtzis, Department of Statistics

E.C.T.S.: 8

**Desired Learning Outcomes:** After successfully completing this course, students will be able to handle topics concerning: correlation coefficient, bivariate and multivariate normal distribution, simple and multiple linear regression, statistical inference in linear regression, hypothesis testing and diagnostic tests, transformations, general linear model, algorithmic methods of choosing the optimal (sub)model, multilinearity and dummy variables, one and two way, with(out) interaction, ANOVA.

**Prerequisites:** Estimation and hypothesis testing (code: 6012)

**Syllabus:** Introduction to regression, fitting, estimating the coefficients. Coefficient estimator properties, mean value, variance, confidence intervals,. Predicted values, ANOVA, R^2, F test (definition via SS_Regr and SS_error).

Introduction to multivariate normal distribution, quadratic forms, quadratic forms mean, distributions, independence. Multiple Regression definition and examples. Design matrix, introduction to dummy variables, linear model general form, LS estimations and properties. Unbiased variance estimation. Predicted values estimation, error estimation, properties, maximum likelihood estimation, LRT, general linear hypothesis, examples. Multiple correlation coefficient, ANOVA, partial F-tests. Examples. Simple residuals, standardized residuals, studentized residuals, normality test, Q-Q plots, basic model hypothesis testing graphs, added variable plot, other diagrams and model hypotheses testing. Simple transformations, influence statistics, the concept of multilinearity, diagnostic tests. One way analysis of variance. Sum to zero parameterization, corner point parameterization, design matrix, estimated coefficients, model ANOVA.

Two way analysis of variance, saturated and cumulative model. Parameterization explanation, design matrix, estimated ANOVA model parameters. Choosing the optimal regression model, forward, backward, stepwise methods, all possible regressions.

**Recommended Reading**

- Κούτρας, Μ. Και Ευαγγελάρας, Χ. (2010). Ανάλυση Παλινδρόμησης: Θεωρία και Εφαρμογές, Σταμούλης

Teaching Method: Face to Face.
Teaching includes: Class lectures. Studying and analyzing bibliography. Tutorial. Assignments.
Student Assessment Method: Written exam at the end of the semester. Home assignment.
Teaching Language: Greek.

**Introduction to Mathematical Analysis (code: 6133)**

Course type: Optional
Course level: First studies cycle
Instructor: Professor A. Yannacopoulos, Department of Statistics
E.C.T.S.: 8
**Desired Learning Outcomes:** After successfully completing the course students will be familiar and able to use in concrete applications the basic concepts of mathematical analysis focusing on the future applications of these concepts in statistics, probability, and computer science as well as their applications in various fields of study related to economic sciences.

**Prerequisites:** none


**Recommended Reading**

Teaching Method: Face to Face.
Teaching includes: Class lectures. Tutorial. Assignments. Self Study.
Student Assessment Method: Written exam at the end of the semester. Home assignment.
Teaching Language: Greek.

---

**Demographic Statistics (code: 6134)**

Course type: Optional
Course level: First studies cycle
Instructor: Professor A. Kostaki, Department of Statistics
E.C.T.S.: 8

**Desired Learning Outcomes:** Knowledge of statistical techniques for analyzing demographic data and their applications.

**Prerequisites:** none

**Syllabus:** Basic concepts: Introduction to demographics, demographic events, types of demographic data, sources of demographic data, demographic data publications, basic demographic measures, ratios, indices or coefficients, population evolution – basic equation. Mortality, mortality per cause of death, mortality measures, mortality probability, mortality comparisons – standardization methods, direct and indirect standardization. Life tables: building a life table, the life table as a stationary population, mortality rate, stochastic


**Recommended Reading**


**Teaching Method:** Face to Face.

**Teaching includes:** Class lectures. Tutorial. Self Study and assignment.

**Student Assessment Method:** Written exam (70% of the final grade) and assignment using the presented techniques (30% of the final grade).

**Teaching Language:** Greek.

---

**Introduction to Economic Theory (code: 6112)**

**Course type:** Optional

**Course level:** First studies cycle

**Instructor:** Associate Professor A. Livada, Department of Statistics

**E.C.T.S.:** 8

**Desired Learning Outcomes:** After successfully completing the course, students will be able to understand the basic concepts of economic science focused on micro and macro analysis, as well as economic policy tools.

**Prerequisites:** none

**Syllabus:** Introductory knowledge regarding the way microeconomics and macroeconomics operate, as well as the main problems they face. Also, introductory knowledge regarding basic concepts and scales of the economy and how to measure and define them. Introduction: the Circular flow of income. The Scarcity problem. Institutional Framework.


**Recommended Reading**
Introduction to Computerized Accounting and Finance (code: 6163)

Course type: Optional
Course level: First studies cycle
Instructor: Associate Professor G. Siougle, Department of Accounting and Finance
E.C.T.S.: 6


Prerequisites: none

Syllabus:

Recommended Reading
- Γκίκας, Δ. και Παπαδάκη Α. (2012) Χρηματοοικονομική Λογιστική, 4η έκδοση, Εκδόσεις Μπένου.
- Μπάλλας Α. και Χέβας Δ. (2010) Εφαρμοσμένες Χρηματοοικονομική Λογιστικής, Εκδόσεις Μπένου.
- An Accounting Information System (AIS)

Teaching Method: Face to Face.
Teaching includes: Class lectures. Lab exercise. Devising a study.
D’ Semester

Linear Models (code: 6023)

Course type: Compulsory
Course level: First studies cycle
Instructor: Professor A. Kostaki, Department of Statistics
E.C.T.S.: 8

Desired Learning Outcomes: After successfully completing this course, students will be able to handle topics concerning: correlation coefficient, bivariate and multivariate normal distribution, simple and multiple linear regression, statistical inference in linear regression, hypothesis testing and diagnostic tests, transformations, general linear model, algorithmic methods of choosing the optimal (sub)model, multilinearity and dummy variables.

Prerequisites: Estimation and hypothesis testing (code: 6012)

Syllabus: Introduction to regression, straight line fitting, coefficients estimators. Coefficient estimators properties, mean value, variance, confidence intervals, estimating data variance. Predicted values, straight line ANOVA, $R^2$, F test (definition via $SS_{Regr}$ and $SS_{error}$).

Introduction to multivariate normal distribution, quadratic forms, quadratic forms mean, distributions, independence. Multiple Regression definition, examples. Design matrix, introduction to dummy variables, linear model general form, LS estimations, Estimator properties. Unbiased variance estimation. Predicted values estimation, error estimation, properties, maximum likelihood estimation, LRT, general linear hypothesis, $R^\text{bete}=r$, examples. Multiple correlation coefficient, ANOVA, partial F-tests. Examples. Simple residuals, standardized residuals, studentized residuals, normality test, Q-Q plots, basic model hypothesis testing graphs, added variable plot, other diagrams and model hypotheses testing. Simple transformations, influence statistics, the concept of multilinearity, diagnostic tests. One factor analysis of variance. Sum to zero parameterization, corner point parameterization, design matrix, estimated coefficients, model ANOVA.

Two way analysis of variance, saturated and cumulative model. Parameterization explanation, design matrix, estimated ANOVA model parameters. Choosing the optimal regression model, forward, backward, stepwise methods, all possible regressions.

Recommended Reading

- Κούτρας, Μ. Και Ευαγγελάρας, Χ. (2010). Ανάλυση Παλινδρόμησης: Θεωρία και Εφαρμογές, Σταμούλης

Teaching Method: Face to Face.
Teaching includes: Class lectures. Lab exercise. Tutorial. Assignments.
Student Assessment Method: Written exam at the end of the semester. Home assignment.
Teaching Language: Greek.

**Time Series Analysis (code: 6145)**

Course type: Compulsory
Course level: First studies cycle
Instructor: Associate Professor I. Vrontos, Department of Statistics
E.C.T.S.: 8

**Desired Learning Outcomes:**

**Prerequisites:** none


Fitting causal stationary ARMA models:

a) preliminary estimators for autoregressive AR(p) models (Yule-Walker, least squares), moving average MA(q) models (innovations algorithm), mixed ARMA(p,q) models, (generalized Yule-Walker method), innovations algorithm).

b) maximum likelihood estimation and asymptotic inference. Diagnostic tests and criteria for choosing ARMA models rank (AIC, BIC).

