

ΟΙΚΟΝΟΜΙΚΟ  
ΠΑΝΕΠΙΣΤΗΜΙΟ  
ΑΘΗΝΩΝ



ATHENS UNIVERSITY  
OF ECONOMICS  
AND BUSINESS

# List of Courses Offered in English



Academic Year

2024-2025



Erasmus+

# Erasmus+



## Academic Year 2024-2025

1. All the Erasmus incoming students are kindly requested to take into consideration that the above-mentioned dates **MUST** be respected according to the Erasmus student Charter *Erasmus students should comply with internal regulations of the host institution*. As a result, they should not reserve their return tickets for earlier dates.
2. Exceptional Changes to the Study Programme  
Changes to the study programme should be exceptional, as the three parties have already agreed on a group of educational components that will be taken abroad, based on the course catalogue that the Receiving Institution has committed to publish well in advance of the mobility period and to update regularly.  
Any party can request changes to the study programme within two weeks after the start of each semester. These changes should be agreed by all parties as soon as possible within two-weeks following.
3. Attendance at each course is compulsory, after submission of the final Learning Agreement. Four justified absences from each course are accepted. The same applies for the Greek Language course, which is offered free of charge at each semester.

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# SCHOOL OF BUSINESS



DEPARTMENT OF MANAGEMENT SCIENCE AND TECHNOLOGY



FALL SEMESTER

## Innovation in Organizations: Knowledge, Creativity and the Processes of Innovation

Code: 9037

Instructor: Klas Eric Soderquist

ECTS Credits: 6

Communication with the Instructor

[soderq@aueb.gr](mailto:soderq@aueb.gr)

Knowledge, Creativity and the Processes of Innovation

- Type of course (compulsory, optional)

Optional.

- Level of course (e.g., first, second or third cycle; sub-level if applicable)

Advanced

- Learning outcomes

Today, all kinds of organizations and businesses must have the ability of constantly innovating and turning environmental uncertainty into exploitable advantages. In this context, demands for creative thinking, and better use of organizational knowledge for enhanced innovation performance and innovation output are raised on employees at all levels. This course provides an introductory overview of innovation, innovation processes and innovation management, placing particular emphasis on the underlying phenomena of knowledge and creativity. The objective is to improve the students' understanding the nature and dynamics of organizational knowledge, the prerequisites and processes of organizational creativity, and how knowledge and creativity relate to innovation.





Innovation in itself is central to the course. Various forms of innovation that can be pursued by organizations will be explained, and the students will develop frameworks for analyzing how different organizational structures, processes and management methods can be used for implementing and managing innovation. The course aims at opening up the black box of innovation and equipping the students with concepts and frameworks that will help them to apprehend and better manage innovation.

- Mode of delivery (face-to-face, distance learning)

Face-to face teaching, individual student work and student presentations. Three (3) effective face-to-face teaching hours per week.

- Prerequisites and co-requisites

Introductory courses in Management and/or Business Strategy and/or Organizational Behaviour are recommended.

#### Recommended optional programme components

Independent research and use of bibliographical sources to synthesize material and analyze specific topics related to innovation.

- Course contents

#### INTRODUCTION TO THE COURSE (SESSION 1)

- Structure and Requirements
- Overview of the three subject topics – Innovation, Creativity and Knowledge.

#### INNOVATION (SESSIONS 2-3 & 5 & 7)

- What is innovation and where does it happen? Definitions, Terminology, Types and Forms of Innovation,
  - Determinants of Creativity and Innovation,
  - Insights from Innovation Leaders. Open Innovation,
  - Drivers for innovation,
  - Innovation management frameworks, the new product and service development process, bringing innovation to the market,
  - Opportunities for Innovation: Ten Types of Innovation.
-



BASICS OF CREATIVITY AND KNOWLEDGE AND THEIR MANAGEMENT (SESSION 4)

- Overview of creativity as a concept – Core elements, Myths & Truths,
- The language of knowledge.

INTERMEDIARY PRESENTATIONS (SESSION 6)

FURTHER ON CREATIVITY (SESSION 8)

- Creative Strategizing - Strategic management frameworks and their relation to creativity and innovation,
- Creativity Tools - Developing the creative potential of human resources,
- Blockages to innovation and creativity.

FURTHER ON KNOWLEDGE (SESSIONS 9-10)

- Forms of organizational knowledge,
- The Knowledge Effect – Valuing Intellectual Capital,
- Knowledge Management – What and How,
- Tools for Knowledge Management,
- In-Term Exam.

FINAL PRESENTATIONS (SESSIONS 11-12)

- Recommended or required reading



Textbooks:

Textbooks are recommended mostly for the part on innovation management. One of the following textbooks is a useful background reading for the entire course:

- Keely, L. et al (2013), *Ten Types of Innovation: The Discipline of Building Breakthroughs*, John Wiley.
- Schilling, M. (2016), *Strategic Management of Technological Innovation*, 5<sup>th</sup> Edition, McGraw-Hill. Earlier editions are also still relevant!
- The [OSLO MANUAL, OECD](#), chapters 2 and 3.



Other important books in the innovation field:

- Burgelman, R.A. Christensen, C.M. & Wheelwright, S.C. (2008), *Strategic Management of Technology and Innovation*, 5<sup>th</sup> Edition, McGraw-Hill.
- Chesbrough, H.W. (2006) *Open Innovation The New Imperative for Creating and Profiting from Technology*, Harvard Business School Publishing.



- Christensen, C.M. (1997), *The Innovators Dilemma*, Harvard Business School Press.
- Christensen, C.M. & Raynor, M.E., (2003), *The Innovators Solution*, Harvard Business School Press.
- 📖 Highly rated books on Knowledge and Creativity
- Milton, N. & Lambe, P. (2016), *The Knowledge Manager's Handbook*, Kogan Page Publishers.
- Easterby-Smith M and Lyles M. (eds), (2011), *Handbook of Organizational Learning and Knowledge Management*, 2<sup>nd</sup> Edition, Wiley.
- Michalko, M. (2001), *Cracking Creativity: The Secrets of Creative Genius for Business and Beyond*, Ten Speed Press.

📖 Articles

In the following, articles are listed for each of the three different parts of the course. Two articles in each part are compulsory readings for all students. These articles are listed first in bold. Another three articles are listed per part, as an indication of important readings depending on the subject of the dissertation selected by the students.

INNOVATION

- Crossan, M.M. & Apaydin, M (2010) "A Multi-Dimensional Framework of Organizational Innovation: A Systematic Review of the Literature", *Journal of Management Studies*, 47(6): 1154-1191.
- Dyer, J.H., Gregersen, H.B. & Christensen, C.M. (2009) "The Innovator's DNA", *Harvard Business Review*, December: 61-67.
- Christensen, C.M., Raynor, M. & McDonald, R. (2015), "What is Disruptive Innovation", *Harvard Business Review*, Dec ember: 44-53.
- Huston, L. & Sakkab, N. (2006) "Connect and Develop: Inside Procter & Gamble's New Model for Innovation", *Harvard Business Review*, March: 58-66.
- West, J. & Bogers, M. (2013), "Leveraging external sources of innovation: A review of research on open innovation", *Journal of Product Innovation Management*, 31(4): 814-831.

CREATIVITY

- Herrmann, D. & Felfe, J. (2014), "Effects of Leadership Style, Creativity Technique and Personal Initiative on Employee Creativity", *British Journal of Management*, 25(2): 209-227.
- Florida, R. & Goodnight, J. (2005), "Managing for Creativity", *Harvard Business Review*, July-August: 124-131.



- Amabile, T.M. et. al. (2002) "Creativity under the Gun", *Harvard Business Review*, August: 52-61.
- Kelley, T. & Kelley, D. (2012), "Reclaim Your Creative Confidence", *Harvard Business Review*, December: 115-118.
- Sutton, R.I. (2001), "The Weird Rules of Creativity", *Harvard Business Review*, September: 94-103.

#### KNOWLEDGE

- Nonaka I, von Krogh, G. & Voelpel, S., (2006), "Organizational Knowledge Creation Theory: Evolutionary Paths and Future Advances", *Organization Studies* 27(8): 1179-1208.
- Johns, T. & Gratton, L. (2013), "The Third Wave of Virtual Work", *Harvard Business Review*, January-February: 66-73.
- Huang, P., Tafti, A., & Mithas, S. (2018). The secret to successful knowledge seeding. *MIT Sloan Management Review*, 59(3), 10-13.
- Soderquist, K.E. (2006), "Organizing Knowledge Management and Dissemination in New Product Development: Lessons from 12 Global Corporations", *Long Range Planning*, 39(5): 497-523.

- Planned learning activities and teaching methods

Nine lectures and three presentation sessions. Lectures, reading assignments, exercises, games, individual student work and student presentations.

- Assessment methods assessment methods and criteria

70% of the grade is based on a dissertation (60% written report, 10% presentation), which can be done by 1 – 3 students. It is recommended that students do it in pairs of two.

30% of the grade is based on an individual In-Term Exam.

Two individual reading assignments are also required to pass the course. These are not graded, only "Pass" or "Fail & Resubmit" to enable Pass. The reading assignments relate to the following three articles (also among the bold above):

#### INNOVATION

Crossan, M.M. & Apaydin, M (2010) "A Multi-Dimensional Framework of Organizational Innovation: A Systematic Review of the Literature", *Journal of Management Studies*, 47(6): 1154-1191.

#### CREATIVITY



Herrmann, D. & Felfe, J. (2014), "Effects of Leadership Style, Creativity Technique and Personal Initiative on Employee Creativity", *British Journal of Management*, 25(2): 209-227.

KNOWLEDGE

Nonaka I, von Krogh, G. & Voelpel, S., (2006), "Organizational Knowledge Creation Theory: Evolutionary Paths and Future Advances", *Organization Studies* 27(8):1179-1208.

Each student must do the first reading assignment on the Innovation article by Crossan & Apaydin. Then, each student selects one of the other two papers for their second reading assignment. More details about the reading assignment (2 articles) will be handed out separately.

The In-Term Exam will take place in session 10, approximately 2 weeks before the Christmas break.

Concerning the dissertation, it is recommended that it is done in pairs of two students. Each student must explicitly indicate his/her individual contribution to the whole and the presentation must be shared between the students.

Students will select topic area as soon as possible (emphasis on Innovation *or* Creativity *or* Knowledge – integrated subjects are also encouraged). The final dissertation must contain a synthesis of various literatures on the selected subject (topic area and specific theme within selected topic area), and an integration of examples from practice through the study of company/organization cases and company/organization websites. Students are also encouraged to enrich their dissertation with primary data, e.g., from interviews with managers or other relevant actors in Greece or in their home country of studies.

A template for the dissertation will be handed out at the beginning of the class. Indicatively, the dissertation should be about 6.500 words (between 6.000 and 7.000 words).

It is estimated that the dissertation will require at least another three (3) effective study hours per week and student.

- Language of instruction  
English
- Work placement(s) N.A.



# Managerial Decision Making

Code: 9047

Instructor: Manolis Kritikos

ECTS credits: 6

Level: Advanced

Communication with the Instructor

[kmn@aueb.gr](mailto:kmn@aueb.gr)

## Course Outline

This course outline describes the course Managerial Decision Making. It has been organized into the following sections:

1. Basic Information about the Course
2. Aim of the course
3. Planned learning activities and teaching methods
4. Learning Outcomes
5. Reading List
6. Syllabus
7. Course Assessment.

## Basic Information about the Course

Prerequisites: None

Teaching Methods: The class meets once a week

## Course Objectives

The course introduces the student to the methodology of decision making, as well as to the major models used today. Decision making is one of the most important functions of management. The three major categories of models are covered: Linear and Integer Programming, Decision Analysis, and Simulation. In each unit, the student is exposed to a number of applications, and has the opportunity to apply his/her knowledge to a number of problems such as Transportation, Assignment and Network models. In addition to developing models, the student is exposed to a number of computer packages, most of them based on Excel, to use in order to solve the problems.



#### Planned Learning Activities and Teaching Methods

We cover the course material in lectures. Attending lectures is compulsory. This is the best way of being introduced to a topic. Self-study is a vital and significant part of studying for the course.

#### Learning Outcomes

Decision-Making is one of the most important functions of management. Today's business environment is characterized by high competition, constant changes, extensive globalization, large availability of data and information, and the huge penetration of information and telecommunications technology. In this environment, decision making is increasingly based on the use and analysis of data, through the development of "models", and the use of user-friendly, PC-based computer packages.

On completion of this course, students should be able to: to understand and formulate decision making problems, and to use the computer technology efficiently in order to make the best decision.

#### Reading List

##### Required Textbook

G.P.Prastacos, (2008), *Managerial Decision Making Theory and Practice*, Tsinghua University Press

##### Recommended Reading

N.Balakrishnan, B.Render, and R.M.Stair, Jr. (2013), *Managerial Decision Modeling with Spreadsheets*, Pearson Education Inc.

C.P.Bonini, W.H.Hausman and H.Bierman, (1997), *Quantitative Analysis for Management*, McGraw-Hill / Irwin

G.L.Nemhauser and L.A.Wolsey, (1999), *Integer and Combinatorial Optimization*, Wiley Interscience

W.L.Winston and S.C. Albright,(2002), *Practical Management Science*, South-Western College Pub.

#### Syllabus

##### Managerial Decision Making

##### Overview

The Fundamentals of Operations Research: Introduction to management Science; The methodology of Decision Making; Models in Managerial Decision Making

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Linear Programming (LP): Introduction; Characteristics of LP Problems; Graphical solution of a LP problems; A Maximization Problem; a Minimization Problems; Problems General Formulation and Assumptions of LP problems  
Sensitivity analysis in Linear Programming: Dual Prices in LP; Reduced costs in LP; Changes in the Objective Function's Coefficients; Changes in the Right Hand Sides (RHS) of the Constraints; Evaluation of a New Activity  
Using Solver to Solve Linear Programming Problems: Introducing the model in Excel; Solving the Problem; Understanding and Analyzing the Solution – SOLVER Reports.

Integer Programming (IP): Introduction; Formulating IP Problems with Binary Variables; Formulating IP Problems; Solving IP problems; Solving Integer Programming Problems with SOLVER.

Implementing Management Science in Practice: Marketing and Sales problems; Production and Inventory problems; Networks and Transportation problems; Logistics and Supply Chain problems; Investments problems; Human Resources problems.

Decision Analysis and Precision Tree: Introduction; Criteria for Making Decision under Uncertainty; The Expected Value of Perfect Information; Decision Tree; Calculating the Risk Profile a Strategy; Sensitivity Analysis; Using Precision Tree to Solve Decision Analysis Problems.

Simulation: Introduction; Implementation of Simulation under Conditions of Uncertainty

Using Excel and @Risk in Simulation: Introduction; Simulation of Queuing Systems; Simulation of an Inventory System; Analysis of Simulation Results.

#### Course Assessment

The following notes offer guidance on how you will be assessed for the course. The final grade will be based on homework, classroom participation, an individual essay, case studies and a final exam. The breakdown of the final grade will be approximately as follows:

- 20% homework and classroom participation
- 30% individual essay and group case studies
- 50% final written exam



# Modern Enterprise Information Systems

Code: 9049

Instructor: George Ioannou

ECTS credits: 6

Instructor: George Ioannou

Level: Advanced

Communication with the Instructor  
[ioannou@aueb.gr](mailto:ioannou@aueb.gr)

Web: [www.msl.aueb.gr/people.html](http://www.msl.aueb.gr/people.html)

## COURSE DESCRIPTION

Modern Enterprise Information Systems include all the transactional level platforms and integrated software applications that enable the capturing of company data within data bases in a structured and efficient way. The most typical such system is the ERP, which incorporates functionalities that cover all business tasks, from the procurement of materials to the collection of payments from customers, and from the issue of a production order to the delivery of consolidated shipments to the customers' warehouse, all within a single and totally integrated system. The specific course will address ERP in its whole, i.e., will cover all applications areas in enterprises of today and will also provide additional knowledge about systems that go beyond and complement ERP's transactions such as CRM, WMS, etc. Practical sessions on widely used ERP systems will be offered on top on theoretical and applied-knowledge lectures. Lab exercises, case studies and assignments will be the basis of grading in this course.

## COURSE OBJECTIVES

Students will:

- Analyze a business' enterprise activities, workflow and process to identify problems, weaknesses, strengths, threats, opportunities, stakeholders and entities interacting with the enterprise;
- Propose reengineered enterprise processes that optimize the enterprise's performance;



Design integrated organizational structures and business processes that optimize the enterprise's performance, overcome problems and weaknesses of current processes;  
Understand the scope of ERP systems and corporate motivation for implementing ERP;  
Appreciate the challenge associated with implementing such large-scale systems and the dramatic impact these systems have on key business processes;  
Gain an understanding of process integration inherent in ERP;  
Solve optimization models for production planning and models for operations management;  
Gain an appreciation of related concepts, technologies, and trends in ERP including forward, backward, and upward integration of the enterprise using supply chain management and customer relationship management;  
Experience the Microsoft Office Excel, Microsoft Office Visio, Expert Choice and Microsoft Dynamics NAV software.

#### COURSE TOPICS

The course will cover the following topics:

Supply Chain Management Overview  
Enterprise Resource Planning (ERP) Systems Overview  
Optimization Models for Production Planning (Microsoft Office Excel)  
Models for Operations Management (Microsoft Office Excel)  
Business Process Reengineering (BPR) using Microsoft Office Visio  
Multi-criteria Decision Making (The Analytic Hierarchy Process, AHP) using Expert Choice  
Microsoft Dynamics NAV – An ERP System

#### COURSE METHODOLOGY

The goal of this course is to develop analytical and critical thinking skills for the development of integrative plans for enterprise-wide systems that optimize enterprise performance. Most class sessions will involve lecture and extensive discussion of ERP based on content contained in the textbooks, readings and cases. Students will be expected to make substantial contributions to the learning process through participation in class



discussion. In addition, they will be responsible for several individual assignments.

To pass this course students should:

Prepare: Spend as much time needed to study the assigned topics before coming to class;

Practice: Review and practice the lab exercises at their own pace;

Present: complete the homework assignments, come to class, and deliver their work to the instructor.

#### COURSE PLATFORM

Students will find course lectures, assignments, useful links etc. at the following links:

E-learning portal: <https://edu.dmst.aueb.gr/>

Management Science Support: <http://www.msl.aueb.gr/msupport.html>

#### COURSE MATERIAL

Hamilton S. *Managing your Supply Chain using Microsoft Navision*. New York: McGraw-Hill; 2004.

Hamilton S. *Maximizing your ERP System: A Practical Guide for Managers*. New York: McGraw-Hill; 2003.

Presentations (Lectures)

#### REQUIRED SOFTWARE

Microsoft Office Excel (to solve optimization models for production planning and operations management)

Microsoft Office Visio (business process reengineering)

Expert Choice (multi-criteria decision making - AHP)

Microsoft Dynamics NAV (ERP System)

#### ASSIGNMENTS

The assignments are designed to familiarize students with the major challenges involved in specifying, selecting and implementing ERP. Assignments include lab exercises and cases studies related to optimization models for production planning, models for operations management, business process reengineering methodology, analytic hierarchy process and Microsoft Dynamics NAV. Students will be responsible for individual assignments.

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### STUDENT RESPONSIBILITIES

This class requires a consistent and substantial week to week commitment on the part of the student. Students are expected to complete reading assignments prior to class and to participate actively in class discussion. Assignments should be emailed on the specified due date. Late work will receive no credit.

Class participation is measured by student's active involvement in discussion of the lab exercises and cases.

### ACADEMIC INTEGRITY POLICY

In accordance with The Athens University of Economics and Business' Academic Regulations, cheating in any form will not be tolerated. This includes plagiarism or receiving inappropriate assistance on examination and/or assignments. Cheating is an extremely serious academic offence

### TENTATIVE SCHEDULE

Topic	Sub-topic	Specialty
Introduction	ERP Systems Overview	Introduction to Enterprise Resource Planning Systems (ERPs) Architecture and Technical Specifications of ERPs Operational Issues and Modern ERPs Advantages of using ERPs in Modern Enterprise Critical Issues for a Successful ERP Integration Methodological Approach for choosing and Integrating ERPs
Maximizing your ERP System I	Supply Chain Management Overview	Logistics in Supply Chain Management Technology Structure Operations Network Designs Administration Optimization Models for Production and Operations



		Management
Maximizing your ERP System II	Material Requirement Planning	Needs for Material Planning Basic MRP Concepts Factor Affecting the Computation of MRP Objectives of MRP System Prerequisites and Assumptions of MRP Inputs to MRP MRP Outputs MRP Logic in Brief Manufacturing Resource Planning (MRP II) MRP Implementation How Can Industry Benefit from MRP?
Material Requirement Planning (Lab Exercises)		
Technology Platforms for ERP Systems		
Multi-criteria Decision Making	Analytic Hierarchy Process	Decision Hierarchy Preferences Synthesization Applications Decision Making using Expert Choice
	Lab Exercises	
	Assignment	Case Study
Managing your Supply chain using Microsoft Dynamics	Lab Exercises	Case Study
Managing your Supply Chain using Microsoft Dynamics NAV II	Lab Exercises	Case Study



SPRING SEMESTER

## Applied Software Engineering

Code: 9002

Instructor: Diomidis Spinellis

ECTS credits: 6

Level: Advanced

Communication with the Lecturer

[dds@aueb.gr](mailto:dds@aueb.gr)

Objective of the course (expected learning outcomes and competences to be acquired)

While most Information Systems and Computer Science courses traditionally deal with the development of new systems, in practice developers spend the largest part of their time in software life-cycle activities that follow the development phase. The objective of the course is to allow students to read and understand a system's software elements (code, structure, architecture). Having followed this course, students should be able to intelligently decide on how existing systems will be maintained, setup design and evolution strategies for legacy code, and prescribe the use of refactoring for dealing with architectural mismatches and low-quality code. An innovative aspect of the course involves the use of Open Source Software (OSS) in course examples and exercises. Through the study of OSS students will be able to see how non-trivial applications like the Apache Web server, the Postgres Relational Database Management System, the Jakarta Java servlet container and the Cocoon framework are structured.