Introduction to ARIMA and SARIMA models for non stationary time series with a unit root, Dickey - Fuller test.

**Recommended Reading**

- Μπόρα-Σέντα Ε., Μωυσυάδης Χ.Θ., Εφαρμοσμένη Στατιστική, Εκδόσεις Ζήτη, 1990.
- Δαμιανού Χαράλαμπος Χ., ΜΕΘΟΔΟΛΟΓΙΑ ΔΕΙΓΜΑΤΟΛΗΨΙΑΣ, Εκδόσεις “σοφία”, 2007.
Teaching Method: Face to Face.
Student Assessment Method: Written exam at the end of the semester.
Teaching Language: Greek.

<table>
<thead>
<tr>
<th>Estimation and Hypothesis Testing (code: 6012)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course type: Compulsory</td>
</tr>
<tr>
<td>Course level: First studies cycle</td>
</tr>
<tr>
<td>Instructor: University Scholar</td>
</tr>
<tr>
<td>E.C.T.S.: 8</td>
</tr>
<tr>
<td>Desired Learning Outcomes: After successfully completing the course, students will be able to estimate unknown parameters using the appropriate methodology, to build confidence intervals that contain the unknown parameters with the desired probability and to carry out statistical tests regarding the specific problems.</td>
</tr>
<tr>
<td>Prerequisites: none</td>
</tr>
<tr>
<td>Syllabus: Point estimation, properties of point estimators (consistency, unbiasedness, efficiency, sufficiency), point estimation methods (moment method, least squares, maximum likelihood). Sampling and sampling distributions. Confidence intervals for means, rates, variances and their differences in the case of normal and non normal populations. Hypothesis testing, statistical hypotheses, hypothesis testing for parameters such as mean values, variations, comparing parameters in two different samples, statistical significance level, p-value, power of a test, sample size calculation.</td>
</tr>
</tbody>
</table>

Recommended Reading
- Αγγελής Β., Δημάκη Α., Στατιστική Τόμος Α, Εκδόσεις "σοφία", 2012.
- Δαμιανού Χ., Κούτρας Μ., Εισαγωγή στη Στατιστική ΜΕΡΟΣ Ι, Εκδόσεις Συμμετρία, 2003.
- Πανόρετου Ι., Ξεκαλάκη Ε. Εισαγωγή στη Στατιστική Σκέψη Τόμος II.
- Newbold, P., Carlson, W. and Thorne, B. 'Statistics for Business and Economics'.
- Freund, J. ‘Mathematical Statistics with applications’.

Teaching Method: Face to Face.
Teaching includes: Class lectures. Studying and analyzing bibliography. Tutorial. Self Study.
Student Assessment Method: Written exam at the end of the semester.
Teaching Language: Greek.
Sampling (code: 6033)

Course type: Optional

Course level: First studies cycle

Instructor: Assistant Professor I. Papageorgiou, Department of Statistics

E.C.T.S.: 8

**Desired Learning Outcomes:** After the completion of the course the students should ideally be able to:

- Implement the standard sampling designs and a combination of these, from the sampling theory to select the sample from a finite population.
- Choose the appropriate method depending on the target population, in order to achieve best performance for the derived estimates.
- Find estimates and their standard errors, confidence intervals, and general statistical inference that is in accordance with the sampling procedure that has been followed.
- Identify the sampling and non-sampling errors that may occur in a sampling survey and implement techniques that can minimize them.
- Construct a questionnaire.

**Prerequisites:** none


**Recommended Reading**

- Παπαγεωργίου Ι., Θεωρία Δειγματοληψίας, 2016.
- Pascal Ardilly, Yves Tillé. Sampling Methods: Exercises and Solutions.
- Δαμιανού, Χ. (2006) Μεθοδολογία της Δειγματοληψίας. Τεχνικές και εφαρμογές. Εκδόσεις Σοφία.

Teaching Method: Face to Face.
Teaching includes: Class lectures. Lab exercise. Tutorial. Assignments. Self Study.
Student Assessment Method: Written exam at the end of the semester.
Teaching Language: Greek.

**Mathematical Methods (code: 6143)**

Course type: Optional
Course level: First studies cycle
Instructor: Professor M. Zazanis, Department of Statistics
E.C.T.S.: 8

**Desired Learning Outcomes:** Upon successful completion of the course, the students will have a good working understanding of the mathematical techniques described in the syllabus.

**Prerequisites:** Calculus I and II, Linear Algebra I and II.


**Recommended Reading**
- Lipschutz S., Lipson Marc Lars, Γραμμική Άλγεβρα, 5η έκδοση, Εκδόσεις Τζιόλα, 2013.
- Χαραλαμπίδης, Χ. (2010). Συνδυαστική Ανάλυση. Εκδόσεις Συμμετρία.

Teaching Method: Face to Face.
Teaching includes: Class lectures. Tutorial. Self Study.
Student Assessment Method: Written exam at the end of the semester.
Teaching Language: Greek.

**Actuarial I (code: 6135)**

Course type: Optional
Course level: First studies cycle
Instructor: Assistant Professor A. Zymbidis, Department of Statistics
E.C.T.S.: 8

**Desired Learning Outcomes:** At the end of the lectures, the students are able to deal with
the basic problems of pricing, reserving and reinsurance in a general insurance company.

**Prerequisites:** none

**Syllabus:** Individual and collective risk models, damage or loss distributions and compensation distributions and their estimation. Application in non analog risk coverage, asymptotic estimations in the distributions right end, estimating upper limits of stop loss premiums, stop loss and inflation, Pricing. Models of insurance against damage: evolution of one use payments or one insurance year use, Reserve for outstanding losses and allocated and non allocated settlement expenses, loss reserving methods, total and structural, triangular methods of compensation progress (chain ladder etc.), expected loss ratio, the Bornhuetter-Ferguson method, separate frequency and severity modeling, parametric methods (use of damage functions). Reinsurance schemes: Quota Share, Excess of Loss, Stop Loss, Markov chains and Bonus-Malus insurance systems.

**Recommended Reading**
- Ζυμπίδης, Α. (2008) Αναλογιστικά Μαθηματικά Γενικών ασφαλίσεων. Εκδόσεις ΟΠΑ.
- Ζυμπίδης, Α. (2008) Θεωρία Κινδύνων, Εκδόσεις ΟΠΑ.

Teaching Method: Face to Face.
Teaching includes: Class lectures. Self Study.
Student Assessment Method: Written exam at the end of the semester.
Teaching Language: Greek.

---

### 3rd YEAR

#### Ε’ Semester

<table>
<thead>
<tr>
<th>Applied Linear Models  (code: 6225)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course type: Optional</td>
</tr>
<tr>
<td>Course level: First studies cycle</td>
</tr>
<tr>
<td>Instructor: Professor V. Vasdekis, Department of Statistics</td>
</tr>
<tr>
<td>E.C.T.S.: 8</td>
</tr>
</tbody>
</table>

**Desired Learning Outcomes:** Students are expected to know the fundamental theory behind the simple and multiple linear regression models, weighted regression, non-linear regression, random effects models and to become familiar with their practical applications. The students study the conditions for applications and the use for analysis under different data types.

**Prerequisites:** Linear Algebra, Linear Models

**Syllabus:** Linear models for normal data using matrices. Statistical inference. Maximum likelihood and least squares. Quadratic forms. Confidence interval construction and
prediction. Goodness-of-fit, plots. ANCOVA and their applications, weighted regression, variance modeling, sensitivity analysis, non-linear regression with independent data. Design of experiments. Factorial experiments with one, two or more factors. Applications of multiple comparisons. Blocking and confounding in factorial experiments. Fractional factorial experiments. Random effects models and split-plot experiments.

**Recommended Reading**


Teaching Method: Face to Face.
Teaching includes: Class lectures. Lab exercise. Assignments.
Student Assessment Method: Written exam at the end of the semester. Written exam (Project).
Teaching Language: Greek.

**Generalized Linear Models (code: 6176)**

Course type: Compulsory
Course level: First studies cycle
Instructors: Associate Professor I. Vrontos – Assistant Professor E. Ioannidis, Department of Statistics
E.C.T.S.: 8

**Desired Learning Outcomes:** Understanding generalized linear models, the statistical analysis techniques implied and their properties, as well as the ability to apply these methods in data analysis. These models include in particular logistic models for binary data as well as Poisson-log-linear models for contingency tables, including the interpretation of their results, and in some depth understanding of the theoretical issues that arise. In addition, the ability to construct design matrices with different parameterizations and to identify the presence of interactions from diagrams of the fitted values of a model.

**Prerequisites:** Linear Algebra, Estimation – Hypothesis Testing, Linear models.

**Syllabus:** GLM Theory: Covariance matrix and the Wald test. Maximum likelihood estimation: scores and their distribution, asymptotic distribution of the maximum likelihood estimators and the likelihood ratio. The exponential distributions family. Generalized linear

Applications, examples: binomial data: Link functions, coefficients interpretation, inference, overdispersion. One factor analysis (categorical or continuous), two or more factors analysis, with or without interactions: parameterizations, design matrices, coefficients interpretation. Probit and clog-log models examples.


**Recommended Reading**

- Dobson & Barnett (2008), An Introduction to Generalized Linear Models, Taylor & Francis.
- Fox (2008), Applied Regression Analysis and Generalized Linear Models, Kindle

Teaching Method: Face to Face.
Teaching includes: Class lectures. Tutorial. Assignments. Self Study.
Student Assessment Method: Written exam at the end of the semester. Written exam (Project). Exams on computers at the end of the semester.
Teaching Language: Greek.

### Bayesian Statistics (code: 6106)

Course type: Optional
Course level: First studies cycle
Instructor: Associate Professor P. Tsiamyrtzis, Department of Statistics
E.C.T.S.: 8

**Desired Learning Outcomes:** After successful completion of the course, students will be able to handle issues regarding: objective and subjective probability, features in the Bayes approach, the likelihood principle, a-priori distribution and how to choose one (conjugate, non-informative, improper, Jeffreys, a-priori mixtures), Sufficiency and sequential updating, Multivariate Bayesian statistics, Statistical inference: (decision theory, Bayes risk, Bayes rule, MINIMAX rule, point estimate, interval estimation, hypothesis testing), predictive distribution.
Prerequisites: none

Syllabus: The aim of this course is to introduce students to the Bayesian approach to statistics and to compare the Bayesian with the classic (frequentist) approach to statistics. During this course are taught: objective and subjective probability, features in the Bayes approach, the likelihood principle. A-priori distribution and how to choose one (conjugate, non-informative, improper, Jeffreys, a-priori mixtures). Sufficiency and sequential updating. Multivariate Bayesian statistics. Statistical inference: decision theory, Bayes risk, Bayes rule and MINIMAX. Point estimate, interval estimation, hypothesis testing. Predictive Distribution. Asymptotic theory.

Recommended Reading
- Δελλαπόρτας Π & Τσιαμυρτζής Π (2012) "Στατιστική κατά Bayes". Πανεπιστημιακές Σημειώσεις;

Teaching Method: Face to Face.

Statistical Quality Control (code: 6123)

Course type: Optional
Course level: First studies cycle
Instructor: Professor St. Psarakis, Department of Statistics
E.C.T.S.: 8

Desired Learning Outcomes: After the course the student will have the skills needed to deal with improving the quality of products or services using statistical methods.

Prerequisites: Estimation – Hypothesis Testing


Recommended Reading
- Ταγαράς Γιώργος (2001) Στατιστικός Έλεγχος Ποιότητας. Εκδόσεις ΖΗΤΗ.

Teaching Method: Face to Face.
Teaching includes: Class lectures, Lab exercise, Studying and analyzing bibliography, Tutorial Assignments: Self Study.

Student Assessment Method: Written exam at the end of the semester + Project.

Teaching Language: Greek.

**Theoretical Statistics (code: 6144)**

Course type: Optional

Course level: First studies cycle

Instructor: Assistant Professor I. Papageorgiou, Department of Statistics

E.C.T.S.: 8

**Desired Learning Outcomes:** After completing the course the students ideally should be able to: Implement the standard methods to derive estimates for unknown parameters of a population with a known distribution. Evaluate and compare estimates with respect to standard criteria. Construct confidence intervals for the unknown parameters. Construct statistical tests for hypothesis testing about unknown parameters.

**Prerequisites:** none


**Recommended Reading**

- Κολυβά-Μαχαίρα Φ., Μαθηματική Στατιστική, Εκδόσεις Ζήτη, 1998.
- Φουσκάκης Δ., Ανάλυση Δεδομένων με τη Χρήση της R., Εκδόσεις Τσότρας, 2013.
- Ρούσσας Γ. (1994) Στατιστική Συμπερασματολογία, Τόμος I - Εκτιμητική, 2η Έκδοση, Εκδόσεις Ζήτη, Θεσσαλονίκη.
- Ρούσσας Γ. (1994) Στατιστική Συμπερασματολογία, Τόμος II – Έλεγχοι Υποθέσεων, 2η Έκδοση, Εκδόσεις Ζήτη, Θεσσαλονίκη.

Teaching Method: Face to Face.
Teaching includes: Class lectures. Tutorial. Assignments. Self Study.
Student Assessment Method: Written exam at the end of the semester. Home assignment.
Teaching Language: Greek.

F' Semester

<table>
<thead>
<tr>
<th>Data Analysis (code: 6005)</th>
</tr>
</thead>
</table>

Course type: Compulsory
Course level: First studies cycle
Instructor: Assistant Professor X. Penteli, Department of Statistics
E.C.T.S.: 8

**Desired Learning Outcomes:** After successful completion of the course, the students should be able to:

1. Manage real life problems and analyze data in R,
2. Perform basic hypothesis testing,
3. Construct and interpret regression models, and
4. Write statistical reports in a professional manner.

**Prerequisites:** Linear Models (code: 6023)

**Syllabus:** Statistical methods in simple problems using statistical packages (emphasis on R and secondary on other statistical packages): Descriptive statistics, visualization, simulating random numbers from theoretical distributions, confidence intervals, hypothesis testing for one and two independent samples, hypothesis testing for two dependent samples, contingency tables, simple and multiple regression analysis, AnCoVa models and analysis for one and two factors (and one continuous explanatory). Case studies and analysis real data sets from various scientific fields (economics, marketing, social sciences, sports, medicine, psychology etc.). Basic principles for writing professional and scientific reports.

**Recommended Reading**

Simulation (code: 6125)

Course type: Optional
Course level: First studies cycle
Instructor: Professor P. Dellaportas, Department of Statistics
E.C.T.S.: 8

Desired Learning Outcomes: The students after successfully completing the course will be able to understand elements of stochastic simulation and implement it on pc.

Prerequisites: none


Recommended Reading

Desired Learning Outcomes: Upon completion of the course, the student will be able to:
- produce graphs and comprehend relations in his data,
- apply basic methods of multivariate data analysis,
- infer on multivariate data,
- use methods of dimension reduction.

Prerequisites: none


Recommended Reading
- Σιάρδος Γ., Μέθοδοι Πολυμεταβλητής Στατιστικής Ανάλυσης, Εκδόσεις Σταμούλη Α.Ε., 2005.
- Bartholomew, D.J., Steele, F., Moustaki, I., Galbraith, J. (2011) Ανάλυση πολυμεταβλητών τεχνικών στις κοινωνικές επιστήμες, Εκδόσεις ΚΛΕΙΔΑΡΙΘΜΟΣ

Teaching Method: Face to Face.
Teaching includes: Class lectures. Tutorial. Research Assignment. Self Study.
Student Assessment Method: Written exam at the end of the semester. Written exam (Project).
Teaching Language: Greek.