Prerequisites

Proficiency in programming and software development

Course contents

Course outline: Course Introduction; Code as Part of the Software Development Process; The Open Source Landscape; Tackling Large Projects; Version Control; Declarative Drawing; Build Management; Code-Reading Tools; General Purpose





Tools; Performance Measurement and Management; Inspection and Testing; Coding Standards and Conventions; Documentation; Maintainability.

Recommended reading

Pierre Bourque and Richard E. Fair (editors). Guide to the software engineering body of knowledge. IEEE Computer Society Press, 2014.

Diomidis Spinellis. Code Reading: The Open Source Perspective. Addison-Wesley, 2003.

Diomidis Spinellis. Code Quality: The Open Source Perspective. Addison-Wesley, 2006.

Martin Fowler. Refactoring: Improving the Design of Existing Code. Addison-Wesley, 2000.

Michael Feathers. Working Effectively with Legacy Code. Prentice-Hall, Englewood Cliffs, NJ, 2005.

Mode of delivery

Lectures, labwork, and coursework

Assessment methods

Coursework

Language of instruction

Greek & English



# Production and Operations Management

Code: 9030

Instructor: Dimitrios Zisis

ECTS credits: 6

Level: Advanced

Communication with the Instructor

[dzisis@aueb.gr](mailto:dzisis@aueb.gr)

## Learning Outcomes

The aim of the course is to introduce the student to the design, analysis, reengineering, optimisation and functional control of Manufacturing and Service operations, and to highlight the need for effective management of the constrained resources of operations systems. Through the course, the student will understand the organizational structure and the various components and functions of a Production or Service Operations System. They will practice basic analysis and problem-solving methods that are used by all kinds of organizations to understand and optimize operations.

The topics of the course cover the major business processes inherent in the operation systems, starting from operations strategy – showing the bigger picture of operations in a transforming global economy. Then the course delves into product, service and process design, forecasting, facility location and layout, procurement and inventory management, operations scheduling, and, finally, quality control. In summary, the course provides: a) an introductory overview of the major areas of operations management, b) an understanding of the practical and theoretical problems encountered in operations, and, c) practice of tools and techniques for effective operations management emphasizing both qualitative reflection and quantitative methods.

Mode of delivery (face-to-face, distance learning)

Face-to face teaching, individual work on cases and exercises.

Prerequisites and co-requisites

Fundamentals in quantitative methods. Fundamentals in management.



Recommended optional programme components

Simulation Game.

Video Tours of operations issues in companies and organizations.

Course contents

The topics included within the scope of Production and Operations Management (POM) are numerous and diverse. The following list provides the areas that will be covered within the course including recommended readings, which are available to the students through the AUEB Library and e-Library.

1. Introduction – Definitions

- Course content and structure
- Context and definitions of POM

Readings:

- o "Operations as a Competitive Weapon", Chapter 1 in Operations Management, L.J. Krajewski & L.P. Ritzman.
- o Merrifield, R. et al (2008), "The Next Revolution in Productivity", Harvard Business Review, June, pp. 73-80.

2. Operations Strategy and Lean Production

- The strategic framework, Illustration and deployment of operations strategies
- "New" operations strategies – Agile Operations

Readings:

- o "Operations Strategy", Chapter 2 in Operations Management, L.J. Krajewski & L.P. Ritzman.
- o Pisano, G.P. & Shih, W.C. (2009), "Restoring American Competitiveness", Harvard Business Review, July-August, pp. 114-125.
- o Womack, J.P. & Jones, D.T. (2005), "Lean Consumption", Harvard Business Review, March, pp. 59-68.

3. Product, Service and Process Design and Development

- Key concepts in product and service design
- The product development process and project
- Classifications of production process structures (product and process).

Video

Readings:



o "Process Design Strategy", Chapter 3 in Operations Management, L.J. Krajewski & L.P. Ritzman.

o Bonabeau, E et al (2008), A More Rational Approach to New Product Development, Harvard Business Review, March, pp. 96-102.

4. Facility Location

• Factors affecting location decisions

• Locating a single facility

Readings:

o "Location", Chapter 10 in Operations Management, L.J. Krajewski & L.P. Ritzman.

o Article

5. Facility Layout

• Layout types and performance

• Product and process layout designs - models/algorithms

• Application exercises in class

Readings:

o "Process Layout", Chapter 7 in Operations Management, L.J. Krajewski & L.P. Ritzman.

o Article

6. Capacity Planning

• Capacity strategies and tools

• Basic forecasting methods

• Application exercises in class

Readings:

"Process Capacity", Chapters 6 in Operations Management, L.J. Krajewski & L.P. Ritzman.

o Article

7. Forecasting

• Basic forecasting methods

• Application exercises in class

Readings:

o "Forecasting", Chapter 13 in Operations Management, L.J. Krajewski & L.P. Ritzman.

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o Saffo, P. (2007), "Six Rules for Effective Forecasting", Harvard Business Review, July-August, pp. 122-131.

8. The Beer Game

• Business game in class where students are practically familiarized with the problems of inventory control and management.

Readings (common to sessions 8-10):

o "Inventory Management", Resource Planning", and "Lean Systems", Chapters 15, 16, and 11 in Operations Management, L.J. Krajewski & L.P. Ritzman.

o Abernathy, F.H. et al, (2000), "Control Your Inventory in a World of Lean Retailing", Harvard Business Review, Nov-Dec, pp. 169-176.

o Liker, J.K. & Choi, T.Y. (2004), "Building Deep Supplier Relationships", Harvard Business Review, December, pp. 104-113.

9. Production Planning and Inventory Control I

- Deterministic models: Economic Order Quantity
- Materials Requirements Planning (MRP)
- Application exercises in class

10. Production Planning and Inventory Control II

- Just-In-Time – KANBAN
- Integrated exercise: Determining inventory strategy

11. Production Scheduling

- Operations Scheduling and Monitoring
- Application exercises in class

Readings:

o "Scheduling", Chapter 17 in Operations Management, L.J. Krajewski & L.P. Ritzman.

o Article

12. Statistical Quality Control and Total Quality Management – TQM

- Overview and introduction to Quality Management, Fundamental definitions
- Basics of Statistic Process Control (SPC)
- Application exercises in class

Readings:



o "Process Performance and Quality", Chapter 5 in Operations Management, L.J. Krajewski & L.P. Ritzman.

o Grant, R.M. et al (1994), "TQM's Challenge to Management Theory and Practice", Sloan Management Review, Winter, pp. 25-35.

#### Recommended or Required Reading

Krajewski, L.J. and L.P. Ritzman (2005). Operations Management: Strategy and Analysis, 7th Edition, Addison-Wesley, NY. (Newer and older editions, as well as any other Operations Management textbook cover all relevant issues).

Articles according to the above list.

#### Planned learning activities and teaching methods

Lectures, exercises in class, case assignments and readings, video illustrations and Business Game. Cases and readings are discussed in class, case assignments are also handed in written and can be part of formal assessment.

#### Assessment methods assessment methods and criteria

- Two case studies to accomplish in groups of two students (30% (2\*15%) of final grade).

- One individual reading note (10% of final grade).

- Final individual written exam (60% of final grade).

The first case study "Disney" consists of various documents that assess the students' understanding of fundamental introductory aspects of operations management and operations strategy. Students are asked to reflect on how an entertainment company and especially entertainment parks take into account different operational and strategic changes, and how operations interact with other functions of the enterprise.

The second case study "Fitness Plus Part A" (Krajewski & Ritzman, 2005, p. 272) is a capacity analysis and planning case. Students are faced with the problem of a fitness center that operates a number of training areas all which have different demand and different capacity. Students should calculate capacity of each area as well as total capacity for the center, and suggest how capacity should be balanced and what moves the center should make in view of maximizing utilization and customer satisfaction. The case requires calculation, reflection and use of capacity notions such as peak and effective capacity, capacity cushions and break-even analysis.



The reading note will be accomplished on the basis of one of the suggested articles (above list) selected by each student. Students can also propose a topic of their own choice. A template for the reading note will be distributed separately.

The final exam lasts for three hours and is composed of two parts. The first assesses through short questions and mini-cases the understanding of fundamental operations management concepts such as different operations paradigms (standardized and diversified mass production, lean production), product, service and process development concepts, procurement, location and lay out issues, forecasting issues and quality management. The second part is based on problems and assesses the different quantitative aspects of the course focusing on inventory management, capacity planning and statistic process control. The above are indicative areas covered, each exam is tailored to the specific emphasis given in class and adapted to what was examined in the case studies.





DEPARTMENT OF BUSINESS ADMINISTRATION



FALL SEMESTER

## Advertising and Communication Management

Code: 9003

Instructor: TBA

ECTS credits: 6

Level: Advanced

### Course Objective

The aim of this course is to examine the promotional function and the role of advertising for contemporary companies. The course focuses on the promotional elements in the marketing programs of domestic and foreign companies. Students will be introduced to the concept of integrated marketing communications (IMC) and consider how it evolves. Also, the course examines how various marketing and promotional elements must be coordinated to communicate effectively. Different IMC models are examined in addition with the steps in developing a marketing communication program.

### Prerequisites

Two marketing courses, at least an introductory one.

### Course Content

- Integrated marketing communication
- Setting communication objectives
- Advertising Planning & Decision Making
- Sales Promotion, Direct marketing & Personal Selling
- Public relations & Corporate Advertising
- Creative strategy
- Media Planning-Strategy & Tactics Media Evaluation



- Advertising Ethics
- Global Advertising
- Advertising and the law

Recommended Reading Material

R.White Advertising 4th ed. Mc Graw Hill

Belch & Belch Advertising & Promotion 6th ed. Mc Graw Hill

Teaching Methods

Lectures, Case studies, Video & Multimedia materials

Assessment Methods

70% written assignment, 30% written exams



# Strategic Management

Code: 9097

Instructor: TBA

ECTS credits: 6

## Prerequisites

None

## Objectives

The course aspires to:

1. Help participants understand:
  - a) the external environment in which our companies operate,
  - b) the role and significance of core competences not only in offering competitive advantage, but also in providing the foundation upon which strategies are based,
  - c) the role and significance of corporate mission/vision statements in success.
2. Help participants craft and implement strategy, given a number of alternative strategic options (choices include: in which areas should we diversify, in which products/services should we expand, how we are going to implement this expansion, are we going to acquire, merge, or form an alliance with another business).
3. Develop understanding on how to build and sustain competitive advantage
4. Realize what type of structure, systems, people, a company needs to successfully implement a chosen strategy.
5. To spot and discuss the most common strategy mistakes taking place, and to offer participants ideas as to how to avoid them.

## Course Outline

The course comprises of the following modules:

1. How to analyze the external environment of the company: (Structural Analysis of Industries-5 Forces, Strategic Groups, Scenario Planning, PESTEL Analysis)
-



2. How to exploit and build resources and capabilities needed to achieve, maintain and improve the firms market positioning (strategy as the creation of dynamic capabilities, Value Chain, Organizational Culture)
3. How to direct the company into the future (mission/vision/strategic intent)
4. How to make a strategic choice, given a number of alternative strategic options (choices include: in which areas should we diversify, in which products/services should we expand, how we are going to implement this expansion, are we going to acquire, merge, form an alliance with another business).
5. How to build and sustain competitive advantage (Porter's Generic Competitive Strategies, Value Disciplines, Strategy Clock)
6. What type of structure, systems, people, does a company need to successfully implement a chosen strategy (McKinsey's 7S's).
7. The course will provide frameworks for identifying the challenges of different competitive environments. We will give you some analytical approaches that are useful to widely different strategic problems. Our final aim is to help you understand how to build a strategically responsive organization by tuning systems, structures and people to strategy, and how to effectively manage the process of strategizing.

#### Assessment Methods

Final written exam and group case studies.

#### Reading List

- Johnson, G., R. Whittington, K. Scholes, D. Angwin, and P. Renger, Exploring Strategy Pearson, 11<sup>th</sup> Edition, 2017.
- Hill, C., G. Jones and M.A. Schilling, Strategic Management Theory, Cengage Learning, 11<sup>th</sup> edition, 2015.
- Thompson, A.A., M.A. Peteraf, J.E. Gamble and A.J. Strickland III, Crafting and Executing Strategy: Concepts and Readings, 20<sup>th</sup> edition, McGraw-Hill, 2016.
- Hitt, M.A., R.D. Ireland and R.E. Hoskisson, Strategic Management: Competitiveness and Globalization, Cengage Learning, 12<sup>th</sup> edition, 2017.



## Entrepreneurship

Code: 9019

Instructor: TBA

ECTS credits: 6

Level of course: Undergraduate

Year of study: Advanced

Communication with the Instructor

[esalavou@aueb.gr](mailto:esalavou@aueb.gr)

### Objectives of the course

Entrepreneurship is both a way of thinking and of doing. It deals with “creating something from nothing”. The course cultivates an entrepreneurial mindset and focuses on skills necessary for writing a comprehensive business plan. Upon completion of the course, students should be able to:

- understand key concepts of entrepreneurship
- successfully develop viable business ideas
- consider entrepreneurship as a professional career choice

### Prerequisites

This course synthesizes concepts from various courses at business schools. Students with managerial know-how are allowed to follow this course. Students registered in the Business Policy and Strategy course during the fall semester of this University are not allowed to attend this course.

### Course content

This course introduces the nature of entrepreneurship. It helps students to successfully develop viable business ideas. This is a teaching-mentoring course. You are going to write and present business plans based on teamwork.

### Recommended reading

Together with a list of recommended references, the following book is required:



- Hisrich R. (2014). Advanced Introduction to Entrepreneurship. USA: Edward Elgar Publishing Ltd.

Teaching methods

Lectures and students' presentations

Assessment methods

Written exams and project



## Financial Management

Code: 9023

Instructor: TBA

ECTS credits: 6

Level: Intermediate

Communication with the Instructor

[Kouretas@aueb.gr](mailto:Kouretas@aueb.gr)

Course outline

This module examines various items in the area of Corporate Finance. For that reason, it is divided into 2 major groups:

- a) The first group includes the most important methods concerning Investment Appraisal.
- b) The second group is concerned with Financing Decisions.

Reading Material

The required text for the course is:

- Brigham and Erhardt. Financial Management - Theory and Practice. DRYDEN PRESS HARCOURT

Some highly recommended texts are the following:

- Brealey, A., Myers, C., (1997): Principles of Corporate Finance, Mc – Graw Hill, New York.
- Lumbly, S., (1996): Investment Appraisal and Financing Decisions, Chapman and Hall.

Components of the Course

The major components of the course are the following:

- Introduction to Investment Appraisal
  - Methods and Criteria of Investment Appraisal
  - Net Cash Flow Analysis
  - Investment Appraisal and Inflation
  - Risk Analysis
  - Capital Markets
  - Bond and Share Valuations
  - Cost of Capital
  - Capital Structure
  - Dividend Policy
  - Portfolio Considerations
-



## Money and Capital Markets

Code: 9051

Instructor: TBA

ECTS credits: 6

- Type of course unit (compulsory, optional)

Undergraduate course in English for Erasmus students.

- Level of course unit (e.g. first, second or third cycle; sub-level if applicable)

Advanced

- Semester/trimester when the course unit is delivered

Both Spring and Fall

- Learning outcomes of the course unit

At the end of the course students should know:

- How securities prices are determined and how to price securities.
- How to structure an efficient portfolio and understand the importance to financial institutions of risk reduction through holding portfolios of assets.
- How futures contracts are used for risk reduction or speculation.

- Mode of delivery (face-to-face, distance learning)

Class teaching

- Prerequisites and co-requisites

None.

- Recommended optional programme components

None.

- Course contents

The course covers the following topics:

- Money and Capital Markets: an overview.
-





- Intermediaries, Markets and Trading – an overview of the type of companies operating in the money and capital markets and the kinds of transactions they engage into.
- Compounding, Present and Future Value – basic principles used for quantitative analysis of financial assets and instruments.
- Bonds and Interest Rates – an overview of debt instruments, pricing and risk assessment.
- Stocks – pricing techniques for stocks
- Portfolio Theory – how to choose assets in order to build an efficient portfolio
- Futures contracts – an overview of the futures market, pricing of futures contracts, speculation, arbitrage and hedging strategies through futures contracts.

- **Recommended or required reading**

1. Bodie Z, Kane A. and Marcus A.J., (2014) Investments, 10<sup>th</sup> edition, McGraw Hill.
2. Brealey R.A. and Myers S.C. (2017) Principles of Corporate Finance 12<sup>th</sup> edition, McGraw Hill.
3. Lecture notes and case studies.

- **Planned learning activities and teaching methods**

The module is taught through a series of three-hour lectures.

- **Assessment methods and criteria**

Final written two-hour exam.

- **Language of instruction**

English



# International Management

Code: 9077

Instructor: TBA

ECTS credits: 6

## Objectives of the course

The core aim of the course is to familiarize students with the fundamental dimensions of international management. Basic management principles remain the same during the internationalization stage of a corporation; however, they should be placed in a context of different markets and macro-environmental characteristics. In this vein, international management should bridge the divide between global integration and national responsiveness as far as resource selection and deployment decisions, strategy adaptation and challenges from global operations are concerned.

## Course content

This course in International Management provides an understanding of how the economic, technological geopolitical and social dimensions of the international business environment shape international business investment and transacting, and how international firms are managed within this environment. It provides students with an appreciation of the increased complexities and opportunities that international markets provide as opposed to operations exclusively focused in the home market. Key issues covered in this course include: macro environmental characteristics, motives for international expansion, entry and global strategies, trade theories, government interventions, foreign direct investments and subsidiary roles and the organizational challenges of the contemporary multinational enterprise.

## Anticipated Learning Outcomes

As a result of taking this course, students should be able to:

- Describe and elaborate on the major cultural, political, economic and technological changes that impact on international management.
- Identify the opportunities, challenges, threats and problems faced by multinational managers.
- Analyze and critically evaluate the impact of globalization and national responsiveness on international management and global strategies.
- Analyze internationalization and market entry strategies.



- Classify and describe the role of subsidiaries and their impact on the economic development of host countries.
- Critically evaluate the diverse organizational structures that govern the relationships of the international corporation.
- Describe and evaluate elements of knowledge-related competitiveness that lead to superior performance in the global marketplace.
- Relate theoretical foundations to actual international management practices.



# Conflict Management and Negotiations

Code: 9082

Instructor: TBA

ECTS credits: 6

Level: Undergraduate

## Objectives of the course

Negotiation is a complex process that requires knowledge, skill, and practice. The aim of this course is to provide the necessary knowledge to effectively prepare for a negotiation, plan a negotiation strategy and deal with conflicts and contingencies. The course also aims at developing those skills that will enable students to effectively communicate with others, manage their emotions, decode their counterparts' interests, etc. Finally, students will participate in negotiation role-plays to apply theory, get feedback, reflect on the outcome and, hence, further enhance their knowledge and abilities.

## Prerequisites

There is no prerequisite for participation in this course.

## Course content

- Managing conflict, building blocks and the process of negotiation
- Preparation: What to do before negotiation
- Creating and claiming value in negotiation
- Managing emotions and building trust in negotiations
- Power, ethics, and reputation
- Multi-party negotiations, coalitions, and team negotiation
- Cross-cultural negotiations and negotiating remotely
- Negotiating a job offer
- Dispute resolution using third parties

## Anticipated Educational Results

Upon completion of this course, the students will be able to:

1. Demonstrate the ability to apply fundamental concepts and theories in conflict management and negotiations to real-world business situations.



2. Be able to analyze the behavior and motives of individuals and the contextual parameters of negotiation and integrate this information into their own behavior.
3. Appraise the advantages and disadvantages of alternative types of competitive and cooperative behavior.
4. Be able to integrate theory and feedback from in-class negotiation simulations and case studies to future negotiations.

#### Recommended reading

The following book is required:

- Thompson, L. (2021). *The mind and heart of the negotiator*, 7th Edition (Global edition). Pearson. ISBN-10: 1292399465; ISBN-13: 978-1292399461.

Together with a list of recommended references for background reading:

- Brett, J. M. & Ramirez-Marin, J. & Galoni, C. (2021). *Negotiation Strategy: A Cross-Cultural Meta-Analytic Evaluation of Theory and Measurement*. *Negotiation and Conflict Management Research* 14(4). doi: <https://doi.org/10.34891/20210918-525>.
- Fisher, R., Ury, W., & Patton, B. (2011). *Getting to Yes: Negotiating agreement without giving in*, 3rd revised edition, Penguin. ISBN-10: 1844131467; ISBN-13: 978-0143118756.
- Ingerson, M. C., DeTienne, K. B., Hooley, J. M., & Black, N. A. (2020). *Dealing with dysfunction: Negotiating with difficult individuals*. *Negotiation Journal*, 36(3), 287-307.
- Kapoutsis, I., & Volkema, R. (2019). *Hard-core toughie: Donald Trump's negotiations for the United States presidency*. *Negotiation Journal*, 35(1), 47-63.
- Malhotra, D. (2015). *Control the negotiation before it begins*. *Harvard Business Review*, December 2015, pp. 3-8.
- Malhotra, D. & Bazerman, M. (2008). *Negotiation Genius: How to Overcome Obstacles and Achieve Brilliant Results at the Bargaining Table and Beyond*. Bantam.
- Volkema, R. J., & Kapoutsis, I. (2016). *From Restaurants to Board Rooms How Initiating Negotiations Teaches Management Principles and Theory*. *Journal of Management Education*, 40(1), 76-101.
- Volkema, R., 1999, *The Negotiation Toolkit: How to get exactly what you want in any business or personal situation*, AMACOM.
- Watkins, M. (2006). *Shaping the Game: The New Leaders Guide to Effective Negotiating*. Harvard Business School Press.

#### Teaching methods

Lectures, case studies, role-plays, videos, and self-assessment tests.



**Assessment methods**

Final written exam (80%) and class participation (participation in role-plays; 20%).



SPRING SEMESTER

## International Marketing Management

Code: 9018

Instructor: TBA

ECTS credits: 6

Type: Elective

Level: Advanced

### Course Objective

This course offers students a practical understanding of the role of marketing in the achievements of corporate goals and the opportunity to gain an appreciation of the different applications of marketing in consumer, and industrial international markets. Also, it provides students with an understanding of both theory and practice of international and export marketing as well as with the ability to apply this understanding to real and simulated situations.

### Prerequisites

Three marketing courses

### Course Content

- International Trade.
- Overseas and European environments: cultural, political and economic.
- Information gathering and marketing information systems for international marketing decision-making.
- Methods of market entrance.
- International marketing mix.(Product, Price, Promotion, Place)
- Logistics, subsidiaries, agents, importers and intermediaries.
- Globalization

### Recommended Reading Material

Cateora International Marketing Management 10th ed. Mc Graw Hill  
Rugman & Hodgetts International Business 3rd ed. Prentice Hall



Teaching Methods

Lectures, Case studies, Video & Multimedia staff

Assessment Methods

70% written assignment, 30% written exams





## Financial Management

Code: 9023

Instructor: TBA

ECTS credits: 6

Level: Intermediate

### Course Outline

This module examines various items in the area of Corporate Finance. For that reason, it is divided into 2 major groups:

The first group includes the most important methods concerning Investment Appraisal.

The second group is concerned with Financing Decisions.

### Reading Material

The required text for the course is:

- Brigham and Erhardt. Financial Management - Theory and Practice. DRYDEN PRESS HARCOURT

Some highly recommended texts are the following:

- Brealey, A., Myers, C., (1997): Principles of Corporate Finance, Mc – Graw Hill, New York.
- Lumbly, S., (1996): Investment Appraisal and Financing Decisions, Chapman and Hall.

### Course Components

The major components of the course are the following:

- Introduction to Investment Appraisal
- Methods and Criteria of Investment Appraisal
- Net Cash Flow Analysis
- Investment Appraisal and Inflation
- Risk Analysis
- Capital Markets
- Bond and Share Valuations
- Cost of Capital
- Capital Structure
- Dividend Policy
- Portfolio Considerations



## Money and Capital Markets

Code: 9051

Instructor: TBA

ECTS credits: 6

- Type of course unit (compulsory, optional)

Undergraduate course in English for Erasmus students.

- Level of course unit (e.g. first, second or third cycle; sub-level if applicable)

Advanced

- Semester/trimester when the course unit is delivered

Both Spring and Fall

- Learning outcomes of the course unit

At the end of the course students should know:

- How securities prices are determined and how to price securities.
- How to structure an efficient portfolio and understand the importance to financial institutions of risk reduction through holding portfolios of assets.
- How futures contracts are used for risk reduction or speculation.

- Mode of delivery (face-to-face, distance learning)

Class teaching

- Prerequisites and co-requisites

None.

- Recommended optional programme components

None.

- Course contents

The course covers the following topics:



- Money and Capital Markets: an overview.
- Intermediaries, Markets and Trading – an overview of the type of companies operating in the money and capital markets and the kinds of transactions they engage into.
- Compounding, Present and Future Value – basic principles used for quantitative analysis of financial assets and instruments.
- Bonds and Interest Rates – an overview of debt instruments, pricing and risk assessment.
- Stocks – pricing techniques for stocks
- Portfolio Theory – how to choose assets in order to build an efficient portfolio
- Futures contracts – an overview of the futures market, pricing of futures contracts, speculation, arbitrage and hedging strategies through futures contracts.
- 

- **Recommended or required reading**

1. Bodie Z, Kane A. and Marcus A.J., (2014) Investments, 10<sup>th</sup> edition, McGraw Hill.
2. Brealey R.A. and Myers S.C. (2017) Principles of Corporate Finance 12<sup>th</sup> edition, McGraw Hill.
3. Lecture notes and case studies.

- **Planned learning activities and teaching methods**

The module is taught through a series of three-hour lectures.

- **Assessment methods and criteria**

Final written two-hour exam.

- **Language of instruction**

English



## Business Strategy

Code: 9064

Instructor: TBA

ECTS credits: 6

Communication with the Instructor

[ithanos@aueb.gr](mailto:ithanos@aueb.gr)

### Prerequisites

None

### Objectives

The course aspires to:

6. Help participants understand:
    - a) the external environment in which our companies operate,
    - b) the role and significance of core competences not only in offering competitive advantage, but also in providing the foundation upon which strategies are based,
    - c) the role and significance of corporate mission/vision statements in success.
  7. Help participants craft and implement strategy, given a number of alternative strategic options (choices include: in which areas should we diversify, in which products/services should we expand, how we are going to implement this expansion, are we going to acquire, merge, or form an alliance with another business).
  8. Develop understanding on how to build and sustain competitive advantage
  9. Realize what type of structure, systems, people, a company needs to successfully implement a chosen strategy.
  10. To spot and discuss the most common strategy mistakes taking place, and to offer participants ideas as to how to avoid them.
-



### Course Outline

The course comprises of the following modules:

1. How to analyze the external environment of the company: (Structural Analysis of Industries-5 Forces, Strategic Groups, Scenario Planning, PESTEL Analysis)
2. How to exploit and build resources and capabilities needed to achieve, maintain and improve the firms market positioning (strategy as the creation of dynamic capabilities, Value Chain, Organizational Culture)
3. How to direct the company into the future (mission/vision/strategic intent)
4. How to make a strategic choice, given a number of alternative strategic options (choices include: in which areas should we diversify, in which products/services should we expand, how we are going to implement this expansion, are we going to acquire, merge, form an alliance with another business).
5. How to build and sustain competitive advantage (Porter's Generic Competitive Strategies, Value Disciplines, Strategy Clock)
6. What type of structure, systems, people, does a company need to successfully implement a chosen strategy (McKinsey's 7S's).
7. The course will provide frameworks for identifying the challenges of different competitive environments. We will give you some analytical approaches that are useful to widely different strategic problems. Our final aim is to help you understand how to build a strategically responsive organization by tuning systems, structures and people to strategy, and how to effectively manage the process of strategizing.

### Assessment Methods

Final written exam and group case studies

### Reading List

- Johnson, G., R. Whittington, K. Scholes, D. Angwin, and P. Renger, Exploring Strategy Pearson, 11<sup>th</sup> Edition, 2017.
- Hill, C., G. Jones and M.A. Schilling, Strategic Management Theory, Cengage Learning, 11<sup>th</sup> edition, 2015.
- Thompson, A.A., M.A. Peteraf, J.E. Gamble and A.J. Strickland III, Crafting and Executing Strategy: Concepts and Readings, 20<sup>th</sup> edition, McGraw-Hill, 2016.
- Hitt, M.A., R.D. Ireland and R.E. Hoskisson, Strategic Management: Competitiveness and Globalization, Cengage Learning, 12<sup>th</sup> edition, 2017.



# Conflict Management and Negotiations

Code: 9082

Instructor: TBA

ECTS credits: 6

Level: Undergraduate

## Objectives of the course

Negotiation is a complex process that requires knowledge, skill, and practice. The aim of this course is to provide the necessary knowledge to effectively prepare for a negotiation, plan a negotiation strategy and deal with conflicts and contingencies. The course also aims at developing those skills that will enable students to effectively communicate with others, manage their emotions, decode their counterparts' interests, etc. Finally, students will participate in negotiation role-plays to apply theory, get feedback, reflect on the outcome and, hence, further enhance their knowledge and abilities.

## Prerequisites

There is no prerequisite for participation in this course.

## Course content

- Managing conflict, building blocks and the process of negotiation
- Preparation: What to do before negotiation
- Creating and claiming value in negotiation
- Managing emotions and building trust in negotiations
- Power, ethics, and reputation
- Multi-party negotiations, coalitions, and team negotiation
- Cross-cultural negotiations and negotiating remotely
- Negotiating a job offer
- Dispute resolution using third parties



### Anticipated Educational Results

Upon completion of this course, the students will be able to:

5. Demonstrate the ability to apply fundamental concepts and theories in conflict management and negotiations to real-world business situations.
6. Be able to analyze the behavior and motives of individuals and the contextual parameters of negotiation and integrate this information into their own behavior.
7. Appraise the advantages and disadvantages of alternative types of competitive and cooperative behavior.
8. Be able to integrate theory and feedback from in-class negotiation simulations and case studies to future negotiations.

### Recommended reading

The following book is required:

- Thompson, L. (2021). *The mind and heart of the negotiator*, 7th Edition (Global edition). Pearson. ISBN-10: 1292399465; ISBN-13: 978-1292399461.

Together with a list of recommended references for background reading:

- Brett, J. M. & Ramirez-Marin, J. & Galoni, C. (2021). *Negotiation Strategy: A Cross-Cultural Meta-Analytic Evaluation of Theory and Measurement*. *Negotiation and Conflict Management Research* 14(4). doi: <https://doi.org/10.34891/20210918-525>.
- Fisher, R., Ury, W., & Patton, B. (2011). *Getting to Yes: Negotiating agreement without giving in*, 3rd revised edition, Penguin. ISBN-10: 1844131467; ISBN-13: 978-0143118756.
- Ingerson, M. C., DeTienne, K. B., Hooley, J. M., & Black, N. A. (2020). *Dealing with dysfunction: Negotiating with difficult individuals*. *Negotiation Journal*, 36(3), 287-307.
- Kapoutsis, I., & Volkema, R. (2019). *Hard-core toughie: Donald Trump's negotiations for the United States presidency*. *Negotiation Journal*, 35(1), 47-63.
- Malhotra, D. (2015). *Control the negotiation before it begins*. *Harvard Business Review*, December 2015, pp. 3-8.
- Malhotra, D. & Bazerman, M. (2008). *Negotiation Genius: How to Overcome Obstacles and Achieve Brilliant Results at the Bargaining Table and Beyond*. Bantam.
- Volkema, R. J., & Kapoutsis, I. (2016). *From Restaurants to Board Rooms How Initiating Negotiations Teaches Management Principles and Theory*. *Journal of Management Education*, 40(1), 76-101.
- Volkema, R., 1999, *The Negotiation Toolkit: How to get exactly what you want in any business or personal situation*, AMACOM.



- Watkins, M. (2006). *Shaping the Game: The New Leaders Guide to Effective Negotiating*. Harvard Business School Press.

Teaching methods

Lectures, case studies, role-plays, videos, and self-assessment tests.

Assessment methods

Final written exam (80%) and class participation (participation in role-plays; 20%).





DEPARTMENT OF ACCOUNTING AND FINANCE



FALL SEMESTER

## Behavioral Finance (Reading Course)

Code: 9004

Instructor: Spyros Spyrou

ECTS credits: 6

Communication with the Instructor

[sspyrou@aueb.gr](mailto:sspyrou@aueb.gr)

Traditional economics and finance is developed on the assumption of a rational utility maximizing economic agent. Recent empirical evidence, however, suggests that real people behave differently than assumed. This module reviews the literature on cognitive psychology as regards to human and investor behaviour and contrasts this with the behavior that is expected from traditional models. We discuss Prospect Theory (PT), i.e. a theory alternative to Expected Utility Theory (EUT), and show that many empirical phenomena that are considered as 'anomalies' by traditional finance can be explained within this framework. The module also discusses empirical findings on various related issues such as herding behaviour, measures of herding, investor overreaction and under-reaction, measurement of investor sentiment, mental accounting, overconfidence, the house-money effect, the dividend puzzle, the equity premium puzzle, the closed-end fund puzzle, among others.

The main aims of the module are:

- To help you understand the most important issues in Behavioral Finance
- To provide an opportunity for the critical evaluation of recent empirical studies and empirical findings in the area
- To examine phenomena that affect investment decisions / behavior
- To discuss behavioral explanations of observed capital market inefficiencies



Course Outline:

- Prospect Theory
- Heuristics / Investor Biases
- Overconfidence
- Empirical Puzzles and Behavioral Explanations
- Over-reaction / Under-reaction
- Herding Behavior in Financial Markets
- Investor Sentiment: Measurement & Empirical Evidence
- Behavioral Finance Theories
- Empirical Findings

Methods of Assessment

A 3000 to 4000 word essay (see eclass for suggested essay questions etc)

Suggested Reading:

A. Suggested Textbooks / Reading / Lecture Notes

- Lecture notes / slides
- Academic papers as suggested in lectures
- Barberis, Nicholas, and Richard Thaler, 2003. "A survey of behavioral finance." in G. Constantinides, M. Harris, and R. Stulz (editors) *Handbook of the Economics of Finance* North-Holland, Amsterdam.
- Forbes, W. (2009). *Behavioral Finance*, John Willey & Sons Ltd.
- Kahneman, D., Slovic, P. and Tversky, A. (eds.) (1982), *Judgment under Uncertainty: Heuristics and Biases*, Cambridge University Press, New York.
- Kahneman, D. and Tversky, A. (eds.) (2000), *Choices, Values, and Frames*, Russell Sage Foundation and Cambridge University Press, New York.
- Shefrin, H. (2002). *Beyond greed and fear: Understanding behavioral finance and the psychology of investing*, Oxford University Press

B. Suggested Articles

- Antoniou, A., Galariotis, E. and Spyrou, S., (2006), Short-term contrarian strategies in the London Stock Exchange: Are they profitable? Which factors affect them?, *Journal of Business Finance & Accounting*, 33, 839-867
- Barberis, N., Shleifer, A., & Vishny, R., 1998. A model of investor sentiment. *Journal of Financial Economics* 49, 307–343.



- Baddeley, M., 2010. Herding, social influence and economic decision-making: socio-psychological and neuroscientific analyses. *Philosophical Transactions, The Royal Society B* 365, 281–290.
- Bikhchandani, S., Sharma, S., 2000. Herd Behavior in Financial Markets. *IMF Staff Papers* 47, 279–310.
- Benartzi, S. and Thaler, R., (2001), Naïve diversification strategies in defined contribution savings plans, *American Economic Review*, 91, 79-98.
- De Bondt, W.F.M., and Thaler, R.H. (1985), Does the Stock Market Overreact? *Journal of Finance*, 40, 793–808.
- Chiang, T., Zheng, D., 2010. An empirical analysis of herd behaviour in global stock markets? *Journal of Banking and Finance* 34, 1911–1921.
- Galariotis, E., Rong, W., & Spyrou, S. (2015). Herding on fundamental information: A comparative study. *Journal of Banking and Finance*, 50, 589-598.
- Grinblatt, M., Titman, S., Wermers, R., 1995. Momentum Investment Strategies, Portfolio Performance, and Herding: A Study of Mutual Fund Behavior. *The American Economic Review* 85, 1088–1105.
- Kahneman, D. and Tversky, A., (1984), Choices, Values and Frames, *American Psychologist*, 39, 341–50.
- Kahneman, D. and A. Tversky, (1979) "Prospect Theory: An Analysis of Decision Making Under Risk," *Econometrica*
- Porter, D. P., and Smith, V., (2003), Stock market bubbles in the laboratory, *Journal of Behavioral finance*, 4, 7-21.
- Ritter, J. R. (2003), Behavioral finance, *Pacific-Basin Finance Journal*, 11, 429-437.
- Shefrin, H. & Statman, M., (2003), The contributions of Daniel Kahneman and Amos Tversky, *The Journal of Behavioral Finance*, 4, 54-58.
- Spyrou, S., 2013. Herding in Financial Markets: A Review of the Literature. *Review of Behavioral Finance* 5, 175-194.
- Other articles as indicated in Lectures.



# Cost and Management Accounting

Code: 9011

Instructor: Sotiris Karatzimas

ECTS credits: 6

Level: Intermediate progressing to advanced

Communication with the Instructor

[skaratzimas@aueb.gr](mailto:skaratzimas@aueb.gr)

## Course Objectives – Content

### Learning Objectives

Upon successful completion of the course, the students will be able to understand the:

1. content of cost accounting,
2. concepts and categories of cost,
3. determinants of production cost (raw materials, direct labor and overheads),
4. costing systems (traditional costing and activity-based costing),
5. costing methods (job order costing and process costing),
6. costing techniques (absorption costing, variable costing and standard costing),
7. allocation and reallocation of overheads,
8. cost-volume-profit analysis, and
9. costing of joint products and by-products.

## Course Structure

The structure of the course includes the following sections:

1. Product Costing Systems: Concepts and Design Issues (Chapter 2)
2. Cost Accumulation for Job Shop and Batch Production Operations (Chapter 3)
3. Activity-Based Costing Systems (Chapter 4)
4. Process Costing Systems (Chapter 8)
5. Joint Process Costing (Chapter 9)
6. Managing and Allocating Support-Service Costs (Chapter 10)
7. Financial and Cost-Volume-Profit Models (Chapter 12)



8. Standard Costing, Variance Analysis and Kaizen Costing (Chapter 16)

Course Assessment

Final two-hour written examination comprising exercises and case studies.

Bibliography

Course Textbook

Hilton, Maher and Selto (2008), "Cost Management: Strategies for Business Decisions", Fourth Edition, McGraw-Hill. (You may borrow copies of the book from the school's library).



## Corporate Finance (Reading Course)

Code: 9085

Instructor: Athanasios Sakkas

ECTS credits: 6

Level: Intermediate progressing to advanced

Communication with the Instructor

[asakkas@aueb.gr](mailto:asakkas@aueb.gr)

This module concentrates on the major investment and financial decisions made by managers within a firm. The idea that managers should operate in the interests of shareholders is examined and we explore the consequences. We then look at the types and sources of finance for a company. Next, we seek to understand the cost of capital and the major theories that guide us. Finally, we delve into the sources of long-term finance: equity capital, debt and hybrid finance.

The main aim of the module is

To gain a sound understanding of the basic principles of corporate finance. Having successfully completed the module, you will be able to demonstrate knowledge and understanding of:

1. the types and sources of finance for a company;
2. the capital structure and the associated cost of capital;
3. the dividend policy and other payouts;
4. the capital budgeting;
5. the sources of long-term finance.

Course contents

1. Shareholders, stakeholders, agents, and financial decision making
  2. Cash flow for Budgeting
  3. Capital asset pricing model (CAPM), Factor Models, and Arbitrage Pricing Theory (APT)
  4. Capital structure
  5. Dividend policy and other payouts
  6. Valuation and Capital budgeting
  7. Initial public offerings (IPOs) and Seasoned equity offerings (SEOs)
  8. Warrants, convertible, and exchangeable bonds
-



Suggested Reading:

*A. Lecture Slides*

*B. Suggested Textbooks*

Berk, Jonathan, and Peter DeMarzo, 2020, *Corporate Finance*, fifth edition, Pearson Education. ISBN 978-1292304151

Brealey, R.A., S.C. Myers, F. Allen, 2017, *Principles of Corporate Finance*, twelfth edition, McGraw Hill. ISBN 978-1259253331.

Copeland, T.E., J.F. Weston, K. Shastri, 2005, *Financial Theory and Corporate Policy*, fourth edition, Addison Wesley. ISBN 978-0321127211.