Probability theory (code: 6116)

Course type: Optional
Course level: First studies cycle
Instructor: Associate Professor H. Pavlopoulos, Department of Statistics
E.C.T.S.: 8

**Desired Learning Outcomes:** Upon successful completion of the course, students should be able to: determine the probability space of a random experiment with uncountable sample space according to the Lebesgue - Caratheodory extension theorem, to apply advanced probability calculus according to Kolmogorov’s axioms, manage random variables as measurable mappings of a given probability space to the Borel line, determine the type of a random variable according to its probability distribution induced on the Borel line (discrete, continuous, mixed), calculate its expected (or mean) value as a Lebesgue integral on the Borel line, to distinguish and verify modes of stochastic convergence of a given sequence of random variables, to apply the laws of large numbers and the central limit theorem.

**Prerequisites:** Probability I, Probability II, Calculus I, Calculus II, Introduction to Mathematical Analysis.

**Syllabus:** Uncountable sets and the necessity for axiomatic foundation of probability spaces ($\sigma$-algebra of events, Kolmogorov’s axioms, properties of probability measure). The Lebesgue-Caratheodory extension theorem for construction of probability spaces (summary, applications). Definition of random variables and Borel measurability. Stochastic independence, Borel-Cantelli lemmas, tail events and Kolmogorov’s 0-1 law. Expectation of random variables with respect to a probability measure as Lebesgue integral with respect to their probability distributions induced on the Borel line, properties of expected values. Modes of convergence for sequences of random variables (almost certain, in p-th order mean, in probability, in distribution). Limit theorems (monotone convergence, Fatou’s lemma, dominated/bounded convergence theorem, uniform integrability, weak and strong laws of large numbers, central limit theorem). Lebesgue’s decomposition of a probability distribution on the Borel line to its components (discrete, absolutely continuous, singular continuous), characterization of absolute continuity by the Radon-Nikodym theorem. Conditional expectation, conditional probability and their properties.

**Recommended Reading:**

Teaching Method: Face to Face.
Teaching includes: Class lectures.
Student Assessment Method: Written exam at the end of the semester.
Teaching Language: Greek.

**Biostatistics I (code: 6246)**
Course type: Optional
Course level: First studies cycle
Instructor: Department of Statistics University Scholar
E.C.T.S.: 8

**Desired Learning Outcomes:** At the end of the course the student will: Be familiar with the basic types of medical research. Be able to read a medical study and the corresponding scientific publication. Be able to perform basic analysis of medical data. The course motivates students to continue their studies in Biostatistics and to engage in the field.

**Prerequisites:** none

**Syllabus:** Basic principles of epidemiology, morbidity and risk measures, odds ratio, diagnostic tests (Mantel-Hanzel, ROC curves, sensitivity – specificity), case control studies, introduction to clinical trials, sample size estimation, principles of epidemic models, Infectious disease control.

**Recommended Reading**

Teaching Method: Face to Face.
Teaching includes: Class lectures. Lab exercise. Tutorial. Assignments. Self Study. Screenings of films relative to the course and exercises/ tasks based on them. Sometimes we also have guest graduates to talk about their career and about problems and methodologies they face in their work.
Teaching Language: Greek.
Desired Learning Outcomes: Upon successful completion of the course students will be able to: know, identify, control and suggest ways to deal with violations of classical hypotheses of the classic linear multivariate regression model: autocorrelation - heteroscedasticity and multilinearity using linear algebra. Also, know what is, when they are used, under which conditions and how they are estimated: the simultaneously determined regressions – Systems of interdependent variables, the structural and reduced models and the Seemingly Unrelated Regression Equation Systems. Applications using Eviews (educational version).

Prerequisites: Regression and Introduction to economical analysis


Estimating structural parameters with Indirect Least Squares Method (ILS) – Instrumental Variables Method (IV) – 2SLS – 3SLS.


Recommended Reading
- Δριτσάκη Ν. Χάιδω, Δριτσάκη Ν. Μελίνα (2013) "Εισαγωγή στην Οικονομετρία με τη Χρήση του Λογισμικού EViews" Εκδ. Κλειδάριθμος.

Teaching Method: Face to Face.
Teaching Language: Greek.

Statistical Learning (code: 6127)

Course type: Optional
Course level: First studies cycle
Instructor: Assistant Professor X. Penteli, Department of Statistics
E.C.T.S.: 8

Desired Learning Outcomes: Upon completion of the course the students will be able to: chart and understand relationships in the data, find groups of observations, create classification rules, apply methods and work with large data sets. At the end of the course, the student will be able to construct graphs and understand relationships between data,
identify observation clusters in the data, be able to build classification rules, apply methods and work with large data sets.

**Prerequisites:** None.

**Syllabus:** Statistical Data mining methods, Hierarchical and Partitioning methods for clustering. Advanced clustering methods, Model based clustering, clustering large data sets. Classification methods, the nearest neighbor methods, decision trees, linear and non linear separation methods, non parametric methods using kernels. Measures of good classification evaluation. Dimension reduction methods. Regularization, LASSO, etc. Big data problems and methods.

**Recommended Reading**
- Bartholomew D.J., Steele F., Moustaki I., Galbraithe J.I., Ανάλυση Πολυμεταβλητών Τεχνικών στις Κοινωνικές Επιστήμες, Εκδόσεις Κλειδάρθης ΕΠΕ, 2011.
- Hastie, Tibshirani and Friedman (2009) Elements of Statistical Learning, 2nd edition Springer
- James, Witten, Hastie and Tibshirani (2011) Introduction to Statistical Learning with applications in R, Springer

Teaching Method: Face to Face.
Student Assessment Method: Written exam at the end of the semester. Oral exam. Written exam (Project).
Teaching Language: Greek.
estimating functions methods: Product-Limit (Kaplan-Meier) and Nelson-Aalen estimators. Standard errors, types of confidence intervals (plain, log, cloglog) and inference. Methods of comparing survival function: Logrank test and generalizations. Extension to more than two samples.


Recommended Reading
- Μπερσίμης Σ., Σαχλάς Α., Εφαρμοσμένη Στατιστική με έμφαση στις Επιστήμες Υγείας, Εκδόσεις Τζιόλα, 2016.
- Μπερσίμης Σ., Σαχλάς Α., Εφαρμοσμένη Στατιστική με χρήση του IBM SPSS Statistics 23, Εκδόσεις Τζιόλα, 2016.
- Petrie A., Sabin C., Ιατρική Στατιστική με μια ματιά, Εκδόσεις Παρισιάνου Α.Ε., 2015.
- Μπεσμπέας (2015) Ανάλυση Επιβίωσης. Σύγγραμμα (150 σελ.).

Teaching Method: Face to Face.
Teaching includes: Class lectures. Lab exercise. Tutorial. Self Study.
Student Assessment Method: Written exam at the end of the semester.
Teaching Language: Greek.

Introduction to Operations Research (code: 6153)
Course type: Optional
Course level: First studies cycle
Instructor: Professor E. Kyriakidis, Department of Statistics
E.C.T.S.: 8

**Desired Learning Outcomes:** After successfully attending the course, the students will be able to solve linear programming problems graphically, with algebraic methods, with the Simplex method and with Excel. They will also be able to find the optimal policy that minimizes the total expected cost for finite-time horizon problems using the method of dynamic programming. They will also be able to find optimal replenishment policies for inventory problems.

**Prerequisites:** none

**Syllabus:** The linear programming problem, realistic examples, solution by graphical method, canonical form, properties of solutions, The Simplex algorithm, the M-method, the dual problem of linear programming, sensitivity analysis, the transition problem, the integer programming problem, the dynamic programming problem, the machine maintenance problem, the replacement problem, the Secretary problem. An introduction to inventory control.

**Recommended Reading**

Teaching Method: Face to Face.
Teaching includes: Class lectures. Studying and analyzing bibliography. Assignments.
Student Assessment Method: Written exam at the end of the semester.
Teaching Language: Greek.

### Stochastic Procedures II (code: 6057)

Course type: Optional
Course level: First studies cycle
Instructor: Professor M. Zazanis - Professor A. Yannacopoulos, Department of Statistics
E.C.T.S.: 8

**Desired Learning Outcomes:** After successfully completing the course, students will be familiar with the basic concepts of stochastic processes in continuous time and continuous state space including their simulation focusing on applications in probability, statistics, computer science and finance.

**Prerequisites:** none


Simulation of stochastic processes. Applications of Brownian motion and stochastic
integration in finance.

**Recommended Reading**

- Χρυσαφίνου Ουρανία (2008) Εισαγωγή στις Στοχαστικές Ανελίξεις. Εκδόσεις Σοφία.

Teaching Method: Face to Face.
Teaching includes: Class lectures. Studying and analyzing bibliography. Self Study. Simulation lab session.
Student Assessment Method: Written exam at the end of the semester.
Teaching Language: Greek.

---

**Actuarial II (code: 6124)**

Course type: Optional
Course level: First studies cycle
Instructor: Assistant Professor A. Zymbidis, Department of Statistics
E.C.T.S.: 8

**Desired Learning Outcomes:** At the end of the course, students can deal with the main problems of pricing and storage of life insurance policies.

**Prerequisites:** none

**Syllabus:** Simple mortality matrix and relative functions. Force of mortality, classic mortality laws, actuarial tables and commutation functions, stochastic approach to life insurance. Types of personal insurance, actuarial present values, present values variances and covariances. Types of annuities, actuarial present values and annuities variances, relations between annuities and insurance policies. Insurance (annual, united, payable in installments), approximate relationships between different types of insurance. Recursive and differential relationships for insurances and annuities. Mathematical stocks of all types, differential equations and approximate relations, alternative reserving methods (stochastic and non stochastic), Joint life and death probability, “multiple head” insurance and annuities, common insurance for Gompertz and Makeham cases, as well as under the assumption for uniform distribution of deaths (UDD). Matrices with multiple output causes, multiple situations standards, disability standards and Markov methods. Retirement models.

**Recommended Reading**

- Ζυμπίδης Α.(2009), Αναλογιστικά Μαθηματικά Ασφαλίσεων Ζωής
- Ζυμπίδης Α. (2008) Συνταξιοδοτικά Ταμεία & Αναλογιστικές Μελέτες
Introduction to Measurement Theory with regard to Probability and Statistics (code: 6256)

Course type: Optional

Course level: First studies cycle

Instructor: Professor M. Zazanis - Professor A. Yannacopoulos, Department of Statistics

E.C.T.S.: 8

Desired Learning Outcomes: After successfully attending the course students will become familiar with the basic concepts of measure theory and integration and will be able to use some of its basic tools. Thus, they will be able to approach the techniques used in the probabilities and statistics from a point of view of measurement theory, as well as the techniques of statistical/mechanical learning.

Prerequisites: none


Measurable functions according to Lebesgue. Borel Functions. Random variables. Sequences of functions and random variables and convergence concepts (almost certain, in measure).


Lebesgue spaces of integrable functions and random variables and their structure as metric spaces. Holder and Minkowski inequities, the Beppo-Levi theorem and completeness. Convergence in Lebesgue spaces and applications. The case of L^2, its structure as a Hilbert space, the projection theorem and its relation to conditional mean value, bases and expansions (eg Karhunen-Loeve transform, etc.).

Product measure, construction and properties and relation to independence. Integration and product measure, Fubini theorem.

Absolute continuity and measure singularity. Hahn-Jordan decomposition. Radon-Nikodym derivation. Measure space as an extension of the functions. Applications in statistics (the conditional average value under a new prism, likelihood, extreme event simulation, consistency) in finance.

Measure space as a metric space and applications. Total change distance, Helinger distance,
Kullback-Leibler distance (entropy), transportation distance. Applications in model selection statistical and mechanical learning, etc.

**Recommended Reading**

- Καλπαζίδου, Σ. (2002). Στοιχεία μετροθεωρίας πιθανοτήτων. Εκδόσεις ΖΗΤΗ.

Teaching Method: Face to Face.
Teaching includes: Class lectures.
Student Assessment Method: Assignments. Written exam at the end of the semester and/or assignment.
Teaching Language: Greek.

---

**Research Methodology** *

* This lesson is not offered during the academic year 2018-19

Course type: Optional
Course level: First studies cycle
E.C.T.S.: 8

**Desired Learning Outcomes:** Upon completion of the course, the students should be able to:

- Read scientific announcements and understand the results as well as their validity
- Be able to find information about data and methodologies needed for their analyses
- Accurately designing surveys and all their individual features
- Understand survey’s validity and reliability
- Be able to distinguish problematic from accurately designed surveys
- Be able to correctly choose and apply statistical methodologies to address a research problem
- Be able to grasp morality issues in research.

Prerequisites:

**Syllabus:** Data collecting methods: contemporary methods, advantages and disadvantages. Error types. Questionnaire design. Building scales, scale types. Reliability indices. Examples of misuse of statistics, discussions on specific publications, building a questionnaire, research issues (introducing bias, etc), report writing and presenting.

**Recommended Reading**

H’ Semester

**Categorical Data Analysis (code: 6108)**

Course type: Optional  
Course level: First studies cycle  
Instructors: Academic Scholar, Department of Statistics  
E.C.T.S.: 8  

**Desired Learning Outcomes:** At the end of the course, students are expected to know how to quantify different dependency forms between two or more categorical data (knowledge), to control which form of dependency appears to apply to a particular set of data (aptitude), to fit logistic regression models and to interpret the results of their data fit (capability).

**Prerequisites:** none  

**Syllabus:** Types of categorical data. Contingency tables, joint, marginal and conditional probabilities, independence, comparison of proportions in 2x2 contingency tables (difference of proportions, relative risk, odds ratio), types of observational studies (retrospective, cross-sectional, prospective), odds ratio and other measures of correlation in LxJ tables. $\chi^2$ test of independence, exact tests, partition of the statistical function $\chi^2$, test of independence for ordinal data, tests of linear trend for 2xL tables. Correlated data pairs, comparison of correlated proportions, Mc Nemar test for comparison of marginal proportions, measures of raters’ agreement, odds ratio for agreement, kappa measure of agreement. Correlation in multidimensional contingency tables, conditional and marginal odds ratios, Simpson’s paradox, partial-conditional independence, homogeneity, collapsibility, Cochran-Mantel-Haenszel tests. Logistic regression, interpretation of model parameters, inference in logistic regression, the case of categorical predictive variables, multiple logistic regression, model selection, test of goodness of fit. Models of logistic regression for polytomous variables.

**Recommended Reading**


Teaching Method: Face to Face.  
Teaching includes: Class lectures. Lab exercise. Studying and analyzing bibliography. Assignments. Self Study.  
Student Assessment Method: Assignment. Written exam at the end of the semester.  
Teaching Language: Greek.

---

**Advanced Sampling Methods (code: 6128)**

Course type: Optional  
Course level: First studies cycle  
Instructor: Associate Professor P. Merkouris, Department of Statistics
E.C.T.S.: 8

**Desired Learning Outcomes:** Upon successful completion of the course, students will be able to recognize the type of statistical problems in real-time sample surveys as well as to select and apply the appropriate by case methodology. They will also have the ability to evaluate the quality of the results of the selected method.

**Prerequisites:** None


Variance estimation in complex surveys. Resampling methods (random groups, jackknife, bootstrap).


**Recommended Reading**


Teaching Method: Face to Face.
Teaching includes: Class lectures. Lab exercise. Studying and analyzing bibliography. Assignments. Self Study.
Student Assessment Method: Written exam at the end of the semester. Open questions. Short answer questions. Home assignment.
Teaching Language: Greek.

---

**Numerical Methods in Statistics (code: 6115)**

Course type: Optional
Course level: First studies cycle
Instructor: Academic Scholar, Department of Statistics
E.C.T.S.: 8

**Desired Learning Outcomes:** At the end of the course the student should be able to: use a pc to perform statistical inference. Write basic programs in R to apply statistical inference. Analyze data using computational methods and approaches.

**Prerequisites:** None


**Recommended Reading**

**Προτεινόμενη Βιβλιογραφία**


Teaching Method: Face to Face.
Teaching includes: Class lectures.
Student Assessment Method: Written exam at the end of the semester.
Teaching Language: Greek.