Hillier, D., S. Ross, R. Westerfield, J. Jaffe, B. Jordan, 2016, *Corporate Finance*, third edition, McGraw Hill. ISBN 978-0077173630

*C. Journal Articles (more details in the eclass)*

Methods of Assessment

A set of exercises + a 3000-word essay



SPRING SEMESTER

## Financial Statement Analysis

Code: 9021

Instructor: Konstantinos Chalevas

ECTS credits: 6

Communication with the Instructor

[chaleas@aueb.gr](mailto:chaleas@aueb.gr)

Important Note: The course presupposes a good knowledge of the basics of financial accounting. The students should already be:

- familiar with the main accounting concepts and principles
- able to understand financial statements
- aware of the financial statements preparation processes.

Core Text : Business Analysis and Valuation : IFRS Edition (5th edition)  
Healy P, Palepu G., Peek E.

This course introduces and develops a framework for business analysis and valuation using financial statement data. Key components of effective financial statement analysis are discussed:

- ❖ A Framework for Business Analysis and Valuation Using Financial Statements
- ❖ Business Analysis and Valuation Tools
  - Industry Analysis
  - Competitive Strategy Analysis
  - Corporate Strategy Analysis
- ❖ Overview /Implementing Accounting Analysis
  - Factors Influencing Accounting Quality
  - Steps in Accounting Analysis
  - Accounting Analysis Pitfalls
- ❖ Financial Analysis





- Ratio Analysis
- Cash Flow Analysis
- ❖ Prospective Analysis: Forecasting-Valuation Implementation
- Defining Value for Shareholders
- The Discounted Cash Flow model
- The Discounted Abnormal Earnings Valuation model

❖ Case Studies

\* Photocopying the book and the use of photocopies are illegal

Course Requirements

- Written Exams
- Paper Summaries



# Market Microstructure and Dealing Room Simulations

Code: 9092

Instructor: Georgios Chalamandaris

ECTS credits: 5

Communication with the Instructor

[gchalamandar@aueb.gr](mailto:gchalamandar@aueb.gr)

Course title: Market Microstructure and Dealing Room Simulations

Type of course: Elective

Level of course: Undergraduate

Year of study: 3rd

Semester/trimester: Spring

Number of credits allocated (based on the student workload required to achieve the objectives or learning outcomes): 5 Credits

Objective of the course:

Students who complete the course will be able to identify the main market structures, understand their principles, as well as main types of participants operating therein. The student will be able to interpret the very short-term market dynamics, as well as to assess the possible strategic decisions that traders face over the course of a day.

Prerequisites:

Undergraduate level courses in Probability and Statistics.

Course contents:

Market Microstructure is the field that deals with the organization of markets and their participants. Specifically, the dynamics of trade and price developments in different markets are examined by studying:

- the rules governing trading.
- the types of market-participants.
- their incentives, and
- the strategies they choose to achieve their objectives.

The course covers the following topics:



- Market Industry: Buy/Sell side, dealers, brokers, clearing and settlement.
- Orders, Algos and algorithmic trading.
- The role of dealers, brokers.
- Main categories of market-users (profit-motivated, utilitarian, noise traders) and their incentives.
- Basic strategies of each of these categories and how they affect the market mechanism.
- Price discovery in exchanges and OTC markets.
- The incorporation of information in market prices and the informational content of trades.
- Market structures: Order-driven, Dealer-to-Customer, Crossing-networks and hybrid markets.
- The nature of liquidity and volatility, their relationship and how they both affect market efficiency.
- Manifestations of asymmetric information, strategies for exploiting the information advantage and ways of protection against the risk arising from it.
- Key microstructure models: Garman, Roll, Glosten-Millgrom, Kyle.

Recommended reading:

The students will be given lecture notes and simulation software. In addition, we suggest the following books:

- L. Harris, "Trading and Exchanges – Market Microstructure for Practitioners", Oxford University Press, 2003
- J. Hasbrouck, "Empirical Market Microstructure – Economic and Statistical Perspectives on the Dynamics of Trade in Securities Market", Teaching Notes, 2003
- M. O'Hara, "Market Microstructure Theory", Basil Blackwell, Cambridge, 1995.

Teaching methods: Distance-learning methods during the pandemic, otherwise, it is taught in class with 3 extra sessions in the lab for applied work. In these workshops students will be able to perform simulations of short-term trading strategies under hypothetical scenarios, observe order-book simulations, and analyze stylized stock market dynamics.

Assessment methods:

Written exam (100%)



Language of instruction:  
English



DEPARTMENT OF MARKETING AND COMMUNICATION



FALL SEMESTER

## Retail Sales Promotions

Code: 9055

Instructor: Paris Argouslides

ECTS credits: 6

Communication with the Instructor

[pargousl@aueb.gr](mailto:pargousl@aueb.gr)

### Course description and content

The present course includes 13 weekly sessions on sales promotions in the sector of retailing. Such promotions are initiated by manufacturers of consumer products, by retailers or by both of them. The course covers the following topics:

- Fundamentals of retail sales promotions.
- Alternative methods of retail sales promotions.
- General conditions leading to retail sales promotions campaigns.
- Design and implementation of retail sales promotions campaigns.
- Post-promotion issues.

### Course delivery

Lectures are based on findings from empirical research published in premier journal outlets, practical examples, and illustrations of sales promotions from retail stores. Students will get electronic access to the theoretical material that will be covered during lectures. Specifically, before each lecture the corresponding slides will be available on e-class and students will have to register to get access. Regular class attendance is important because lectures include additional material that will not appear on e-class.

### Course assessment

Though not formally assessed, the course requires students to work on several individual assignments and be ready to discuss them during lectures. Formal assessment involves a written exam (weight: 100% of the final mark).



#### Key benefits

Students attending this course will likely get a job with a manufacturer of consumer goods (e.g. grocery or durables) or with a domestic or global retailer. It is, therefore, of particular importance to acquire knowledge about retail sales promotions. By combining empirical evidence with practical illustrations and case studies, this course aims at offering students a thorough understanding of the nature, content and context of retail sales promotions. Specifically, by course completion students will be able to know:

1. The philosophy of retail sales promotions.
2. The alternative methods of retail sales promotions.
3. The conditions justifying a retail sales promotion campaign.
4. Issues relating to the design, implementation, and post-promotion evaluation of retail sales promotions campaigns.
5. Promotions for perishable products.
6. Promotions for durable products.
7. Framing of retail sales promotions.
8. The role of gifts in retail sales promotions.

#### Key references

Ailawadi K.L., Gedenk K., Lutzky, C., and Neslin S.A. (2007), 'Decomposition of the sales impact of promotion-induced stockpiling', *Journal of Marketing*, 44 (August), pp. 450-467.

Chen, H.A., Marmorstein, H., Tsiros, M., and Rao, A.R., (2012), 'When more is less: the impact of base value neglect on consumer preferences for bonus packs over price discounts', *Journal of Marketing*, 76 (July), pp. 64-77.

DelVecchio D., Krishnan S., and Smith D.C. (2007), 'Cents or percent? The effects of promotion framing on price expectations and choice,' *Journal of Marketing*, 71 (July), pp. 158-170.

Laran, J. and Tsiros, M. (2013), 'An investigation of the effectiveness of uncertainty in marketing promotions involving free-gifts', *Journal of Marketing*, 77 (March), pp. 112-123.

Liu Y. (2007), 'The long-term impact of loyalty programs on consumer purchase behaviour and loyalty', *Journal of Marketing*, 71 (October), pp. 19-35.

Ramanathan S. And Dhar S.K. (2010), 'The effect of sales promotions on the size and the composition of the shopping basket: regulatory compatibility from the framing and temporal restrictions', *Journal of Marketing Research*, 47 (June), pp. 542-552.



Tsiros, M. and Chen, H. A. (2017), 'Convexity neglect in consumer decision making', *Journal of Marketing Behavior*, 2 (4), pp. 253-290.

Tsiros M. and Heilman C. M. (2005), 'The effects of expiration dates and perceived risk on purchasing behaviour in grocery store perishable categories', *Journal of Marketing*, 69 (April), pp. 114-129.

Tsiros M. and Hardesty D. M. (2010), 'Ending a price promotion: retracting it on one step or phasing it out gradually', *Journal of Marketing*, 74 (January), pp. 49-64.



SPRING SEMESTER

# Change Management

**Code:** 9008

**Instructor:** Maria Vakola

ECTS credits: 6

Level: Advanced

Communication with the Instructor

[mvakola@aueb.gr](mailto:mvakola@aueb.gr)

## General Aim and Rationale

The concept of change is not a new one. Indeed change has always been recognized as necessary and inherent to all aspects of life. However, the last decade has, for most organizations, been a time of totally unprecedented and seemingly ever accelerating change so that the phrase "change or die" has increasing resonance. Coping with change has become another element in organizations' battle to compete, thereby focusing attention on the need to manage change effectively. The aim of this course is to provide an understanding of the change management process and to present a framework for managing change in order for the participants to further explore advanced issues related to change management such as leadership, resistance to change, communication in a change context etc.

## Specific Objectives

On successfully completing the module, participants will be able to do the following.

- Present a clear view of the theory and practice of managing change.
- Demonstrate an understanding of the choices and dilemmas facing organisations.
- Explain the nature and history of the theories, approaches and beliefs available to guide their action, in order to make informed choices when instigating and implementing change.





- Demonstrate a practical understanding of organizational change, of the approaches to change and the methods of identifying, planning and implementing change.

### Methodology

The course is based on lectures, workshops and individual and group work . Please find below a detailed description of these scheduled meetings.

Weeks	CONTENT
1	Introduction to the course Introduction to change management
2	Selecting change agents/ Theory and team exercise
3	Culture change: Case study
4	Workshop: Identify success or failure factors in a culture change context
5	The role of culture in mergers and acquisitions
6	Resistance to change
7	Workshop: Antecedents and outcomes of resistance to change
8	Leadership and change management
9	Communication and change
10	Group presentations



### Assessment

Course assessment is based on a group assignment and a group presentation:

Group report: In a group of 5-7 people, you try to explore a major change that took place in a European country. The aim is to collect information in order to write a case study of a major change presenting its main phases, ways of change implementation, main obstacles etc. This report counts for the 70% of your total mark.

Group presentation: You need to present to our group your main findings in a 10 minute presentation. This presentation counts for the 30% of your total mark. More information will be given in the first lecture.

### Reading

Change is a broad subject and therefore students need to invest on searching and collecting materials from the library. Students will have access to e-class where there is recommended reading list.

### Bibliography

- Alvesson, M., & Sveningsson, S. (2015). Changing organizational culture: Cultural change work in progress. Routledge.
- Beer, M., & Nohria, N. (2000). Cracking the code of change. HBR's 10 must reads on change, 78(3), 133-141.
- Bernick, C. L. (2001). When your culture needs a makeover. Harvard Business Review, 79(6), 53-8.
- Caldwell, R. (2003). Models of change agency: a fourfold classification. British Journal of Management, 14(2), 131-142.
- Hemerling, J., Kilmann, J., Danoesastro, M., Stutts, L., & Ahern, C. (2018). It's not a digital transformation without a digital culture. BCG, Boston, Massachusetts, USA.
- Kotter, J. P. (2007). Leading change: Why transformation efforts fail, Harvard Business Review, pp.2-12
- Oreg, S., Vakola, M., & Armenakis, A. (2011). Change recipients' reactions to organizational change: A 60-year review of quantitative studies. The Journal of Applied Behavioral Science, 47(4), 461-524.
- Probst, G., & Raisch, S. (2005). Organizational crisis: The logic of failure. Academy of Management Perspectives, 19(1), 90-105.



- Rousseau, D. M. (2006). Is there such a thing as “evidence-based management”? *Academy of management review*, 31(2), 256-269.
- Seo, M. G., & Hill, N. S. (2005). Understanding the human side of merger and acquisition: An integrative framework. *The Journal of Applied Behavioral Science*, 41(4), 422-443.
- Vakola, M (2012), Resistance to change: Technology implementation in the public sector, In *Cases and Exercises in Organization Development*, Anderson, D. (ed). pp 112-118, USA: Sage Publications



# Marketing of Services

**Code:** 9020

**Instructor:** Kalipso Karantinou

ECTS credits: 6

Communication with the Instructor

[kkarantinou@aueb.gr](mailto:kkarantinou@aueb.gr)

## Course Objectives

The service sector is the dominant driving economic force worldwide and marketing and management practices in this field are evolving rapidly. There is as a result an increasing academic and business interest in the service sector, where the manufacturing-based models of business and marketing practice are not always useful, relevant and appropriate. Service organizations differ in many important respects, posing a number of interesting challenges to managers, and thus requiring a distinctive approach to the development of marketing strategies. This course aims to provide the students with an extensive understanding of the distinguishing characteristics of services and their implications and to acquaint students with services marketing theories, models, applications, and best practices, as ways to deal effectively with the unique challenges in services.

## Learning Outcomes

At the end of the course students should have developed a comprehensive understanding of the distinguishing characteristics of services, an appreciation of their multifaceted implications, and a resulting insight into the challenges of managing and marketing services. They should be able to identify optimal strategies for services and know how to implement them.

## Course Content

- The Uniqueness and Characteristics of Services
- Managerial Implications and Challenges in Marketing Services
- Service Quality - Customer Care - Service Excellence
- Creating and Sustaining Competitive Advantages in Services
- Service Positioning and Branding
- Communicating an Offering the Customer Cannot See
- The Role of People in Services



- Internal Marketing in Services
- Loyalty and Relationship Development in Services
- The Importance of Physical Evidence in Services
- Developing Servicescapes
- Using Process as a Distinguishing Advantage in Services
- Blueprinting and Customer Journey Mapping
- Pricing for Optimal Yield and Demand Management

#### Teaching and Learning Methods and Style

Sessions will combine lecture style delivery with case studies, practical examples and extensive discussions of the application of theories in a variety of different sectors and situations. Student participation is particularly encouraged and facilitated. Case studies will be provided every week to facilitate understanding of the practical relevance of theoretical concepts and students will be asked to work on them individually or in groups. Students will also work on five practical projects enabling them to apply models and tools in practice.

#### Reading Material

Readings and case studies will be uploaded onto e-class every week, pertaining to each lecture, illustrating the discussed concepts and their applications.

#### Assessment

Assessment will be by a combination of:

- Examination (70%),
- Projects (30%).



# Human Resource Management

**Code:** 9031

**Instructor:** Leda Panagiotopoulou

ECTS credits: 6

Level: Intermediate

Communication with the Instructor

Office: 2nd Trias str., 5th floor (room 510)

Tel. 210 8203 544

E-mail: [ledapan@aueb.gr](mailto:ledapan@aueb.gr)

## Aims

This course aims at familiarizing students with the theoretical background of Human Resource Management. The subjects covered throughout the lectures will introduce students to the current way of managing employees in modern organizations. More specifically, after the completion of the course, the participants will be able to understand:

- The important role of HRM in supporting organizational strategy in the modern firm.
- HRM practices and current trends.
- Issues in international HRM

## Course Outline

The course covers the following areas of HRM:

- The Nature of HRM - Strategic HRM
- Staffing: HR planning, Recruitment, Selection
- Performance Management
- Learning and Development
- Rewards and Incentives
- International Dimension

The main textbook of the course is: Human Resource Management, by Torrington, Hall, Taylor & Atkinson, Pearson, 2020, 11th edition.



### Teaching Method

Interactive lecture enriched with case studies and group discussions.

### Assessment of the Course

- Class participation
- Individual and group assignments
- Written exam



# Marketing Management

Code: 9086

Instructor: Dr. Kostas Kaminakis, Assistant Professor

ECTS credits: 6

Communication with the Instructor

[kkaminakis@aueb.gr](mailto:kkaminakis@aueb.gr)

## 1. Main aim(s) of the module:

This module examines the evolution of marketing thought and the environment in which it operates and introduces the students to the field of marketing planning in a variety of contexts. It will look closely at what constitutes a market and how a marketer identifies, segments and targets markets. Students will be introduced to the ways in which marketers develop the elements of the Marketing Mix. The aim is for you to have a greater understanding of the marketing processes that you will encounter every day in your role as a marketer.

### Module content

- Introduction to The Marketing Concepts, theories and models.
- Elements of the marketing mix (4P's).
- Marketing Planning and Decision Making: Understanding the issues surrounding effective marketing planning. A review of some decision-making models that help the planning process.
- Market segmentation, targeting & positioning: Looks at how consumers are divided into manageable groups and how targeting strategies are structured to aim at these specific target groups.
- Introduction to Marketing Research, Consumer and Organizational Buyer, Behaviour and marketing in the international context.





## Learning Outcomes

On successfully completing the module students will be able to:

- Demonstrate advanced understanding of the strategic role of marketing, including their primary functions in the context of the organisation and wider environment.
- Identify and critically evaluate the trends in the environment and use innovative market research techniques, both qualitative and quantitative, to understand customer behaviour.
- Demonstrate a comprehensive understanding of the marketing mix principles and how the marketing mix is managed, including marketing communications.
- Evaluate arguments or propositions and to make judgments that can guide the development of marketing plans that effectively addresses the challenges of businesses in different contexts.

## 2. Assessment methods

Exams 100%

Optional Group Presentation (up to +20% given that your exams grade exceeded 50%)

## 3. Reading and resources for the module:

Core:

- Kotler, P., Keller, K. (2020), Marketing Management, 15<sup>th</sup> ed., Pearson.

Recommended:

- Blythe, J., and Megicks, P. (2010). Marketing planning: Strategy, environment and context. Harlow, England: Prentice Hall.
- Keller, K. L. (2015). Strategic brand management: Building, measuring, and managing brand equity. 4th Ed. Boston: Pearson.
- Kerin, R. A. and Peterson, R. A. (2013). Strategic marketing problems: Cases and comments. Boston: Pearson.



- Kotler, P., and Keller, K. L. (2015). A framework for marketing management, 6th Ed. Boston: Prentice Hall.
- McDonald, M. and Wilson, H. (2016) Marketing plans: how to prepare them, how to use them. 8th edition. Chichester: John Wiley & Sons.

Academic Journals:

- Journal of Marketing
- Journal of Consumer Research
- Journal of Product and Brand Management
- Journal of Marketing Research
- European Journal of marketing
- Journal of Consumer Marketing
- Marketing intelligence and Planning
- Journal of Retail and Distribution Management
- Qualitative Market Research: International Journal

4. Indicative Lecture Content

Week No	Topic
1	WHAT IS MARKETING? <i>Creating and Capturing Customer Value</i>
2	MARKETING ENVIRONMENT <i>Analyzing the Marketing Environment</i>
3	BUYER BEHAVIOUR: <i>Consumer and Business Markets</i>
4	MARKET SEGMENTATION <i>Customer-Driven Marketing Strategy: Creating Value for Target Customers</i>
5	PRODUCT STRATEGIES <i>Product, Services, Brands, Product Development, and Product Life cycle</i>
6	PRICING STRATEGIES



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	<i>Understanding and Capturing Customer Value</i>
7	DISTRIBUTION CHANNELS <i>Delivering Customer Value, Retailing, and Wholesaling</i>
8	INTEGRATED MARKETING COMMUNICATIONS <i>Communicating Customer Value</i>
9	MARKETING RESEARCH <i>Managing Marketing Information to gain Customer Insights</i>
10	GLOBAL MARKETING <i>The Global Marketplace</i>
11	MARKETING PLANNING <i>Company and Marketing Strategy: Partnering to Build Customer Relationships</i>



# SCHOOL OF ECONOMIC SCIENCES



DEPARTMENT OF INTERNATIONAL AND EUROPEAN ECONOMIC STUDIES



## Economics of Globalization

Code: 9014

Instructor: TBA

ECTS credits: 6

Level: Advanced (4th year course)

Communication with the Instructor

### Course Objective

The purpose of this course is to examine the forces that have shaped the evolution of the world economy during the last two centuries (with special emphasis on developments after World War II), and to study the consequences for national and individual welfare of the increased pace of worldwide economic integration.

### Course Content

1. A Brief Historical Overview of the World Economy
2. International Trade in Goods
  - (a) Effects on National Welfare
  - (b) Distributional Implications
3. The Effects of Preferential Liberalization
4. Economic Integration, Labour Markets and Migration
5. Outsourcing
6. Capital Movements and Exchange Rate Regimes
  - (a) Fixed Exchange Rates
  - (b) Flexible Exchange Rates
  - (c) Monetary Unions



#### Recommended Prerequisite Knowledge

Intermediate-level knowledge of International Economics such as presented in Robert Feenstra and Alan Taylor, 2008, *International Economics*, Worth

#### Recommended Books on Globalization

Dani Rodrik, 1997, *Has Globalization Gone too Far?*, Peterson Institute

Joseph Stiglitz, 2003, *Globalization and Its Discontents*, Norton

Jeffrey Frieden, 2006, *Global Capitalism: Its Fall and Rise in the 20th Century*, Norton

Dani Rodrik, 2011, *The Globalization Paradox: Democracy and the Future of the World Economy*, Norton

Additional reading of (mainly) journal articles will be provided after the first lecture.