---

**Statistical Methods for the Environment and Ecology (code: 6058)**

Course type: Optional
Course level: First studies cycle
Instructor: Associate Professor P. Besbeas, Department of Statistics
E.C.T.S.: 8

**Desired Learning Outcomes:** After successfully completing the course, students should be able to: distinguish between deterministic and statistical criteria for weighing/evaluating environmental contamination, apply contamination weighing criteria in stochastic models of enumerating violations of contamination threshold, compare the compatibility between keeping the statistical criterion and probability of violating the corresponding contamination threshold, determine the (spatial and temporal) distribution of pollutants concentration (produced at a constant rate at a constant source) based on a stochastic model of molecular diffusion – transmission of the pollutant to the environmental medium, determine probability distribution for pollutant concentration in a fixed point in space based on the theory of consecutive stochastic diffusions, apply stochastic models of population dynamics in estimating the population size based on sampling data with various methods (inventory, survival, distance, retrieval)
Prerequisites: Probability I, Probability II, Stochastic Procedures I

Syllabus: General overview of topics and problems of interest in environmental statistics and ecology. Criteria of weighing environmental pollutants. Applications of stochastic models in checking the keeping or violation of weighing criteria. Statistical analysis and modeling of extreme values (for example, exceeding the pollutant concentration threshold). Natural process of pollutant diffusion and dilution, and the Plume model of spatial and time distribution of pollutant concentration. The theory of stochastic dilution and asymptotic lognormal diffusion processes for modeling point concentration of pollutants. Introduction to spatial statistics methods, models and estimating the function of spatial scatter (variogram) and the Kringing regression.

Data types from studies of biological organizations and examples. Preliminary analysis of characteristic data sets. Special characteristics of sample distributions and the appropriate models, such as truncated, inflated, mixed. Overdispersion, underdispersion and appropriate models. Individual heterogeneity models. Model fit using maximum likelihood through arithmetic methods and the use of statistical packages (R). Estimating population size and variance. Methods of census and distance sampling. Capture – Recapture methodologies for closed and open populations. Ecological time series and their characteristics. Stochastic models of population dynamics: state – space models and models for simultaneous analyses of survival and census. Examples and applications.

Recommended Reading
- Μπεσμπέας, Π. (2010): Στατιστικές Μέθοδοι στην Οικολογία, Πανεπιστημιακές Σημειώσεις
- Καρανδεινός Γ. Μ. (2007): Ποσοτικές Οικολογικές Μέθοδοι, Πανεπιστημιακές Εκδόσεις Κρήτης

Teaching Method: Face to Face.
Teaching includes: Class lectures.
Student Assessment Method: Written exam at the end of the semester.
Teaching Language: Greek.

Official Statistics (code.: 6114)

Course type: Optional
Course level: First studies cycle
Instructor: Associate Professor A. Livada, Department of Statistics
E.C.T.S.: 8

Desired Learning Outcomes: After successfully completing the course, students will be able to understand the basic concepts and principles of each country’s Official Statistics. They will also be able to know the basic concepts and principles of constructing, assessing and using
index numbers.

**Prerequisites:** none

**Syllabus:** Introduction, use of index numbers, estimation of simple and composite index numbers, evaluation criteria, how we define and choose the base, base change, chain index, issues of weights for composite indices, sampling errors, heterogeneity, concentration indices, indices’ applications especially in Greece – Europe.

Family budget surveys, Metadata, basic Eurostat surveys and issues of statistical nomenclature. Describing basic surveys (SILC, HBS, steady panels, INTRASTAT etc).

**Recommended Reading**
- Τζωρτζόπουλος Π., Α Λειβαδά (2011) «Αριθμοδείκτες Και Επίσημες Στατιστικές», Οικονομικό Πανεπιστήμιο Αθηνών, Αθήνα.

Teaching Method: Face to Face.
Student Assessment Method: Written exam with open notes at the end of the semester. Open questions. Problem solving. Project and project presentation. Practical exercises.
Teaching Language: Greek.

### Non Parametric Statistics (code: 6113)

**Course type:** Optional

**Course level:** First studies cycle

**Instructor:** Assistant Professor E. Ioannidis, Department of Statistics

**E.C.T.S.:** 8

**Desired Learning Outcomes:** At the end of the course the student will be able to: a) Understand the non parametric methods described and their properties: Bootstrap, non parametric density estimation, non parametric regression, generalized additive models and rank tests. b) Implement these methods in real data analysis and correctly interpret the results.

**Prerequisites:** Linear algebra, Estimation and testing statistical hypothesis, Linear models.


**Recommended Reading**
- Shao and Tu (1995), The Jackknife anδ the Bootstrap, Springer.
- Ξεκαλάκη , Ε. (2001). Μη παραμετρική στατιστική.

Teaching Method: Face to Face.
Teaching includes: Class lectures. Tutorial. Assignments. Self Study.
Student Assessment Method: Written exam at the end of the semester. Written exam (Project).
Teaching Language: Greek.

<table>
<thead>
<tr>
<th>Statistics – Erasmus Course*</th>
</tr>
</thead>
<tbody>
<tr>
<td>* This lesson is not offered during the academic year 2018-19</td>
</tr>
</tbody>
</table>

Course type: Optional

Course level: First studies cycle

E.C.T.S.: 8

**Desired Learning Outcomes:** After successful completion of the course the students should be able to:

- Understand basic statistics and how they are interconnected
- Be able to understand lectures in English
- Know the English terminology about statistical concepts
- Be able to write assignments with statistical content in English
- Use English bibliography for statistical science

**Prerequisites:**

**Syllabus:** This course is taught in English and contains subjects of introduction to probability, descriptive statistics, statistical inference and hypothesis testing as a service course. It is addressed to Erasmus students and the students of the department can attend it and have their exams in English. The curriculum covers: Overview of Statistics, Summarizing Data, Tables and Plots, Introduction to Probability, Discrete Probability Distributions, Continuous Probability Distributions, Sampling. Hypothesis testing and confidence intervals, Correlation.
and regression.

Recommended Reading


Teaching Method: Face to Face.
Teaching includes: Class lectures.
Student Assessment Method: Written exam at the end of the semester.
Teaching Language: Greek/ English.

Methods of Bayesian Inference

<table>
<thead>
<tr>
<th>Course type: Optional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course level: First studies cycle</td>
</tr>
<tr>
<td>Instructor: Academic Scholar, Department of Statistics</td>
</tr>
<tr>
<td>E.C.T.S.: 8</td>
</tr>
</tbody>
</table>

**Desired Learning Outcomes:** After successful completion of the course the students should be able to:

- Understand the differences between classic and Bayesian approach
- Know the basic principles of the Bayesian approach
- Apply contemporary Bayesian analysis methods to real problems
- Know the tools that will assist them in implementing these analyses

**Prerequisites:**

**Syllabus:** Repetition of the basic principles of Bayesian inference. Markov chain, Monte Carlo and its use in Bayesian Statistics. Variations of this method and extensions. Building algorithms MCMC in R. Bayesian regression. Bayesian models using R and WinBUGS. Deviance information criterion and model complexity. Hierarchical models. Basic principles of Bayesian hypothesis testing, comparing and weighing models.

**Recommended Reading**


Teaching Method: Face to Face.
Teaching includes: Class lectures.
Student Assessment Method: Written exam at the end of the semester.
Teaching Language: Greek.

Decision Theory

<table>
<thead>
<tr>
<th>Course type: Optional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course level: First studies cycle</td>
</tr>
</tbody>
</table>
**Desired Learning Outcomes:** Μετά την επιτυχή ολοκλήρωση του μαθήματος οι φοιτητές θα είναι σε θέση:

- Construct a table of financial outcomes in a decision problem with a finite number of different possibilities and decisions.
- Find the optimal decision based on the criterion of (i) maximize the minimum financial gain, (ii) maximize the maximum financial gain, (iii) the prevailing possibility, (iv) the Hurwicz index and (v) Bayes.
- Construct the table of loss of the chance of financial gain.
- Find the optimal decision based on the criterion of minimizing the expected loss of the chance of financial gain.
- Construct the table of financial outcomes with added information and find the optimal decision.
- Construct the decision tree.
- Locate the points of balance in a game, if there are any.