#### Course Evaluation

The overall evaluation in this course is based on the following items:

1. Comprehensive Final Exam (50% of the final grade) covering all the units and topics presented in the lectures.
2. Students will have to work on a project (approximately 5000 words), to do in-class presentation (30 minutes), and to deliver the essay to their discussant a week prior to their presentation (35% of the final grade).
3. Students will have to write a comment on another student's project (maximum 1000 words) and to present it in class (15% of the final grade).



# International Economics

Code: 9039

Instructor: TBA

ECTS credits: 6

Level: Intermediate

Communication with the Instructors

## Course Description

### *Part A. International Trade: Theory and Policy*

- Absolute and comparative advantage in international trade.
- The determination of relative prices; the gains from trade;
- The effects of productivity changes on domestic and foreign welfare.
- Gains and losses from trade in the specific-factors model;
- Trade policy: tariffs, subsidies, and quantitative restrictions.
- International Factor Movements: Winners, Losers?

### *Part B. International Monetary Economics: Theory and Policy*

- National income and the Balance of Payments; the Current Account, foreign indebtedness.
- Money, interest rates and exchange rates; purchasing power parity; international interest-rate differences and the real exchange rate.
- National income and the exchange rate: Fixed versus flexible exchange rates; monetary, fiscal and exchange rate policy effectiveness under imperfect and perfect capital mobility. The insulating properties of alternative exchange rate regimes. Balance of payments crises and capital flight.
- The international monetary system; macroeconomic policy goals in the open economy: internal and external balance. International macroeconomic policy coordination.

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## Course Outline

### *Part A. International Trade: Theory and Policy*

- Trade and Technology: The Ricardian Model (FT: 2)
  - Factor Endowments and International Trade: The Specific Factors Model of International Trade (FT: 3)
  - Import Tariffs and Quotas under Perfect Competition (FT: 8)
-



- Export Subsidies (FT: 10)
- International Factor Movements (FT: 5)
- Part B. International Monetary Relations: Theory and Policy*
- National and International Accounts: Income, Wealth, and the Balance of Payments (FT: 16)
- Exchange Rate Determination in the Short Run and in the Long Run (FT: 13, 14, 15)
- Output, Exchange Rates, and Macroeconomic Policies (FT:18)
- Fixed versus Floating Exchange Rates (FT: 19)
- Exchange Rate Crises (FT: 20)

### Course Evaluation

The overall evaluation in this course is based on the following diagnostics:

1. Mid-term exam (Part A, 30% of the final grade): Week of 21-26, November 2022. Details to be announced in due time.
2. Comprehensive Final Exam (70% of the final grade). The exam covers the entire course material, PART A and PART B

### Bibliography

#### *Required Readings*

- Course Textbook: Feenstra, Robert & Alan, Taylor: International Economics, Worth Publishers, 2008 (FT).
- E-class material

#### *Supplementary Readings*

- Krugman, Paul & Maurice Obstfeld, International Economics: Theory and Policy, 8th Edition, Addison-Wesley 2009
- Jagdish Bhagwati, Protectionism, MIT Press, 1988
- Jagdish Bhagwati, The World Trading System at Risk, MIT Press, 1991.
- Paul Krugman, Pop-Internationalism, MIT Press, 1995





## Legal Aspects of European Integration

Code: 9043

Instructor: TBA

ECTS credits: 6

Level: Advanced

Communication with the Instructor

### Course Objective

The aim of the course is to analyze the most fundamental aspects of the process of European integration. Its objective is to provide an overview of the basic EU institutional and Economic law issues. It will help students understand how EU law can facilitate the process of the European Integration and promote or impede business transactions taking place at the European as well national level.

### Course Outline

1. The History of European Integration
  2. The Creation of the European Communities
  3. The Creation of the European Union
  4. EU Institutions
  5. EU Decision Making System
  6. The Protection of Fundamental Rights
  7. The Citizenship of the European Union
  8. EU-Member States: the Principles
  9. The Internal Market of the EU
  10. Economic and Monetary Union
  11. EU Competition Policy
-



12. EU Social Policy

13. Freedom, Security and Justice

14. External action by the EU

Course material

EU Law, Chalmers/Davies/Monti, 2015 (CUP)

EU Law, R. Schütze, 2015 (CUP)



# Applied Machine Learning in Economics

Code: 9087

ECTS credits: 6

## Course Objective

Machine learning, originally a development in computer science, combined with ideas of statistical analysis, offers the basis for a set of tools for modeling and understanding complex datasets. This introductory course gives an overview of different concepts, techniques, and algorithms in machine learning with a view towards applications in economics. We begin with topics such as linear Regression, Classification, Model Selection, and we move to methods of improved predictive accuracy like Regularized Regression, Decision Trees, Boosting, Support Vector Machines, and Neural Networks as time permits.

The course will be delivered from the vantage point of user and provide the student with skills of implementation of the basic machine learning methods in economic problems using the R programming language.

## Learning Outcomes

The aim of the course is to acquaint students with the basic methodological tools of machine learning, providing a comprehensive background. Upon successful completion of the course students will be able to:

- Understand the basic types and issues of a machine learning problem.
- Understand the standard learning methods for regression and classification problems.
- Estimate the test error rates using cross validation.
- Use R libraries to implement machine learning methods.
- Apply methods to analyze data on relevant economic questions.

## Course Content

- Basic trade offs when we train a method.
  - Linear Regression, Ridge Regression, Lasso.
  - Logistic classification, KNN, Naïve Bayes.
-



- Cross-Validation approaches.
- Tree-based methods (Bagging, Random Forest, Boosting)
- Support Vector machines.
- Deep Learning.

#### Delivery Method

- Lectures on the basic concepts followed by computer implementation of the methods using R.

#### Evaluation

- Final written exam (25%), Midterm written exam (20%)
- Project (35%) and Assignments (20%)

#### Level

Intermediate level, appropriate mainly for third year students of economics or related subjects.

#### Recommended Prerequisite Knowledge

Introductory one-sample statistics and basic linear regression model.

#### Textbooks

*An Introduction to Statistical Learning, (with Applications in R)*, by James, Witten, Hastie, Tibshirani.



SPRING SEMESTER

## Empirical Economics

Code: 9080

Instructor: TBA

ECTS credits: 6

Communication with the Instructor

### Course Objective

The course is an introduction to practical problems of applied econometrics. The approach followed will be very practical, emphasizing the empirical aspects of economic problems. This requires a good knowledge of econometric theory as it is essential to have a good idea of what the computer does, when asked to estimate and evaluate a model. Each section will begin with a presentation of the main theoretical econometric results that are required, followed by an economic/financial problem of interest and concluded with empirical applications. The analysis of the issues will be performed using real data.

### Learning Outcomes

The aim of the course is to acquaint students with the basic methodological tools of modern empirical analysis, providing a comprehensive background. Upon successful completion of the course students will be able to:

- Understand and analyze the fundamental problems associated with empirical analysis of financial problems.
- Collect data suitable for empirical research and evaluate empirical models.
- Understand the concept of causality and how the causal effect of a variable can be calculated experimentally.
- Estimate linear regression models.
- Estimate and evaluate discrete choice models and use them for classification.



- Use instrumental variable techniques to estimate causal effects of interest
- Estimate models with panel data or repeated cross-sections, and use these in policy analyses

#### Course Content

- Understanding cause and effect in Economics
- Review of the simple and multiple regression model
- Pooled Cross Sections and Panel Data Models (DID methodology)
- Instrumental Variables Regression and Systems of Equations
- Models with binary dependent variables and classification
- Other limited dependent variable models (Tobit, Poisson)

#### Delivery Method

- Lectures followed by computer sessions to get a hands-on experience with the use of R

#### Evaluation

- Final Written Exam (40%)
- Projects and Assignments (60%)

#### Level

Intermediate level, appropriate mainly for third year students of economics or related subjects.

#### Recommended Prerequisite Knowledge

Introductory econometrics (basic linear model and deviations from classical assumptions).

#### Textbooks

Wooldridge, J. M. (2018) *Introduction to Econometrics: A Modern Approach*, 7<sup>th</sup> ed, Cengage

Stock, J. H. and Watson, M. W. (2019) *Introduction to Econometrics*, 4<sup>th</sup> ed, Pearson Education.

#### Other Material



- Angrist, J. and Pischke, J.-S. (2014) *Mastering 'Metrics. The Path from Cause to Effect*. Princeton University Press
- Angrist, J. D. and Pischke, J.-S. (2009) *Mostly Harmless Econometrics: An Empiricist's companion*, Princeton University Press.
- Greene, W. H. (2018) *Econometric Analysis*, 8<sup>th</sup> ed, Pearson
- Kleiber, C. and Zeileis, A. (2008) *Applied Econometrics with R*, Springer
- Hanck, C., Arnold, M., Gerber, A. and Schmelzer, M. (2020) Introduction to Econometrics with R, <https://www.econometrics-with-r.org>
- Heiss, F. (2020) *Using R for Introductory Econometrics*, <http://www.urfie.net>



*DEPARTMENT OF ECONOMICS*



FALL SEMESTER

## **Business Economics**

Code: 9006

Instructor: Fabio Antoniou

ECTS credits: 6

Level: Intermediate (3rd year course)

Communication with the instructor

[fantoniou@aueb.gr](mailto:fantoniou@aueb.gr)

Web Site: Look at the website of this course on e-class: <http://eclass.aueb.gr>

### Course Description

Managerial (or Business) Economics is the application of economic theory to decisions made by firms. Our focus is on four topics. We start with demand theory and consumer behaviour, studying how consumers and other firms respond to price changes and thus how to decide what price to charge. We then move to production and cost theory, where we think about the most basic decisions of firms: how much to produce and what inputs to use (optimal boundaries). We then analyze pricing strategies under different market structures and the strategic world of managers (market and competitive analysis). Then we look at how firms choose (and maintain) their competitive advantage. Lastly, we look inside the firm, on how firms are organized and the way they evaluate and reward performance (optimal internal structure). Managerial economics provides a comprehensive application of economic theory and methodology to managerial decision making.

### Course Objectives

The learning objectives of the course:





- To enable students to develop the skills and to provide the opportunity to practice the study of Managerial Economics.
- To develop a critical understanding of methods, procedures and current issues and debates appropriate to the study of Managerial Economics.

By the end of the course the students should:

- have gained a knowledge and understanding of the themes, issues and debates within the study of Managerial Economics
- be able to think critically and independently about what they have seen and read
- have been introduced to the range of skills and critical vocabularies needed to facilitate the study of Managerial Economics
- gained a critical understanding of the application of the methods involved in the study of Managerial Economics

#### Textbooks and Reading

The main textbook of the course is:

1. Besanko, D., Dranove, D., Shanley, M., Shaefer, S., Economics of Strategy, John Wiley and Sons, 5<sup>th</sup> edition, 2010.

Course participants will be given a package of additional reading in some sessions. For those interested in further reading the following books are recommended:

2. W. Bruce Allen, Neil Doherty, Keith Weigelt, and Edwin Mansfield, Managerial Economics, Norton, 7<sup>th</sup> edition, 2009.
3. Church J. and R. Ware (2000), Industrial Organization: A Strategic Approach, McGrawHill.
4. Keat, P. and Young, P., Managerial Economics, Prentice Hall, fifth edition, 2006.
5. Lazear E. and M.Gibbs, Personnel Economics in Practice, Wiley, 2<sup>nd</sup> edition, 2009.

#### Course Outline

- i. Introduction; Theory of the Firm
  - ii. Does Management matter?
  - iii. Basics of Demand and Supply & consumer behaviour
  - iv. Individual and Market Demand; Estimating Demand
-



- v. Production and Cost Theory
- vi. Profit maximization and competitive supply-optimal boundaries
- vii. Market power and pricing
- viii. Business strategy and game theory
- ix. Markets with Asymmetric Information
- x. Strategic position and dynamics
- xi. Internal organization



## Public Economics

Code: 9026

Instructor: Petros Varthalitis

ECTS credits: 6

Level: 3<sup>rd</sup> year course

Communication with the instructor

[pvarthalitis@aueb.gr](mailto:pvarthalitis@aueb.gr)

Level of course: Undergraduate

Year of study: 3<sup>RD</sup> year

### Assessment methods and criteria

The course grade will be based on written exams and (optional) assignments.

### Prerequisites and co-requisites

Basic Microeconomics and Macroeconomics

### Planned learning activities and teaching methods

Lectures, problem sets and assignments.

### Objectives of the course:

This is the basic course in public economics. Public economics focus on the role of the government in the economy by answering key questions like:

- How do government policies affect the economy?
- How should government policies be designed to maximize economic welfare?

The main objective of the course is to equip students with the basic analytical concepts, theoretical and empirical tools in public economics so as to understand the 'real-world' policy making issues faced by policymakers and applied economists in national (e.g. Government Departments, Fiscal Councils



and Central Banks) and international policy institutions (e.g. IMF, OECD, European Commission).

By the end of this course students will be able to use the main analytical tools, theoretical models and empirical evidence to:

- Understand and explain issues on public finances, e.g. tax and government expenditures, budget deficits/surpluses and public debt sustainability.
- Analyze efficiency and equity concepts.
- Market failures and government intervention.
- Political economy issues, e.g. how the government make decisions.
- The effect of taxation on the economy, types of taxation, principles of optimal taxation.

Students will learn how to use and interpret modern theoretical models so as to study economic policy issues as well as to process and interpret economic data for policy analysis. Ultimately, students will acquire necessary skills and competences so as to pursuit a professional career as applied economists to policy-orientated institutions.

#### Recommended optional programme components

N.A.

#### Course contents

In general, public economics is the study of economic efficiency, distribution and economic policies. Public economics attempts to understand how the government makes decisions and what decisions should make. The course will cover the following topics:

- Public Finances.
- Efficiency and Equity.
- Externalities.
- Public Goods.
- Political Economy and Democracy.



- Issues on taxation.
- Government policies in the era of COVID-19 crisis.

Recommended or required reading

- Gruber, Jonathan., *Public Finance and Public Policy*, 6th Edition, MacMillan (2019).
- Hindriks Jean and Myles D. Gareth., *Intermediate Public Economics*, MIT Press (2006).

Additional references and will be recommended during each lecture.



# Labour Economics

Code: 9041

Instructor: E. Hatziharitou

ECTS credits: 6

Level: Intermediate (3<sup>rd</sup> year course)

Semester: Fall semester (5<sup>th</sup> semester)

Communication with the Instructor

[ehatzi@aueb.gr](mailto:ehatzi@aueb.gr)

Objectives of the course:

Upon completion of the course, students will be able to understand why it is so important to study LABOUR ECONOMICS. So we emphasize first the main economic and institutional characteristics of the labour market and how this market is related to the other markets and the whole economy. It is very important to understand that demand and supply forces play an important role to the labour market as to the whole economy. The whole course uses both static and dynamic analysis as we are living in a very changeable environment and all economic agents react and adapt to these changes all over time.

Course Contents:

## (1) Introduction

- . Why it is so important to study Labour Economics ?
- . Which are the main questions we will try to answer in this course ?
- . Static versus dynamic analysis .

## (2) Labour Market

- . The economic and institutional factors of the labour market.
- . The relation of the labour market with the other markets of an economy.
- . The role of labour resource in the productive procedure .



- . The analysis of labour market at local , regional , national , European and inter- national level .
  - . The main determinants of the size of the labour force and its quality ( the investment in human capital ) .
    - . Labour market flexibility . Advantages and disadvantages.
    - . Labour market statistics and their comparability over time and between countries
      - . EUROSTAT labour market statistics for all the member countries.
  - ( 3 ) Industrial Relation System
    - . Industrial relation system and labour market .
    - . Industrial relation system and working terms determination .
    - . Which is the best ? Centralized or decentralized industrial relation system ?
  - ( 4 ) Quantified Aspect of Labour Supply
    - . Static and dynamic analysis of individual and total labour supply .
    - . Income and substitution effect .
    - . The elasticity of labour supply .
    - . Income tax and labour supply .
    - . Labour market participation cost and labour supply .
    - . Unemployment and labour supply .
    - . The role of family income in each member labour supply .
    - . Gary Becker analysis of the allocation of time .
  - ( 5 ) Qualified Aspect of Labour Supply: (A)Labour Mobility
    - . Occupational and geographical mobility .
    - . Economic and non- economic incentives and disincentives .
    - . Unemployment and labour mobility .
-



( 6 ) Qualified Aspect of Labour Supply:(B) Education ,Training and Research

- . Investment in human capital theory .
- . Education , training and experience as an investment in human capital .
- . Training on the job .

( 7 ) Labour Demand

- . The short-run and long-run demand for labour under competitive or non-competitive conditions in the product market .
- . The elasticity of labour demand .
- . Its importance.
- . The main determinants of labour demand elasticity.
- . Which factors shift the labour demand curve ?

( 8 ) Wage and Employment Determination

- . Under perfect competitive conditions in product and labour market.
- . In monopolistic product market.
- . In monopsonistic labour market.
- . Bilateral monopoly.

( 9 ) Labour Unions and Collective Bargaining

- . The economic impact of unions.
- . The bargaining power of both parties of negotiation.
- . The determining factors of bargaining power.

( 10 ) Wage Structure

- . The main sources of wage differentials.
-





- . Heterogeneous jobs, heterogeneous workers, market imperfections.
- . Hedonic theory of wages.

( 11 ) Labour Market Discrimination

- . Types of discrimination.
- . Theories of labour market discrimination.

( 12 ) Employment and Unemployment

- . Theoretical and empirical analysis.
- . European Union countries comparison.

• Prerequisites and co-requisites

N.A.

• Recommended optional or not optional practical assignments

All the Erasmus students have the obligation / or not to write and present an essay

Under the supervision of their professor

• Assessment methods and criteria

The course grade will be based on written exams and an optional group or individual

Assignment

TEXT BOOKS IN LABOUR ECONOMICS

1 ) G. Mc CONNELL and S. BRUE, " CONTEMPORARY LABOUR ECONOMICS ",  
4th ed. (1995) Mc Graw - Hill

2) C. McCONNELL , S. BRUE and D. MACPHERSON, " CONTEMPORARY  
LABOUR ECONOMICS", 9 th ed. (2009) McGraw - Hill

3) O. ASHENFELTER and R. LAYARD, " HANDBOOK OF LABOR ECONOMICS ",  
Vol. I , II, (1986) North - Holland



- 4) R. EHRENBERG and R. SMITH, "MODERN LABOR ECONOMICS", 6th ed. (1997) Addison Welsey, 9th ed. (2006) Pearson
- 5) D. HAMERMESH and D. REES, "THE ECONOMICS OF WORK AND PAY", 5th ed. (1993) Harper Collins Publisher
- 6) R. EHRENBERG and R. SMITH, "MODERN LABOR ECONOMICS :THEORY AND PUBLIC POLICY", 12th ed. (2017) Ronald G.
- 7) GEORGEJ. BORGJAS, "LABOUR ECONOMICS", 6th ed. Mac-Graw Hill.
- 8) A. BOOTH, "THE ECONOMICS OF THE TRADE UNION", 1995, Cabridge University Press



## Theory and Practice of Economic Integration

Code: 9063

Instructor: E. Hatziharitou

ECTS credits: 6

Level: Advanced (4<sup>th</sup> year course)

Semester: Fall and Spring semester (7<sup>th</sup> and 8<sup>th</sup> semester)

Communication with the Instructor

[ehatzi@aueb.gr](mailto:ehatzi@aueb.gr)

Objectives of the course:

Upon completion of the course, students will be able to understand the main objectives of the European Union and the way to achieve these objectives as the member countries have different economic and institutional characteristics. It is also very important to understand completely the stages and policies of economic and monetary integration. Using cost-benefit analysis we can derive the main conclusions about the behaviour of each member country after the experience of various shocks and see which country with which characteristics (both economic and institutional) manage to be in the Optimum Currency Area Zone. In these countries the economic integration leads to economic convergence over time.

Course Contents:

PART I

Introduction ,Historical References and the Main Purpose of this course

( a ) The Treaty of Rome

( b ) The stages of Economic and Monetary Integration

( c ) The main objectives of the EU and the way to achieve these objectives

( d ) The role of : mutual recognition , cooperation , coordination and harmonization

( e ) Which countries , with which characteristics ( economic and non-economic ) managed to be in the "Optimum Currency Area Zone" ?



( f ) How this was achieved during the process of Economic and Monetary Integration ?

#### PART II

The Structure Policy of the European Union, its Instruments and its Targets

( a ) European Social Fund and European Social Policy

( b ) European Agricultural Fund

( c ) European Fund of Regional Development and Regional Economic Policy

( d ) Cohesion fund

( e ) The Budget of the EU

#### PART III

The Creation of the Unified Internal market

( a ) Economic Integration and its forms

( b ) Partial and general equilibrium analysis of the custom duties effects

( c ) The welfare effects of custom duties , quotas and subsidies

( d ) The theory of custom union's and its effects. A partial and general equilibrium analysis

( e ) Free Trade Area Agreement and the comparison with custom union

( f ) Fiscal unions and tax harmonization

( g ) Excise tax harmonization

#### PART IV

Historical Reference of the Monetary Union : From the European Monetary System to the Economic and Monetary Union and the Common Currency , EURO

( a ) The system of the ECU

( b ) The Single European Act

( c ) The Criteria of Maastricht

( d ) The Three Stages of the Monetary union

( e ) The Euro : The mechanism of the Unique Money



## PART V

### The Theory of Monetary Integration

- ( a ) The Theory of “ Optimum Currency Areas ”
- ( b ) The criticism of “ Optimum Currency Areas Theory ” over time : symmetric or asymmetric shocks ?
- ( c ) The benefits of a common currency
- ( d ) The comparison between costs and benefits : static and dynamic analysis
- ( e ) The European Monetary System and its imperfections
  
- ( f ) Case studies comparing EU member countries and third countries

## PART VI

### The Implementation of the Central Banks European System

- ( a ) The European System of Central Banks
- ( b ) The European Central Bank
- ( c ) The Policy of the European Central Bank

## PART VII

### The Economic and Financial Crisis

- ( a ) How the EU member countries were affected and why ?
- ( b ) Which were the policies followed during the crisis ?
- ( c ) Which will be the new rules and policies of the EU after the experience of the shocks created during the Economic and Financial crisis?

- Prerequisites and co-requisites

N.A.

- Recommended optional or not optional practical assignments

All the Erasmus students have the obligation / or not to write and present an essay under the supervision of their professor.



- Assessment methods and criteria

The course grade will be based on written exams and an optional group or individual assignment.

TEXT BOOKS IN THEORY AND PRACTICE OF ECONOMIC INTEGRATION

- 1 ) T . HITIRIS , " EUROPEAN UNION ECONOMICS " 5<sup>th</sup> ed. (2002) and 6<sup>th</sup> ed.(2012)Prentice Hall
- 2 ) P. KRUGMAN and M. OBSTFELD , " INTERNATIONAL ECONOMICS : THEORY AND POLICY ", 2<sup>nd</sup> ed. (1991) Harper Collins College, 8<sup>th</sup> ed. (2009) Addison – Wesley Pearson
- 3 ) P. ROBSON , "THE ECONOMICS OF INTERNATIONAL INTEGRATION ", 3<sup>rd</sup> ed. (1987) George Allen & Unwin, 4<sup>th</sup> ed. (1998) Routledge Chapman & Hall
- 4 ) PAUL DE GRAUWE , "THE ECONOMICS OF MONETARY INTEGRATION ", 3<sup>rd</sup> (1997)and 7<sup>th</sup> (2007) ed. Oxford University Press



SPRING SEMESTER

## Theory and Practice of Economic Integration

Code: 9063

Instructor: E. Hatziharitou

ECTS credits: 6

Level: Advanced (4<sup>th</sup> year course)

Semester: Fall and Spring semester (7<sup>th</sup> and 8<sup>th</sup> semester)

Communication with the Instructor

[ehatzi@aueb.gr](mailto:ehatzi@aueb.gr)

Objectives of the course:

Upon completion of the course, students will be able to understand the main objectives of the European Union and the way to achieve these objectives as the member countries have different economic and institutional characteristics. It is also very important to understand completely the stages and policies of economic and monetary integration. Using cost-benefit analysis we can derive the main conclusions about the behaviour of each member country after the experience of various shocks and see which country with which characteristics (both economic and institutional) manage to be in the Optimum Currency Area Zone. In these countries the economic integration leads to economic convergence over time.

Course Contents:

PART I

Introduction ,Historical References and the Main Purpose of this course

( a ) The Treaty of Rome

( b ) The stages of Economic and Monetary Integration

( c ) The main objectives of the EU and the way to achieve these objectives

( d ) The role of : mutual recognition , cooperation , coordination and harmonization



( e ) Which countries , with which characteristics ( economic and non-economic ) managed to be in the "Optimum Currency Area Zone " ?

( f ) How this was achieved during the process of Economic and Monetary Integration ?

## PART II

The Structure Policy of the European Union, its Instruments and its Targets

( a ) European Social Fund and European Social Policy

( b ) European Agricultural Fund

( c ) European Fund of Regional Development and Regional Economic Policy

( d ) Cohesion fund

( e ) The Budget of the EU

## PART III

The Creation of the Unified Internal market

( a ) Economic Integration and its forms

( b ) Partial and general equilibrium analysis of the custom duties effects

( c ) The welfare effects of custom duties , quotas and subsidies

( d ) The theory of custom union's and its effects. A partial and general equilibrium analysis

( e ) Free Trade Area Agreement and the comparison with custom union

( f ) Fiscal unions and tax harmonization

( g ) Excise tax harmonization

## PART IV

Historical Reference of the Monetary Union : From the European Monetary System to the Economic and Monetary Union and the Common Currency , EURO

( a ) The system of the ECU

( b ) The Single European Act

( c ) The Criteria of Maastricht





- ( d ) The Three Stages of the Monetary union
- ( e ) The Euro : The mechanism of the Unique Money

#### PART V

##### The Theory of Monetary Integration

- ( a ) The Theory of “ Optimum Currency Areas ”
- ( b ) The criticism of “ Optimum Currency Areas Theory ” over time :  
symmetric or asymmetric shocks ?
- ( c ) The benefits of a common currency
- ( d ) The comparison between costs and benefits : static and dynamic analysis
- ( e ) The European Monetary System and its imperfections

- ( f ) Case studies comparing EU member countries and third countries

#### PART VI

##### The Implementation of the Central Banks European System

- ( a ) The European System of Central Banks
- ( b ) The European Central Bank
- ( c ) The Policy of the European Central Bank

#### PART VII

##### The Economic and Financial Crisis

- ( a ) How the EU member countries were affected and why ?
- ( b ) Which were the policies followed during the crisis ?
- ( c ) Which will be the new rules and policies of the EU after the experience of  
the shocks created during the Economic and Financial crisis?

- Prerequisites and co-requisites

N.A.

- Recommended optional or not optional practical assignments
-



All the Erasmus students have the obligation / or not to write and present an essay under the supervision of their professor.

- Assessment methods and criteria

The course grade will be based on written exams and an optional group or individual assignment.

#### TEXT BOOKS IN THEORY AND PRACTICE OF ECONOMIC INTEGRATION

- 1 ) T. HITIRIS , " EUROPEAN UNION ECONOMICS " 5<sup>th</sup> ed. (2002) and 6<sup>th</sup> ed.(2012)Prentice Hall
- 2 ) P. KRUGMAN and M. OBSTFELD , " INTERNATIONAL ECONOMICS : THEORY AND POLICY ", 2<sup>nd</sup> ed. (1991) Harper Collins College, 8<sup>th</sup> ed. (2009) Addison – Wesley Pearson
- 3 ) P. ROBSON , "THE ECONOMICS OF INTERNATIONAL INTEGRATION ", 3<sup>rd</sup> ed. (1987) George Allen & Unwin, 4<sup>th</sup> ed. (1998) Routledge Chapman & Hall
- 4 ) PAUL DE GRAUWE , "THE ECONOMICS OF MONETARY INTEGRATION ", 3<sup>rd</sup> (1997)and 7<sup>th</sup> (2007) ed. Oxford University Press



# Startup Entrepreneurship

Code: 9083

Instructor: Ioanna Sapfo Pepelasi, Emerita Professor

Communication with the Instructor

[ioannasapfopepelasis@gmail.com](mailto:ioannasapfopepelasis@gmail.com)

ECTS credits: 6

\*This course is supported by ACEin , the incubator of AUEB.

## Course Objectives

To provide a basic knowledge and direct familiarity with: startup entrepreneurship and its links to innovation and sustainable economic growth , the steps required during the journey from business idea to early stage firm creation; the prerequisites for success; lessons from failure and developing familiarity with the startup ecosystem and how it has evolved..

## Contents

1. Defining the entrepreneurial mindset and toolset from a variety of theoretical and practical based methodological approaches.
2. Startup entrepreneurs(ship): Basic features and varieties (past, present and 'tomorrow').
3. Startup entrepreneurship: significance and links to (sustainable) economic growth.
4. From idea to realization/maturity. The birth and (early) stages of growth of a startup.
5. Tools, case studies and information useful for prospective start uppers.
  - 5a. Business Model Canvas
  - 5b. Basic Business Plan/Financial Tool
  - 5c. Digital Transformation of an organization
  - 5d. Branding for Start ups
  - 5e. How to make a perfect Pitch for a Start up
6. Drivers of Success and dealing with failure.
7. Selected examples of successful startups and startup ecosystems.
8. Epilogue: Summary and looking towards the future.



## Method

During the second part of each lecture we will have an invited speaker. These speakers will consist of members of ACEin, startupper, other stakeholders of the startup/innovation ecosystems and academics. The study material will consist of a collection of written academic and practice based articles and videos.

## Requirements

1. A short 5 minute presentation in class (on selected topics).
2. Final exam : open ended questions.

## Indicative Wider Bibliography

- Aulet, Bill (2013), Disciplined Entrepreneurship, Wiley, (selected chapters).
  - Baumol, W,(1996) „ Entrepreneurship: Productive, unproductive, and destructive, Journal of Business Venturing, Volume 11, Issue 1. <https://www.sciencedirect.com/science/article/abs/pii/088390269400014X>
  - Besis, Ioannis and Ioanna Sapfo Pepelasis (2020), Incubated early stage startupper and their initiatives in Athens during the Crisis (2010-2016), Department of Economic, AUEB, Working Papers, <https://www.hellenic.org/wp-content/uploads/2020/06/allWP-01-20-Besis-Pepelasis-03-June-2020-AUEB-Report.pdf>
  - Blank, Steve (2013), Why the Lean Start-Up Changes Everything A faster, smarter methodology for launching companies may make business plans obsolete., Harvard Business Review, May <https://hbr.org/2013/05/why-the-lean-start-up-changes-everything>
  - Cassens, Nathalie (2021), The Lean Startup – A Systematic Literature Review Seminar paper FH Wedel, Wedel, Germany, bwl105273@fh-wedel.de Seminar IT-Management in the Digital Age (Winter ), FH Wedel, Germany
  - European Startup Monitor 2019/20 [https://www.europeanstartupmonitor2019.eu/EuropeanStartupMonitor2019\\_2020\\_21\\_02\\_2020-1.pdf](https://www.europeanstartupmonitor2019.eu/EuropeanStartupMonitor2019_2020_21_02_2020-1.pdf)
  - European Startups (2021) , The Past, Present, Future of European Tech,(selected chapters). <https://www.europeanstartups.co>
  - Ries, Eric, (2011) The Lean Startup, Crown Business,(selected chapters).
  - Salamzadeh, Aidin and Kawamorita Kesim, Hiroko, (2015). Startup Companies: Life Cycle and Challenges. Proceedings of the 4th
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International Conference on Employment, Education and Entrepreneurship (EEE), Belgrade, Serbia. <https://tarjomefa.com/wp-content/uploads/2017/01/5929-English-TarjomeFa.pdf>

- Senor, Dan and Singer, Saul, (2009) Start-up Nation, Twelve, (selected chapters).
- StartupBlink, Global and Europe GUIDE <https://www.startupblink.com/blog/a-startup-ecosystem-guide-europe/>



# Principles of Sociology

Code: 9053

ECTS credits: 6

Level: Introductory level, (2<sup>nd</sup> year course)

## Course Objectives

The course aims to introduce students to the science of Sociology and, specifically, to acquaint them with basic concepts, analytical tools and research methods. The presentation of classic and modern sociological theories and perspectives, fundamental sociological concepts (social structure, action, organization, social reproduction/transformation, social facts, social interaction, culture, stratification and social class, social inequalities etc.), and of quantitative and qualitative research methods purports to equip students with the proper knowledge and analytical skills that will enable them to approach, analyze, understand and interpret critically the social, cultural, economic, political processes and dimensions of our contemporary –complex, globalized, and rapidly changing– social world(s).

## Course Contents

Session 1. Introduction to Sociology

Session 2. Founders of Sociology: The development of French, German, British and Italian Sociology

Session 3. Modern Sociological Theories: Functionalism, Conflict Theory, Symbolic Interactionism

Session 4. Sociological Research Methods: Quantitative and qualitative research methods

Session 5. Culture, Social Structure and Socialization

Session 6. Stratification, Social Class and Inequalities

Session 7. Gender, Race and Ethnicity: Social discrimination, exclusion and inequalities

Session 8. Political Sociology: Forms of Government and Social Movements

Session 9. Sociology of Work: The social organization of work and the experience of employment and unemployment

Session 10. Media, Popular Culture and Consumption

Session 11. Urban Sociology: Forms of urbanization in contemporary social world



Session 12. Sociology in a globalized world: Social, Cultural, Political, Ecological, Labour Changes

Session 13. Oral presentations of group assignments.

Mode of Delivery

Face-to-face teaching, class discussion, group student work and oral presentations of assignments.

Textbook and Reading

*Main textbook:*

Anthony Giddens, *Sociology*, 6<sup>th</sup> edition, Polity Press, Cambridge: 2009.

*Recommended books for further reading:*

- M. Hughes-C. J. Kroehler, *Sociology: The core*, 7<sup>th</sup> edition, The McGraw-Hill Companies, 2005
- S. Hall-B. Gieben, *Formations of Modernity*, Polity Press/Blackwell Publ., Oxford 1992
- G. Ritzer, *Modern Sociological Theory*, 7<sup>th</sup> Edition, The McGraw-Hill Companies, 2008.

\* Course participants will be informed about additional-recommended reading in every session.

Planned learning activities and teaching methods

Regular three-hour Lectures per week/ Internet-based communication with students. At every lecture we will present and discuss main subject matters of Sociology, as it's referred in Course Content. We will follow largely A. Giddens' book, but we will also draw material from additional resources, in order to accomplish a more comprehensive presentation of sociological subject-areas. Students will have to join in groups of 3 or 5 individuals and to conduct a research on the same topic that will be announced to them in the first meeting. The joining of students from different countries will provide an interesting and important ground for comparative sociological research work. At the last lecture, student research teams will have to present orally their assignments. This presentation will offer the possibility for critical sociological discussion and will testify students acquired analytical skills.

Assessment methods and criteria

Final written exam (80%)

Written assignment and Oral presentation of assignment (20%)







# **SCHOOL OF INFORMATION SCIENCES AND TECHNOLOGY**



## DEPARTMENT OF INFORMATICS



Incoming Erasmus students who speak Greek may attend any of the undergraduate courses of the Department of Informatics (6 or 7 ECTS credits each); their descriptions (in Greek) can be found at: <http://www.cs.aueb.gr/el/content/programma-spydon>.

Incoming students who speak English may also attend any of the following courses, which are offered as taught or reading courses.

The following courses of the Postgraduate Programmes of Studies are recommended not to be chosen by ERASMUS undergraduate students.



FALL SEMESTER

## Computer Graphics

Code: 9088

Instructor: G. Papaioannou

ECTS credits: 6

Communication with the Instructor

[gepap@aueb.gr](mailto:gepap@aueb.gr)

### Objectives

Learn the fundamentals of computer graphics and image synthesis (rendering), with a focus on real-time and interactive graphics.

### Intended Audience

Mainly computer science students.

### Course Description

Digital imaging synthesis, applications and spatial data representation models. Basic 2D shape drawing algorithms, antialiasing and supersampling. 2D and 3D transformations and coordinate systems, compound transformations and kinematic chains, scene graphs and modeling. Culling, viewing transformations and projections. Data structures for polygonal models. Back face removal. Hidden surface elimination and depth sorting. Scan-conversion and the Z-buffer algorithm. Illumination models, the bidirectional reflectivity distribution function and empirical local illumination models and algorithms. Texturing: Texture maps, texture coordinates and transformations, antialiasing and procedural textures. Introduction to shaders. Animation techniques and motion synthesis. Visibility computation (shadows): Shadow maps and their variants. Graphics hardware architectures. Modern computer game graphics. Laboratory courses on the Unity game engine (transformations, materials and shading, animation, shadows, baked and dynamic lighting, light probes, shaders). Optional lab courses on graphics programming using OpenGL and C/C++.



#### Prerequisites

Calculus, computer organization

#### Suggested textbooks

Graphics and Visualization: Principles & Algorithms, T. Theoharis, G. Papaioannou, N. Platis, N. M. Patrikalakis, A. K. Peters, Ltd., 2008.

Real-TimeRendering, T. Akenine-Möller, E. Haines, N. Hoffman, 3rd edition, CRCPress, 2008

Computer Graphics: Principles and Practice, J. F. Hughes, A. van Dam, M. McGuire, D. F. Sklar, J. D. Foley, S. K. Feiner, 3η έκδοση, Addison Wesley, 2013.

#### Assessment methods

Written examinations, optional: final assignment (small computer game in Unity or C++, using graphics APIs)



## Distributed Systems, Cloud Computing, **BigData (Master's Course)**

Code: 9090

Instructor: V. Kalogeraki

ECTS credits: 6

Communication with the Instructor

[vana@aueb.gr](mailto:vana@aueb.gr)

Intended audience

Mainly Computer science students. Knowledge of a Programming language is required.

Course Description

Distributed systems and architectures, Communication protocols, Coordination systems, Message delivery systems, Parallel computing, The MapReduce Programming model, Cloud computing fundamentals, Cloud computing: properties, characteristics, benefits and disadvantages, Cloud computing models including IaaS, PaaS, SaaS, FaaS, Microservices, Cloud infrastructures, Virtualization, Resource Management and Scheduling, Elasticity, Scalability, Performance tuning, Storage systems, Pub/Subsystems, Apache systems and tools including Apache Hadoop, Yarn, Mesos, Kafka, Zookeeper and Redis.

Suggested textbooks

Collection of papers



## Software Verification, Validation & Maintenance

Code: 9016

Instructor: N. Malevris

ECTS credits: 6

Communication with the Instructor

[ngm@aueb.gr](mailto:ngm@aueb.gr)

### Objectives

Learn the fundamentals of software quality and the way it can be achieved.

### Intended Audience

Mainly computer science students.

### Course Description

Importance of software specifications and user's requirements. Programming practice. Programming languages importance in software development. High quality software development. Software quality and methods for achieving it. Quality standards. Software verification – formal methods. Validation of software and techniques. Software testing. Strategies and methods for effective software testing. Test data generation. Software maintenance. Emphasis on effective methods for maintaining software. Importance of appropriate documentation in software development. Cost estimation of software development. Emphasis on special characteristics of object oriented software as well as web applications. Automated tools with respect to the topics listed above.

### Prerequisites

Knowledge of a Programming language.

### Suggested textbooks



M. PEZZE, M. YOUNG, «SOFTWARE TESTING AND ANALYSIS: PROCESS,  
PRINCIPLES AND TECHNIQUES» (WILEY) or

P. AMMANN, J. OFFUTT, INTRODUCTION TO SOFTWARE TESTING (CAMBRIDGE  
UNIVERSITY PRESS).



# Multimedia Technology

Code: 9098

Instructor: G. Xylomenos

ECTS credits: 6

Communication with the Instructor

[xgeorge@aueb.gr](mailto:xgeorge@aueb.gr)

## Objectives

Introduction to the technologies and applications of digital media and multimedia. Emphasis on multimedia for the Web and multimedia communications on the Internet.

## Intended Audience

Mainly computer science students.

## Course Description

Multimedia applications and systems. Definition and attributes of various media types. Media streams. Sound, images and video. Elements of information theory. Media coding and compression. Compression standards: JPEG, MPEG, H.26x, MP3 and AAC. Multimedia on the web and on the Internet. Multimedia communications, multicasting. Conferencing. Synchronization. Media streaming, RTP, IPTV and MPEG-DASH. Quality of service in multimedia communications. The course requires completing a development project related to multimedia (e.g. a game or a media manipulation application).

## Suggested textbooks

Z.N. Li and M.S. Drew, Fundamentals of Multimedia, 2nd edition, Prentice Hall, 2014.





# Wireless Networks and Mobile Communications

Code: 9065

Instructor: Vasilios Siris

ECTS credits: 6

Communication with the Instructor

[vsiris@aueb.gr](mailto:vsiris@aueb.gr)

## Objectives

Learn the key principles, architectures, and operation of wireless networks and mobile communications to exploit and further expand their application to domains such as wireless Internet of Things, interconnected smart objects, intelligent mobility, mobile digital wallet applications, and Web 3.0 technologies.

## Intended Audience

Primarily students in computer science. Students in other majors will be considered based on their background in computer science related courses and must be approved by the Instructor before registering for the course.

## Course Description

Wireless networks and mobile communications is one of the fastest evolving areas in computer science, having a huge impact on economics and society, affecting how people work, communicate, and entertain themselves. Wireless and mobile communication technologies target to offer universal broadband connectivity to stationary and mobile users, as well as machines and objects, offering online access to information and data anywhere, anytime, and from any device.

The course's objective is to introduce the key principles, architectures, and operation of wireless networks and mobile communications. Understanding of these principles and fundamentals is necessary to exploit and further expand the application of wireless and mobile technologies in domains such



as wireless Internet of Things, interconnected smart objects, smart cities, smart homes, supply chain management, intelligent mobility, mobile digital wallet applications, and Web 3.0 technologies, among others.