**Prerequisites:** None.

**Syllabus:** Decision making under conditions of uncertainty. Calculating the financial outcomes for every combination of an act and a possible event. Decision criteria (criteria based exclusively on the possible financial outcomes). A priori decision making analysis. Hurwicz alpha index, the Bayes criterion, expected value of complete information. Graphical analysis of decision making problems. Point and possibility of indifference. The normal distribution in a priori decision making. The Bayes criterion and sensitivity analysis. Decision making and the theory of money utility. Constructing the money utility curve. The expected value as a decision criterion. Posterior analysis of decision making (utilizing the added information to optimize decisions, constructing the decision tree). Bayesian decision making and classic statistic deduction. Introduction to game theory (games with complete information, games with lacking information, games with two players of zero sum).

Η αναμενόμενη αξία χρησιμότητας ως κριτήριο αποφάσεων. Μεταγενέστερη ανάλυση λήψης αποφάσεων (αξιοποίηση πρόσθετης πληροφόρησης για βελτίωση των αποφάσεων, δημιουργία του διαγράμματος δέντρου). Προμεταγενέστερη ανάλυση λήψης αποφάσεων. Μπεύζανη λήψη αποφάσεων και κλασική στατιστική επαγωγή. Εισαγωγή στη θεωρία παιγνίων (παιγνία πλήρους πληροφόρησης, παιγνία ελλειπούς πληροφόρησης, παιγνία δύο παικτών μηδενικού αθροίσματος).

**Recommended Reading**

- Ευάγγελος Μαγείρου, Παιγνία και Αποφάσεις, Εκδόσεις Κριτική, 2012.
- K. Μηλολιδάκης, Θεωρία Παιγνίων, Εκδόσεις Σοφία, 2009.

**Teaching Method:** Face to Face.

**Teaching includes:** Class lectures.

**Student Assessment Method:** Written exam at the end of the semester and/ or assignment.

**Teaching Language:** Greek.

**Bachelor Thesis (code: 6907)**

Course type: Optional
Course level: First studies cycle
Coordinator: Associate Professor Al. Zymbidis, Department of Statistics
E.C.T.S.: 8

**Desired Learning Outcomes:** At the end of the thesis the student will have extensive experience in using interdisciplinary knowledge in a particular area and will have improved his/her understanding of a research question or problem, the analysis and processing of the relevant evidence and other problem solving techniques as appropriate

**Prerequisites:**

**Syllabus:** It can only take place in the 4th year of studies, or later. In order for a student to be able to conduct a thesis he/she must have passed all compulsory courses and hold an average grade of at least 7. The work lasts one Semester. A supervising Professor is assigned, as well as two other faculty members as examiners. The thesis is presented on a specific day and time specified for all theses within (or shortly before) the corresponding exam. The thesis corresponds to 8 PM.

---

**Practical Training (code: 6801)**

Course type: Optional
Course level: First studies cycle
Coordinator: Professor D. Karlis, Department of Statistics
E.C.T.S.: 6-14

**Desired Learning Outcomes:** Upon completion of the practical training the student will be able to:

- Know how they can deal with a statistical problem with real data
- Be able to understand, explore and formulate a real problem of statistical content in the sense of statistical analysis.
- Know the role of a statistician in a company and the way of interacting with colleagues and function within a group.
- Understand time allocation when working on a project.
- Learn to handle various types of data, coming from different sources.
- Learn how to compile reports on the results of statistical analyses.
- Transfer theoretical knowledge to practical aspects
- Acquire work experience and work skills while discovering the working environment.
- Learn how to write a CV and choose prospective employers/work environment

**Prerequisites:**

- Student must have completed the 5th semester.
- Not have participated again in practical training
- Have accumulated at least 80 ECTS's
- Have successfully completed at least 8 compulsory courses
- Participate in a relevant informative session/seminar of the Practical Training office.
**Syllabus:** The Practical Training can take place only once and it refers to the application of statistical methods in a workplace of the Public or Private Sector. To start with the practical training, everyone interested should obtain the assent of a Department Professor who will act as a supervisor, and the approval of the Department’s coordinator, and then fill out the forms available on the Department’s website. The start of the Practical training can take place after the 5th Semester. The student must have registered at least 80 ECTS, passed a minimum of 8 compulsory courses and attended a relevant seminar. Depending on the subject and its duration, it can yield from 6 to 14 ECTS. The number of ECTS is determined by the Practice Exercise Coordinator at the suggestion of the supervisor faculty member. URL: http://internship.aueb.gr/.
THIRD PART
GENERAL INFORMATION FOR THE STUDENTS

The Athens University of Economics and Business emphasizes not only in providing high quality education, but also high quality services. The issue of PD 387/83 and the Law 1404/83, defines the operation, organization and administration of Student Clubs in the Universities, which aim at improving the living conditions of the students, their entertainment and the promotion of their social and intellectual education with processes and initiatives to participate in socialization.

Fulfillment of this objective is pursued by ensuring the necessary infrastructure for accommodation, feeding, training of students, with the operation of a restaurant, a canteen, a reading room, a library, organizing lectures, concerts, theater productions and excursions locally and abroad, developing international student relations, teaching of foreign languages and computer science as well as Modern Greek as a foreign language for foreign and expatriate students and the provision of any other means.

1. Cost of Living
The cost of living is determined by the current housing and feeding prices. This cost is reduced if students qualify for free housing and meals.

2. Housing
The Student Club of the Athens University of Economics and Business is responsible for providing free accommodation to its students under certain conditions, which are available on the Student Club’s website. At the same time, the Student Club of the University also has a Housing Finding Office, which collects ads for renting apartments.

3. Feeding
In the main building of the University operates a restaurant where all members of the academic community can eat free or for a fee. Free meals are granted to those that meet the necessary conditions, which they can be informed about by the Student Club office.

4. Medical Services, Insurance/ Healthcare
The undergraduate, postgraduate and doctoral candidates of the University that have no other medical and hospital care are entitled to full care in the National Health System, with expenses covered by the National Health Services Provider (EOPYY). The university’s infirmary is housed in the main building and operates on some working days. The Psychiatric Counseling Service also operates at the University, where a physician specializing in the psychodynamic treatment of mental health issues is employed.

5. Services for students with special needs
The University ensures the facilitation of students with special needs through the design, implementation and application of adaptations to the university’s environment for access to university buildings. More specifically, in the main building there are specially designed lifting equipment, ramps and lifts. There are also specific exam rules for students with special needs. The Study-Room of the Library is accessible by anyone who uses a wheelchair.
or has other problems with mobility. A lift for mobility-disabled people is available in the staircase of central building that leads to the entrance of Study-Room. It is suggested that you should use Antoniadou or Derigni entrances to enter the Building.

Electronic access in the Library for students with sight disabilities:

There is the possibility of electronic access to the proposed Greek literature from students of AUEB that face impaired sight problems which cannot be corrected using eye lenses to a degree that would be sufficient for reading and generally students who because of disabilities are unable to read a printed text in a conventional manner or understand the content of a work using their natural senses.

For this purpose, within the framework of the Hellenic Association of Academic Libraries Link (HEAL-Link), it has been developed a multimodal electronic library called AMELib, accessible to students who face serious sight-problems. To enter the service, user authentication is required.

6. Financial Support for Students

Undergraduate students of Higher Education Institutions and Higher Ecclesiastical Academies, Greek nationals or nationals of other European Union countries, are entitled to annual housing allowance in accordance with the terms and conditions set out in Joint Ministerial Decision 140832 / G1 / 25-8-2017 (FEK 2993 B / 31-8-2017).

Also, the State Scholarship Foundation (IKY) grants annual scholarships and scholarships and grant loans to students who have exceeded the examinations: a) six-month courses and b) admission to universities. The Secretariats of the respective Departments shall notify the names of the Candidate Scholars by announcing them and will set the deadlines for submitting their supporting documents.

In addition, at the University operates the "George Halkiopoulos Foundation", which grants scholarships depending on the educational performance and the financial status of the candidates. In October of each academic year, the Foundation (Public Relations Department, ground floor building) announces the scholarship amount, as well as the manner and timing of submission of interested parties' applications.

Finally, other awards are granted occasionally by various Institutions, Organizations and Businesses. Information is provided by the Department of Education Department of Student Welfare (ground floor of the main building) and by the Secretariats of the Departments, as well as on the central AUEB website.

7. Office of Student Affairs – Student Counselors

At the beginning of the studies, each student of the Department is assigned a Faculty member as Student Counselor. The Student Counselor advises the student for matters of his studies. The students distribution to the counselors is done under the responsibility of the Department’s President. In the case that a faculty member is on educational leave, then a surrogate is set for the students he advises, under his responsibility. In the case that a faculty member leaves the Department, the President has the responsibility to distribute his
students to the remaining members.

8. Study Centers – Reading Rooms – Libraries

The Library & Information Center (BCC) of the Athens University of Economics and Business was established in 1920 and is located on the first and second floor of the University's central building. It is a part of the Hellenic Academic Libraries Association (Heal-LINK), the European Documentation Centers Europe Direct and the Economic Libraries Cooperation Network (DIOB).

At the Library there are also three (3) Documentation Centers:

- The European Documentation Center (KET) since 1992,
- The Organization for Economic Cooperation and Development (OECD) Documentation Center since 1997
- The Delegation Center of the World Tourism Organization (WHO) publications since 2004.

The Library contributes decisively both to meeting the academic community’s needs for scientific information as well as to support the teaching and research work. This objective is achieved through the unified organization of collections and the coordination of the services provided. The Library provides access to:

- the printed collection of books and scientific journals,
- courses textbooks,
- the collection of electronic scientific journals
- e-books collection
- the postgraduate theses and doctoral theses produced in AUEB and deposited in digital form at the PYXIDA institutional repository
- sectoral studies
- statistical series by national and international organizations
- audiovisual material
- information material (encyclopedias, dictionaries)
- Collection of official governmental publications of the European Union, the OECD and the WCO
- databases on the issues cultivated by the University
- printed collections of other academic libraries.

The Library is lending to its members, in all its printed collections, except for magazines and statistical series, according to its internal rule of operation. The Library has a reading room, computer workstations for visitors, photocopiers and printing machines, and provides the opportunity to interlibrary loan books and magazine articles from other academic libraries that are members of the networks in which it participates.
9. International programs and practical information regarding international student mobility

AUEB is actively involved in the Erasmus+ Program by promoting cooperation with universities, businesses and international organizations of the European Union (EU) as well as the mobility of students, teaching and administrative staff. Within the framework of the above Program, the University collaborates with more than 220 European Institutions on the subjects that concern its Departments. More than 7000 students have participated so far in the Erasmus Program at AUEB. From 1989 up to now approximately 4000 students have attended courses at EU partner institutions while approx. 3000 were welcomed to our university and took courses in English for one semester or one full academic year. In addition, the Foundation co-ordinates the Erasmus+ Practical Training Group with partners from the National Technical University of Athens and the Universities of Crete, Ioannina and Macedonia, offering the possibility of practical training for students of these five (5) Universities as well as the ability to further educate and train the staff. Finally, the University, acting in accordance to the internationalization and extroversion strategy, has been successfully participating in the International Credit Mobility Program with the aim of developing international collaborations in education and research with Partner Universities in countries outside the EU. through: a) student mobility; b) the mobility of teaching staff for short-term teaching; and c) the mobility of teaching and administrative staff for training. The Program is being implemented in the University from the academic year 2015-2016 and to date there have been 52 students and staff members moving from and to 8 Partner Institutions in countries outside the EU. (USA, Canada, Singapore, Russia, South Korea, Armenia). More information can be found on the Foundation's homepage (https://www.aueb.gr/el/content/πρόγραμμα-έρασμος).

10. Language lessons

Knowledge of foreign languages, as a universally accepted educational value, is a necessary resource for effective participation of the individual in the complex work and social reality. The Student Club, understanding this modern educational necessity, offers the opportunity to every university and technical university student, as well as to all those who are interested, in attending relevant seminars. Seminars are held in English, French, German, Spanish, Italian and Russian, and new language seminars are available if there is a similar interest.

11. Practical Training

The mission of the Central Office of Practical Training is to promote in the best possible way the linking of theory to practice and the transition of students from student to working life. Practical Training is an integral part of education at the Athens University of Economics and Business, as all Departments have instituted and included it in their curriculum. It lasts 2 to 4 months and is mainly implemented in three periods (winter
semester, spring semester and summer season). Prepare seminars are carried out before each internship. Information: 13 Elpidos street, 3rd floor.

12. Sports Facilities
The Athens University of Economics and Business organizes a variety of sports activities. It has a long history in sports with a multitude of distinctions, medals, cups, prizes in national and international competitions. In order to continue to provide complete education to its students, the Athens University of Economics and Business collaborates with the City of Athens Cultural, Sports and Youth Organization and uses its sports facilities, located at 10 Pasov Street, Grava, Ano Patissia (indoor swimming pool, indoor basketball and volleyball court, open athletics course at the junction of Ermonassis & Pityountos - Thermis (5x5 open soccer field) and at the junction Street Mitsakis & Polyla - Ano Patissa (Open tennis tennis) court.

The teaching of the courses in the Department of Physical Education of AUEB follows the curriculum for the teaching of academic subjects. It begins with the beginning of the winter semester and ends with the end of the spring semester courses. It is worth noting that students have the right to attend Physical Education courses up to six months after receiving their Diploma. The Department of Physical Education of the Athens University of Economics and Business is staffed by well-trained Physical Education Teachers and by temporary specialized teaching staff.

13. Student Clubs
Various Student Organizations and Clubs are active and developing in the academic community of the Athens University of Economics and Business. More information can be found on the main website of AUEB.

14. Career Office
The Office’s main task is to assist students and graduates of the University to join the labor market and guide them for postgraduate studies. The Career Office assists students and graduates in their first steps to find work: (a) by communicating available positions and promoting CV’s to collaborating businesses and organizations, (b) organizing Occupational Orientation Days where students and graduates get the chance to meet and discuss with businesses and other organizations representatives, (c) organizing seminars concerning the job interview procedure, as well as presentations of the current trends in the job market, (d) providing printed and electronic material with directions on how to write the cv and the cover letter, as well as advices for job interviews, (e) giving the chance to students and graduates to talk with consultants for career or educational issues and also to use the special psychometric tests.

The office also provides extended information for AUEB’s undergraduate and postgraduate programs, other postgraduate programs in Greece and abroad, scholarships and Greek businesses.

The Office publishes information brochures and organizes informative events as well as regular visits of high school students to the University’s premises. In addition, the Office maintains a database of graduate employment data and job positions, which provides an
insight into the supply and demand of the labor market. The Office also cooperates with The Athens Center for Entrepreneurship and Innovation.

**15. Unit of Innovation and Entrepreneurship**

The Unit of Innovation and Entrepreneurship task is to encourage innovative thinking and foster entrepreneurship in the AUEB community, to support the students of the University and the wider public that is interested in entrepreneurship, understand requirements and organize new innovative business endeavors. For that reason:

- The Unit's website provides direct and continuous access to relevant information, knowledge and practical tools to encourage creativity and to provide the means for managing innovation and organizing successful business efforts.
- The Unit's helpdesk offers the possibility of direct personal communication for information and problem solving.
- Professors and Partners of the unit produce educational material providing students with instructions and information on the cutting edge of developments in various scientific fields.
- The Unit supports teaching of entrepreneurship courses by providing contemporary material and tools to the teachers.
- The Unit organizes open events, seminars and visits to lessons giving the opportunity of direct contact with successful entrepreneurs and prominent executives in order to improve students' understanding by reducing the distance between theoretical training and the practical application of their ideas.
- The Unit closely cooperates with the Advisory Steering Committee, providing the opportunity to enhance educational activities and provide practical knowledge to students, with the assistance of specialized teachers and executives.

The Unit also provides support for the start-up of new business groups through the services of the ACEin Center (Athens Center for Entrepreneurship (https://acein.aueb.gr/)).