#### Prerequisites

Introductory course on computer communications or computer networks.

#### Suggested textbooks

Wireless Communication Networks and Systems, C. Beard and W. Stallings, Pearson, 2016. A previous edition is freely available: Wireless Communications & Networks, William Stallings, 2nd Edition, 2005, Prentice Hall.

#### Assessment methods

The final grade will be computed as follows: 50% project (in teams of 2 students) and 50% final examination. Final examination score must be above 4/10 to get a passing grade.



## **Blockchains (Master's course)**

Code: 9094

Instructor: S. Voulgaris

ECTS credits: 6

Communication with the Instructor

[voulgaris@aueb.gr](mailto:voulgaris@aueb.gr)

### Objectives

Demystify the innerworkings of blockchain systems and how intricate algorithms are combined to offer paramount trust out of non-trusted components.

### Intended Audience

Computer science students with a solid understanding of algorithms and data structures.

### Course Description

Basic cryptographic principles and tools, cryptographic hash functions, blockchains, smart contracts, detailed Bitcoin operation, UTXO payment model, detailed Ethereum operation, consensus protocols, Proof-of-Work, Proof-of-Stake, the Solidity programming language, security issues in Solidity, oracles, next generation blockchains: Algorand, Cardano, Filecoin, atomic swaps, side-chains, lightning network, Inter-Ledger Communication, Distributed Identifiers (DIDs), Verifiable Credentials (VCs).

### Suggested textbooks

No textbook, just slides and papers.

### Planned learning activities and teaching methods

In vivo teaching.

### Assessment methods and criteria



A programming exercise during the semester and a written final exam.



SPRING SEMESTER

## Distributed Systems

Code: 9010

Instructor: V. Kalogeraki

ECTS credits: 6

Communication with the Instructor

[vana@aueb.gr](mailto:vana@aueb.gr)

### Objectives

Study the theory and practice of distributed systems. Focus on recent developments and state-of-the-art practical systems.

### Intended Audience

Mainly computer science students.

### Course Description

The purpose of this course is to integrate the theory and practice of distributed systems with focus on recent developments and state-of-the-art practical systems. The topics we will cover include middleware architectures, process management, replication, consistency and group communication protocols, peer-to-peer systems, real-time scheduling, logical clocks, synchronization, programming frameworks such as MapReduce, file systems, caching and mobility. We will discuss detailed case studies that illustrate the concepts for each major topic.

### Prerequisites

Knowledge of a Programming language.

### Suggested textbooks

Distributed Systems, M. van Steen and A.S. Tanenbaum, 4th Edition (2023).



## Computer Architecture

Code: 9093

Instructor: S. Voulgaris

ECTS credits: 6

Communication with the Instructor

[voulgaris@aueb.gr](mailto:voulgaris@aueb.gr)

Objectives

Study modern computer architecture, understanding the principles, the theory and practice of designing processors, memory systems, and I/O devices.

Intended Audience

Computer science students with some background on computer hardware.

Course Description

Modern computer architectures and design cycle of integrated circuits and systems. MIPS assembly, compilers and their relation to computer architecture. Computer architecture and the VHDL language. Design of the datapath and control circuit for MIPS (one cycle), pipeline and MIPS design, MIPS of multiple cycles. Instruction-level parallelism, out-of-order execution, microprogramming, memory hierarchy, cache memories, I/O, and virtual memory.

Suggested textbooks

Computer Organization and Design MIPS Edition: The Hardware/Software Interface, D. Patterson and J. Hennessy, 5th edition, Morgan Kaufmann, 2013. • Structured Computer Organization, A. S. Tanenbaum and Todd Austin, 6th edition, Pearson, 2013.

Planned learning activities and teaching methods

In vivo teaching

Assessment methods and criteria

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Exercises during the semester and a written final exam.



## Computability and Complexity (Reading Course)

Code: 9095

Instructor: E. Foustoucos

ECTS credits: 6

Communication with the Instructor

[eugenie@aueb.gr](mailto:eugenie@aueb.gr)

### Course Description

Computability: Inductive proofs and recursive definitions. Encodings. Introduction to computation models. Primitive recursive functions and relations. Partial recursive functions and minimization. Device computability. Turing machines and Turing-computable functions. Equivalence between recursive functions and Turing-computable functions. Church-Turing Thesis. The basic theorems: normal type theorem, enumeration theorem and parameters theorem (s-m-n theorem). Recursively enumerable sets and unsolvable problems. Definability and arithmetical hierarchy. Turing-reducibility and degrees of unsolvability. Complexity: Classes NP and co-NP. NP-completeness. The classes of the polynomial hierarchy and the class PSPACE. PSPACE-completeness. Oracle Turing machines. Alternating Turing machines. If time allows, topics among the following may be covered: Complexity classes for finding problems (FP, FNP, PPAD). Counting problems: the class #P. Classes for optimization problems (APX, MAXSNP). Gap reductions and PCP theorem.

Prerequisite Courses: To enroll in the course, students must have successfully completed basic courses on Theory of Computation and/or on Algorithms. It is also recommended that students have successfully completed a basic course on (Mathematical) Logic.

### Suggested textbooks

Introduction to the Theory of Computation, M. Sipser, Cengage Learning, 3rd edition, 2013.





Theory of Computation, Dexter Kozen, Texts in Computer Science, Springer, 2006.

Computable functions, A. Shen, N.K. Vereshchagin, Student Mathematical Library Vol 19, American Mathematical Society, 2003.

Theory of computation, George Turlakis, Wiley Editions, 2012.

Computability Theory, R. Weber, Student Mathematical Library Vol 62, American Mathematical Society, 2012.



## Computer Game Graphics and Virtual Reality (Master's course)

Code: 9089

Instructor: G. Papaioannou

ECTS credits: 6

Communication with the Instructor

[gepap@aueb.gr](mailto:gepap@aueb.gr)

### Objectives

Learn the theory and practical algorithms used in real-time rendering for computer games and immersive virtual environments.

### Intended audience

Computer science, mathematics and statistics students. A background in fundamental computer graphics techniques is recommended but not required.

### Course Description

This course introduces the students to the exciting world of computer graphics for computer games, extended reality and other interactive applications. The course covers both the theory and practical aspects of photorealistic, real-time rendering, including technologies for the display, animation and capture of 3D content and its motion. The lectures start by presenting fundamental theory and algorithms of real-time computer graphics and then move to more advanced techniques such as deferred shading and tiled rendering, screen-space effects, global illumination and ray tracing, skeletal animation, light probes and precomputed radiance transfer. Lectures are complemented with practical examples and specific techniques from commercial games and game engines.

### Suggested textbooks

Graphics and Visualization: Principles & Algorithms, T. Theoharis, G. Papaioannou, N. Platis, N. M. Patrikalakis, A. K. Peters, Ltd., 2008.



Real-Time Rendering, T. Akenine-Möller, E. Haines, N. Hoffman, 3rd edition, CRC Press, 2008.

Computer Graphics: Principles and Practice, J. F. Hughes, A. van Dam, M. McGuire, D. F. Sklar, J. D. Foley, S. K. Feiner, 3<sup>rd</sup> edition, Addison Wesley, 2013.



*DEPARTMENT OF STATISTICS*



All students should come from Department of Statistics or  
Department of Mathematics



FALL SEMESTER

## Actuarial Science II (Reading course)

Code: 9001

ECTS credits: 7

Level of course: Undergraduate

Year of study: 4<sup>th</sup> year

Objectives of the course:

At the end of the course, students can deal with the main problems of pricing and reserving of life insurance policies.

• **Prerequisites and co-requisites**

Basic knowledge of Mathematics, Probability and Statistics.

• **Recommended optional programme components**

N/A

• **Course contents**

Survival function, Simple mortality table and related functions, force of mortality, laws Classics mortality, actuarial tables and commutation functions, Stochastic approach to Life Insurance. Life annuities with one or more payments annually, Relationship between annuities, life insurance of various kinds, Relationship annuities and insurance, interest rate movements and mortality. Net premiums and gross premiums, concept and process of calculating reserves, Relationship between successive stock price. Tables and Actuarial functions for two or more persons, Contingent actuarial functions..

• **Recommended or required reading**

- Zimbidis A.(2009), «Actuarial Mathematics of Life Insurance»
- Neil A. (1986), «Life Contingencies» Heinemann Professional Publishing
- Etienne De Vylder (1997), "Life insurance : Actuarial Perspectives"
- Kluwer Academic Print

• **Planned learning activities and teaching methods**

Teaching Method: Reading Course

• **Assessment methods and criteria**

Courseworks during the semester plus oral exam at the end of the semester.



## Computational Statistics (Master course)

Code: 9007

ECTS credits: 7,5

Level of course: Postgraduate

Year of study: 1<sup>st</sup> year

Objectives of the course:

The students learn the basic principles of simulations and its usage in modern statistical analyses. They also learn how to make statistical inference using the computer and how to apply numerical methods to solve statistical problems like, estimation, calculation of quantities that it is not possible otherwise etc.

• **Prerequisites and co-requisites**

Probability, Statistics, Estimation-Hypothesis testing, Linear Modelling, Analysis of Variance.

The course is suitable for students from Statistics departments.

• **Recommended optional programme components**

None

• **Course contents**

R programming, simulation techniques, Monte Carlo methods, numerical methods for stats, smoothing, numerical optimization, bootstrap, MCMC.

• **Recommended or required reading**

- Venables, W.N., Ripley, B.D. (2002). Modern Applied Statistics with S (4th edn). Springer
- Crawley, M.J. (2002). Statistical Computing: An introduction to data analysis using S-Plus. Wiley
- Robert, C.P. and Casella, G. (2010). Introducing Monte Carlo Methods with R, Springer.
- Efron, B. and Tibshirani, R.J. (1993). An Introduction to the Bootstrap, Chapman & Hall.

• **Planned learning activities and teaching methods**

Teaching face to face

1-2 extra lab sessions, the students need to bring their laptop

• **Assessment methods and criteria**

30% by two projects during the course

70% final exam



## Data Analysis (Master course)

Code: 9013

ECTS Credits: 7,5

Level of course: Postgraduate

Year of study: 1<sup>st</sup> year

Semester/trimester: Winter (1<sup>st</sup> Semester)

Objectives of the course:

Upon completion of the course, students will be able to:

- 1) To manipulate and analyze data in R
- 2) To perform basic hypothesis tests
- 3) To build and interpret regression models
- 4) To write statistical reports in a professional way.

• **Prerequisites** and co-requisites

Students should have good knowledge of estimation and statistical inference. It is also useful to have basic knowledge of the statistical language R and to be familiar with the statistical theory of regression

• **Recommended optional programme components**

None

• **Course contents**

Primary aim of this course is the understanding and the application of statistical method in real life problems of various scientific fields such as Management, Marketing, Psychology, Medicine, Sports and Social Sciences. Focus is given on the review of parametric and non-parametric hypothesis tests for one and two samples (t-tests and Wilcoxon tests), analysis of variance and regression models. Emphasis is given in the implementation of all methods using R and in problem solving. Interesting real-life datasets and problems are analyzed during this course with aim to provoke their attention and motivate them. Finally, the students are introduced to the basic principles of scientific report writing and story telling either in the form of a written report or in form of oral presentation.



• **Recommended or required reading**

- Diez, D., Barr, C., & Cetinkaya-Rundel, M. (2012). Open Intro statistics (Second. Edition). Free Open Book; available at <http://www.openintro.org/stat/textbook.php>.
- Fox J. & Weisberg H.S. (2011). An R Companion to Applied Regression. 2nd edition. SAGE Publications Inc.
- Faraway, J. (2002). Practical regression and ANOVA using R; available at <http://cran.r-project.org/doc/contrib/Faraway-PRA.pdf>
- James, G., Witten, D., Hastie, T., & Tibshirani, R. (2013). An introduction to statistical learning. Springer; available at <http://www-bcf.usc.edu/~gareth/ISL/>.

• **Planned learning activities and teaching methods**

- Introductory motivational talk about the value and the fun part of Statistics.
- Introductory course in R
- Introductory videos (for R, for interpretation of Statistics by David Spiegelhalter, for the necessity of statistics in our daily life).
- Teaching in a classroom and computer labs.
- Laboratory exercises conducted during an extended lab session.
- Online game Quizizz (all together in the room - online version and asynchronously offline).
- Guess the correlation game.

• **Assessment methods and criteria**

One assignment (50%) and one written examination (50%) with the requirement the grade in the written examination to be higher than 5 (out of 10).





## Probability and Statistical Inference (Master course)

Code: 9075

ECTS Credits: 7,5

Level of course: Postgraduate

Year of study: 1<sup>st</sup> year

Objectives of the course:

Upon successful completion of the course, students will be able to handle issues related to: probability and distribution theory, principles of sufficiency and likelihood, and statistical inference with emphasis on the presentation of analytical methods of finding and evaluating: point estimators, interval estimators and hypothesis tests (using the Frequentist and the Bayesian approaches).

- **Prerequisites and co-requisites**

Undergraduate probability and calculus of functions of multiple variables.

- **Recommended optional programme components**

None

- **Course contents**

The aim of the course is to present key topics of probability and distribution theory and to place particular emphasis on statistical inference. Initially, the axiomatic definition of probability is given by using measure theory and its interpretation in the classical/Bayes approach. Then the conditional probability is given, the concept of random variable, transformations, moments, moment generating function and characteristic functions, followed by distribution theory, location/scale families, exponential family and measures of goodness of fit. The topics defined in the one-dimensional case are presented for multivariate distributions and furthermore the hierarchical models are defined. The concepts of independence, correlation and prediction, while some basic inequalities are given. Next, is the theory of order statistics, convergence (in probability, almost sure and by law), law of large numbers, central limit theorem and delta method. The principle of sufficiency and likelihood and completeness are also given. Finding point estimators (method of moments,



maximum probability, Bayes rule) and their evaluation (mean square error, uniformly minimum variance unbiased estimator, Cramer-Rao, Rao-Blackwell, decision theory). Hypothesis testing (likelihood ratio test, Bayesian testing, union-intersection tests) and their evaluation (size and level, p-value, type I and II errors, even more powerful test, Neyman-Pearson lemma, monotone probability ratio, Karlin-Rubin), hypothesis testing and large data, multiple comparisons and corrections. Finally, confidence interval material is covered by finding methods (inverting a test statistic, pivots and Bayes methods), their evaluation (coverage probability) and interpretation.

• **Recommended or required reading**

- R. Ash, Statistical Inference, Dover
- Jacod and Protter, Probability Essentials Springer.
- Berger and Casella, Statistical Inference

• **Planned learning activities and teaching methods**

In vivo and online teaching

• **Assessment methods and criteria**

Exercises during the semester, essays and written or oral exam.



## Generalized Linear Models (Master course)

Code: 9081

ECTS Credits: 7,5

Level of course: Postgraduate

Year of study: 1<sup>st</sup> year

Semester/trimester: Winter (1<sup>st</sup> Semester)

Objectives of the course:

Upon successful completion of the course, students are expected to understand if the nature of their data allows application of a generalized linear model (knowledge and understanding). They should also be able to define the appropriate generalized linear model to the data at hand (application). They should be able to fit this model and interpret the results of analysis (skill). Finally, they should be able to explain to scientists of other disciplines the results of their analysis (synthesis).

• **Prerequisites and co-requisites**

Students should have basic knowledge of mathematical calculus, linear algebra, and probability theory

• **Recommended optional program components**

None

• **Course contents**

Introduction to statistical modeling, exponential family of distributions, part of a GLM, binomial data, logit models, contingency tables, Poisson models, log-linear models, overdispersion, normal data, Gamma data, polynomial-ordinal regression models, linear mixed effects models, GEE models, GLMM models. All applications include the use of the R language.

• **Recommended or required reading**

• Agresti (2013). Categorical data analysis, Wiley  
• Atkinson (1985). Plots, transformations and regression, Oxford university Press  
• Carroll and Ruppert (1988). Transformation and weighting in regression, Chapman and Hall  
• Chatterjee and Price (1977). Regression analysis by example, Wiley.



- Christensen R. (1998). Analysis of variance, design and regression. Chapman and Hall. Collett, D. (1991) Modelling Binary data, Chapman and Hall
- Cook and Weisberg, S. (1982). Residuals and Influence in regression, Chapman and Hall
- Dobson, A., Barnett, A.G (2008). An introduction to generalized linear models, Chapman and Hall. Draper and Smith (1981). Applied regression analysis, Wiley.
- Fitzmaurice, Laird and Ware (2004). Applied longitudinal data analysis, Wiley. Hedeker and Gibbons (2006). Longitudinal data analysis.
- McCullagh, P and Nelder, J.A. (1989) Generalized Linear Models, Chapman and Hall.
- Montgomery, D.C. (1989) Design and Analysis of Experiments, Wiley
- Montgomery, D.C., Peck, E.A. and Vining, G.G. (2001). Introduction to linear regression analysis. Wiley. Ryan (1997). Modern regression methods, Wiley. Weisberg, S. (1985) Applied Linear Regression, Wiley Venables W.N. and Ripley B.D (1999) Modern Applied Statistics with S-Plus, Springer

• **Planned learning activities and teaching methods**

One three-hour lecture per week, one one-hour laboratory, study exercises as homework (some to be submitted).

• **Assessment methods and criteria**

The final grade is the final examination grade.



## Statistics I: Probability and Estimation

Code: 9079

ECTS credits: 6

Level of course: Undergraduate

Year of study: 1<sup>st</sup> year

Objectives of the course:

The students will be able to compute probabilities of events, expected values and variances of discrete and continuous random variables. They will also be able to apply the central limit theorem and find estimates of unknown parameters. Furthermore, they will have the necessary background for the construction of confidence intervals of the mean value and the variance of a normal population. The students will be able to solve realistic problems that are related with random experiments.

• **Prerequisites and co-requisites**

Knowledge of Calculus

• **Recommended optional programme components**

None

• **Course contents**

Random Experiment. Sample Space. Axioms of Kolmogorov. Properties of Probabilities. Law of total probability. Bayes's Rule. Discrete and Continuous random variables. Expected value and variance of random variables. Binomial distribution. Geometrical Distribution. Poisson Distribution. Hypergeometrical Distribution. Uniform Distribution. Exponential Distribution. Normal Distribution. Central Limit Theorem. Law of Large Numbers. Estimator of unknown parameter. Unbiased Estimator. Consistent Estimator. Sufficient Estimator. Rao-Blackwell Estimator. Cramer-Rao lower bound. Method of maximum likelihood. Methods of moments. Confidence Intervals for the Normal mean when (i) the population variance is known and (ii) when the population variance is unknown. Confidence Intervals for the difference of means of Normal populations. Confidence intervals for ratios. Confidence Intervals for the variance of a Normal distribution.



• **Recommended or required reading**

- S. M. Ross, "A first course in Probability", 8<sup>th</sup> Edition, 2010, Prentice Hall.
- S. M. Ross, "Introduction to Probability and Statistics for Engineers and Scientists", 3<sup>rd</sup> Edition, 2004, Elsevier.
- G. G. Roussas, "A Course in Mathematical Statistics", 2<sup>nd</sup> Edition, 1997, Academic Press.

• **Planned learning activities and teaching methods**

Teaching in Class, distant learning (if necessary)

• **Assessment methods and criteria**

Written final exam, Assignments



## Estimation and Hypothesis Testing (Reading Course)

Code: 9091

ECTS Credits: 8

Year of study: 2<sup>nd</sup> year

Semester/trimester: Winter (3<sup>rd</sup> Semester)

Level of course: Undergraduate

Objectives of the course:

The students will be able apply the central limit theorem and find estimates of unknown parameters. Furthermore, they will have the necessary background for the construction of confidence intervals of the mean value and the variance of a normal population.

The students will be able to solve realistic problems that are related with random experiments.

• **Prerequisites and co-requisites**

Knowledge of Calculus and Probability

• **Recommended optional** programme components

None

• **Course contents**

Normal Distribution and the Central Limit Theorem. Law of Large Numbers. Estimator of unknown parameter. Unbiased Estimator. Consistent Estimator. Sufficient Estimator. Rao-Blackwell Estimator. Cramer-Rao lower bound. Method of maximum likelihood. Methods of moments. Confidence Intervals for the Normal mean when (i) the population variance is known and (ii) when the population variance is unknown. Confidence Intervals for the difference of means of Normal populations. Confidence Intervals for the variance of a Normal distribution. Confidence Intervals for proportions. Hypothesis testing, statistical hypothesis, test statistic, testing hypotheses for population



parameters such as: means, proportions, variances, mean difference in two populations. Significance level, p-value, power of a statistical test, sample size calculation.

• **Recommended or required reading**

- S. M. Ross, "A first course in Probability", 8<sup>th</sup> Edition, 2010, Prentice Hall.
- S. M. Ross, "Introduction to Probability and Statistics for Engineers and Scientists", 3<sup>rd</sup> Edition, 2004, Elsevier.
- G. G. Roussas, "A Course in Mathematical Statistics", 2<sup>nd</sup> Edition, 1997, Academic Press.

• **Planned learning activities and teaching methods**

Reading course with a few Class lectures.

• **Assessment methods and criteria**

Written final exam, Assignments





SPRING SEMESTER

## Actuarial Science I (Reading course)

Code: 9032

ECTS credits: 7

Level of course: Undergraduate

Year of study: 2<sup>nd</sup> year

Semester/trimester: Spring (4<sup>th</sup> Semester)

• Objectives of the course:

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 and co-requisites**

Basic knowledge of Mathematics, Probability and Statistics.

• **Recommended optional programme components**

N/A

• **Course contents**

Uncertainty, Risk, Insurance, Insurance Companies, Actuaries, Insurance Concepts, Products, Actuarial base. Frequency, severity and pricing methodology premium adjustments, Projections and trends for the final payments by using linear and other models. Reserving methods, Analysis of Insurance Data, Triangular methods and olistic methods of reserving, Discounting reserves, and Confidence Intervals. Reinsurance schemes, «Bonus-Malus» and Markov Chains.

• **Recommended or required reading**

- Zimbidis A.(2008) "Actuarial Mathematics of Non-life Insurance"
- Brown R.L , Gottlieb L.R. (2005) -3<sup>rd</sup> edition
- "Introduction to Ratemaking and Loss Reserving for Property and Casualty Insurance", Actex Publications,
- Mikosch T. (2006) "Non-Life Insurance Mathematics: An Introduction with Stochastic Processes", Springer

• **Planned learning activities and teaching methods**

Teaching Method: Reading course.

• **Assessment methods and criteria**

Courseworks during the semester plus oral exam at the end of the semester.



## Stochastic Models in Finance (Master Course)

Code: 9034

ECTS Credits: 3

Level of course: Postgraduate

Year of study: 1<sup>st</sup> year

Semester/trimester: Spring (2<sup>nd</sup> Semester)

### Objectives of the course

Familiarize the students with the use and construction of stochastic models for finance, as well as with the necessary analytic and computational methods which are used in finance and risk management both in academic as well as in real business environments.

### • **Prerequisites and co-requisites**

None

### • **Recommended optional programme components**

None

### • **Course contents**

This course aims in introducing students in stochastic modeling in finance and the use of stochastic models in the description and forecast of prices of various assets such as stocks and indices, pricing of derivative products and bonds as well as their use in portfolio selection and risk management, focusing on models which are widely used in theory and practice. The course introduces fundamental concepts and analytic as well as computational methodologies such as for example martingale pricing methods, stochastic differential equations, simulation methods and estimation methods for financial models.

### • **Recommended or required reading**

- Shreve, S. (2005), Stochastic calculus for finance, Springer
- Yannacopoulos A. (2014) Stochastic finance (notes)

### • **Planned learning activities and teaching methods**

In vivo and by distance learning, computational applications.

### • **Assessment methods and criteria**

Exercises during term and final project.



## Financial Analytics (Master course)

Code: 9036

ECTS credits: 7,5

Level of course: Postgraduate

Year of study: 1st year

### • Objectives of the course:

The aim of this module is to provide students with advanced statistical and econometric skills required to analyze empirical financial problems. On completion of this module, students will be able to:

- Implement statistical and econometric models and techniques for the analysis of financial time series
- use advanced econometric estimation techniques and tools to analyze models used in financial applications
- model the expected returns of financial assets
- model the variances and covariances/correlations of financial returns
- interpret the concepts of return and risk in financial markets
- forecast financial returns
- assess the performance of portfolio managers
- understand modern portfolio theory
- solve mean-variance optimization problems
- estimate the risk of financial assets

### • **Prerequisites and** co-requisites

The students should have a basic statistical background. Specifically, basic knowledge in the fields of probabilities and distributions will be necessary for this course.

### • **Recommended optional programme components**

None

### • **Course contents**

This module provides a broad introduction to the theory and empirical analysis of econometric models to financial applications. Statistics/Econometrics is concerned with the systematic study of empirical financial problems using observed data. The aim of the course is to develop the relevant econometric tools for analyzing empirical problems in finance such as optimal portfolio construction, performance evaluation, and risk management among several



others. It presents and introduces the multifactor model, the basic theory of stationary processes, the Autoregressive Moving Average (ARMA) models and develops analytically the Box-Jenkins methodology for the empirical analysis of financial time series models. The course introduces the class of conditional heteroscedastic models (ARCH/GARCH/EGARCH) and presents estimation and forecasting techniques for practical implementation. It introduces the multivariate factor models, as well as the multivariate heteroscedasticity models for the analysis of time-varying volatilities and covariances/correlations. It describes analytically several empirical financial problems such as portfolio construction, performance evaluation and risk management. Illustrative examples applying econometric models and techniques to actual financial and economic data are also presented using the R package. The empirical analysis consists of (i) unit root testing to exchange rate series and financial series, e.g. stocks and indices, (ii) modeling and forecasting financial return series, (iii) performance evaluation of fund investments, e.g. mutual and hedge fund investment returns, (iv) optimal portfolio construction, and (v) estimating and forecasting risk measures.

• **Recommended or required reading**

Recommended textbooks:

- Hamilton, James D. *Time Series Analysis*. Princeton, New Jersey: Princeton University Press, 1994.
- Enders, Walter. *Applied Econometric Time Series*. New York: Wiley, 2010.
- Tsay, Ruey S. (2010). *Analysis of Financial Time Series*, New York: Wiley.
- Cowpertwait, Paul S.P., and Metcalfe V. Andrew. *Introductory Time Series with R*. New York: Springer Texts in Statistics, 2009.
- Cryer, Jonathan D., and Chan Kung-Sik. *Time Series Analysis with Applications in R*. Springer Texts in Statistics, 2010.
- Elton, E.J., Gruber, M.J., Brown, S.J., and Goetzmann W.N. (2014). *Modern Portfolio Theory and Investment Analysis*, 9th edition, Wiley.
- Sharpe, W.F., Alexander, G.J, and Bailey, J.V. (1999). *Investments*, 6th edition, Prentice-Hall.
- Vrontos, I.D. (2016) *Financial Econometrics, Lecture Notes (In Greek)*.

Other Useful textbooks:

- Gujarati, Damodar N. *Basic Econometrics*. New York: McGraw-Hill, 2008.
- Harvey, Andrew. *Time Series Models*. Cambridge: MIT Press, 1993.
- Hendry, David F. *Dynamic Econometrics*. Oxford: Oxford University Press, 1995.
- Pindyck, R.S. and D.L. Rubinfeld. *Econometric Models and Economic Forecasts*. New York: McGraw-Hill, 1991.



- Shumway, Robert H. and David S. Stoffer. *Time Series Analysis and Its Applications with R Examples*. New York: Springer Texts in Statistics, 2011.
- Wooldridge, Jeffrey. *Introductory Econometrics: A Modern Approach*. South-Western College Publishing, 2009.
- Engle, Robert F. and C.W.J. Granger (eds.). *Long-Run Economic Relationships: Readings in Cointegration*. Oxford: Oxford University Press, 1992.
- Granger, C.W.J. and Paul Newbold. *Forecasting Economic Time Series*. San Diego, CA: Academic Press, 1986.
- Banerjee Anindya, Juan Dolado, J.W. Galbraith, and David F. Hendry. *Cointegration, Error Correction, and the Econometric Analysis of Non-Stationary Data*. Oxford: Oxford University Press, 1993.

• **Planned learning activities and teaching methods**

One three-hour lecture per week, study of the model theory, empirical applications in R package, programming exercises as homework (some to be submitted) and assignments.

• **Assessment methods and criteria**

The final grade is the weighted average of the final examination grade (weight 80%) and the grade of two homework assignments that will be submitted (weight 20%). Please note that one needs to pass the final exam, i.e. the final examination grade is at least 5/10 (independently of the grades in the homework assignments) in order not to fail the course.



## Statistical Quality Control (Reading Course)

Code: 9057

ECTS credits: 7

Level of course: Undergraduate

Year of study: 3<sup>rd</sup> year

- Objectives of the course:

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

- **Prerequisites and co-requisites**

Attendance and knowledge of topics related to Estimation-Hypothesis testing, are very useful.

- **Recommended optional programme components**

None

- **Course contents**

Basic concepts of quality control and statistical quality control. Cause and effect charts. Pareto charts. Control charts for variables (R,S). Attributes control charts (p,np,c,u). CUSUM and EWMA control charts. Capability indices. Introduction to multivariate control charts. The six sigma methodology. Acceptance sampling. Basic experimental design using principals of repetition and blocking.

- **Recommended or required reading**

- Montgomery D (2012) Introduction to Statistical Quality Control, 7th Edition Wiley.
- Ryan, T. (2000). Statistical methods for quality improvement. J. Wiley New York 2nd edition.

- **Planned learning activities and teaching methods**

Reading course with a few Class lectures

- **Assessment methods and criteria**

Written final exam, Assignments



## Health Data Science (Master Course)

Code: 9099

ECTS Credits: 7,5

Level of course: Postgraduate

Year of study: 1st year

Semester/trimester: Spring Semester

Objectives of the course:

At the end of the course students will have knowledge of the basic principles, methods and implementation tools of the main data science techniques that are being used in the analysis of health data.

• Prerequisites and co-requisites

Probability and Statistical Inference, Computational Statistics.

• Recommended optional program components

None

• Course contents

Basic concepts in survival analysis, definitions, hazard and survival functions, relationships, parametric methods, likelihood function, Exponential and Weibull Models, applications in R. Non-parametric methods: Kaplan-Meier estimator, Greenwood and Nelson-Aalen estimator, graphical goodness of fit, log rank test. Regression models, Cox proportional hazards, Survival Analysis theory, counting processes, applications in R. Martingale/Deviance/Schoenfeld residuals. Heterogeneity and frailty models, LASSO and elastic net, hyperparameter selection via cross-validation, applications in glmnet. Non-proportional hazards models, additive hazards, accelerated failure time, proportional odds, competing risks and (non-)identifiability, multi-state models. Prospective and retrospective studies, (non)interventional, AR, RR and OR, equivalence of OR. Screening tests, PPV/NPV and sensitivity/specificity. Clinical trial design and analysis, protocol, sample size calculations, phase I, MTD, 3+3 design, Phase II, safety and efficacy, phase III. Real world vs (and/or) randomised data. CRM+adaptive designs, Simon 2-stage design, Bayesian and historical/synthetic controls. Meta analysis, systematic reviews, fixed effects, heterogeneity, random effects, publication bias, funnel plots, indirect treatment comparisons and network meta analysis, example applications in health economics using ICER, INB and CEAC. Evidence synthesis and conflict diagnostics. Introduction to Epidemic models, main results, vaccination and control. Basic stochastic models, branching processes and coupling, functional



LLN and CLT, connections between the different types of model. Inference for chain binomial models using MCMC. Inference for deterministic models using HMC. Heterogeneity, multiple age-groups, contact matrices, epidemics among households. Epidemics on networks.

- Recommended or required reading

No single textbook covers the material presented. There will be lecture notes and course code from books in Biostatistics, Survival Analysis and Epidemic models as well as relevant research papers.

- Planned learning activities and teaching methods

Classroom teaching and assignments.

- Assessment methods and criteria

The main course assessment will be based upon assignments that will be prepared, given as reports and presented on an individual basis.





## Categorical Data Analysis (Reading Course)

Code: 9084

ECTS Credits: 8

Level of course: Undergraduate

Year of study: 4<sup>th</sup> year

Semester/trimester: Spring (8<sup>th</sup> Semester)

Objectives of the course:

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 and co-requisites**

None

• **Recommended optional programme components**

None

• **Course contents**

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 or required reading**

- Agresti A., (2013). Categorical data analysis, Wiley
- Agresti A., (2007). An Introduction to Categorical Data Analysis, Wiley.
- Hosmer, D., Lemeshow, S. and Sturdivant, R. (2013) Applied Logistic Regression, Wiley
- Kateri, M. (2014). Contingency Table Analysis, Springer.

• **Planned learning activities and teaching methods**

Teaching includes: Reading course with a few Class lectures. Field exercise. Bibliography study and analysis Assignments. Self Study.

• **Assessment methods and criteria**

Assignment. Written exam at the end of the semester



## Statistics II: Inference and Regression

Code: 9068

ECTS credits: 6

Level of course: Undergraduate

Year of study: 1<sup>st</sup> year

Semester/trimester: Spring (2<sup>nd</sup> Semester)

Objectives of the course:

By completing the course the students will be able to:

Learn the fundamentals in statistical inference allowing them to understand which type of analysis is necessary and how it can be correctly implemented.

Learn about the theory and the accurate practice of regression analysis.

- **Prerequisites and co-requisites**

Knowledge of Probability and (point/interval) Estimation Theory.

- **Recommended optional programme components**

None

- **Course contents**

Hypothesis testing, statistical hypothesis, test statistic, testing hypotheses for population parameters such as: means, proportions, variances, mean difference in two populations. Significance level, p-value, power of a statistical test, sample size calculation. Introduction to regression, simple linear model, statistical linear model, normal linear model. Inference in the normal linear model: confidence and prediction intervals, hypothesis testing. Transformations, residuals and diagnosis of violations of the linear model assumptions. Multiple linear model, variable selection, forward, backward, stepwise, all possible regressions, model selection with information criteria: AIC, BIC, Mallows Cp. One factor Analysis of Variance (ANOVA). Applications in R.



• **Recommended or required reading**

- "An Introduction to Probability and Statistical Inference", by G. Roussas, 2<sup>nd</sup> edition, 2014, Academic Press
- "Statistical Inference" by G. Casella and R.L. Berger, 2nd edition, Duxbury Press, 2001
- "Applied Linear Regression", by S. Weisberg, 3<sup>rd</sup> edition, Wiley 2005
- "An R Companion to Applied Regression", by J. Fox and S. Weisberg, 2nd edition, SAGE Publications Inc, 2011.

• **Planned learning activities and teaching methods**

Teaching in Class, distant learning (if necessary)

• **Assessment methods and criteria**

Written final exam, Assignments



## Linear Models (Reading Course)

Code: 9096

ECTS Credits: 8

Level of course: Undergraduate

Year of study: 2<sup>nd</sup> year

Semester/trimester: Spring (4<sup>th</sup> Semester)

Objectives of the course:

By completing the course the students will be able to:

Understand point and interval estimates for parameters of linear models. Assess the validity of the model. Perform hypothesis testing. Interpret the fitted model. Perform model selection.

• **Prerequisites and co-requisites**

Knowledge of:

- Linear Algebra (matrix algebra: multiplication, inversion, rank, projections to sub-spaces)
- Calculus (multivariate functions, differentiation and optimization)
- Probability (univariate random variables, probability mass and density functions, moments, multivariate random variables, joint density function, conditional probability)
- Statistics: estimation (Theory of point and interval estimation, maximum likelihood inference)
- Statistics: Hypothesis testing (test statistics, rejection regions, p-values, z-test, t-test, F-test)

• **Recommended optional programme components**

R programming language



• **Course contents**

Introduction to simple linear regression, model coefficients estimates. Properties of estimated coefficients, mean value, variance, confidence intervals, hypothesis testing, estimation of conditional variance. Predicted values, simple linear regression ANOVA,  $R^2$ , F-test. Introduction to multivariate normal distribution. Multiple regression, design matrix, introduction to pseudo variables, general form of linear model, LS estimates and properties. Unbiased estimate of data variance. Maximum likelihood estimation. Multiple correlation coefficient, model ANOVA, partial F-tests. Simple residuals, standardized and studentized residuals, normality test, Q-Q plots, residual plots, added variable plots. Transformations, influence statistics and diagnostic tests, multicollinearity. Model choice, forward, backward, stepwise methods, all possible regressions, model choice using AIC, BIC, Mallows Cp.

• **Recommended or required reading**

- Montgomery, D.C., Peck, E.A. and Vining, G.G. (2012). Introduction to Linear Regression Analysis, Wiley.
- Weisberg, S. (2014). Applied Linear Regression, Wiley

• **Planned learning activities and teaching methods**

Teaching includes: Reading course with a few Class lectures. Field exercise. Bibliography study and analysis.

• **Assessment methods and criteria**

Written final exam, Assignments



## Advanced Methods in Survey Sampling (Master Course)

Code: 9100

ECTS Credits: 3

Level of course: Postgraduate

Year of study: 1st year

Semester/trimester: Spring Semester

Objectives of the course:

Upon completion of the course, the students will be able to identify the type of the statistical problem in real survey sampling situations, as well as to choose and apply in any case the appropriate methodology. Furthermore, they will be able to evaluate the quality of the results of the chosen methodology.

• **Prerequisites and co-requisites**

Basic knowledge of Statistics

• **Recommended optional programme components**

None

• **Course contents**

The module refers to the problem of inference for survey populations adopting the design-based approach. Topics include: Basic theory of survey sampling in finite populations. A brief presentation of basic sampling designs and methodology for estimation of parameters of populations. Use of auxiliary information to introduce weights and improve statistical errors. Methods include ratio and regression estimation, probability proportional to size and calibration. Variance estimation in complex surveys. Methods of adjustment for non-response.

• **Recommended or required reading**

- Lohr, S.L (2021). *Sampling: Design and Analysis*. Third edition. Chapman and Hall/CRC.
- Lu, Y. and Lohr, S.L. (2022) *R Companion for Sampling Design and Analysis*. Third edition.
- Lumley, T. (2010) *Complex Surveys: A Guide to Analysis Using R*. Wiley.

• **Planned learning activities and teaching methods**



Six weekly three-hour lectures and homework/projects.

• **Assessment methods and criteria**

Grade of final exam (70%) and projects during the teaching weeks (30%)





## Topics in Applied Statistics: Statistical Genetics – Bioinformatics (Master Course)

Code: 9101

ECTS Credits: 3

Level of course: Postgraduate

Year of study: 1st year

Semester/trimester: Spring Semester

Objectives of the course:

After completing the course, the students will:

- know the basic statistical challenges in bioinformatics
- properly deal with large scale hypothesis testing
- learn many novel statistical ideas and methods developed in the last 20 years, such as
  - hybridizations of Bayesian and frequentist data analysis
  - put their hands on many different types of data that modern biologists have to deal with,
    - including microarrays, RNA-Seq, chip-Seq and single cell measurements
  - know how to apply the relevant methods using R and Bioconductor.

• **Prerequisites** and co-requisites

This course is tailored to a statistically trained audience. More specifically:

- Prerequisites
- Estimation/Hypothesis Testing theory
- (Generalized) Linear Models

Some basic knowledge on:

- Computational Statistics
- Bayesian Inference
- R programming

Students will also benefit from the following courses (not required):

- Bayesian Statistics
- Statistical Learning
- Statistics for Big Data

• **Recommended optional programme components**

None

• **Course contents**

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Modern biology is a data-rich science. This course will expose the students to high-throughput biological datasets (such as microarrays, RNA-Seq, ChIP-Seq) and present the main inferential tools to deal with challenges they impose to the statistician. These methods include techniques for:

- controlling the False Discovery Rate in multiple testing (such as the Benjamini-Hochberg procedure)
- modelling high-throughput count data (multifactorial designs, generalized linear models)
- performing differential expression analysis in microarray and RNA-Sequencing data
- taking into account heterogeneity in sizeable data (mixture models)
- fitting (frequentist or Bayesian) models specifically designed for estimating gene and transcript expression given a known genome/transcriptome annotation and (big) datasets of short nucleotide reads

• **Recommended or required reading**

- Holmes, Susan and Wolfgang Huber. *Modern Statistics for Modern Biology*. Cambridge University Press, 2019
- Efron, Bradley. *Large scale inference: Empirical Bayes Methods for Estimation, Testing and Prediction*. Cambridge University Press, 2010
- Gentleman, Robert, et al., eds. *Bioinformatics and computational biology solutions using R and Bioconductor*. Springer Science & Business Media, 2006
- McLachlan, Geoffrey and David Peel. *Finite Mixture Models*. Wiley Series in Probability and Statistics, 2000
- Benjamini, Yoav and Hochberg, Yosef. Controlling the false discovery rate: a practical and powerful approach to multiple testing. *Journal of the Royal statistical society: series B*, 1995
- Dudoit, Sandrine and Shaffer, Juliet Popper and Boldrick, Jennifer C. Multiple hypothesis testing in microarray experiments. *Statistical Science*, 2003
- Robinson MD, McCarthy DJ, Smyth GK. edgeR: a Bioconductor package for differential expression analysis of digital gene expression data. *Bioinformatics*, 2010
- Love MI, Huber W, Anders S. Moderated estimation of fold change and dispersion for RNA-seq data with DESeq2. *Genome Biology*, 2014
- Li, B., Dewey, C.N. RSEM: accurate transcript quantification from RNA-Seq data with or without a reference genome. *BMC Bioinformatics*, 2011



- Glaus, P, Honkela, A, Rattray, M. Identifying differentially expressed transcripts from RNA-seq data with biological variation. *Bioinformatics*, 2012
- Hensman, J, Papastamoulis, P, Glaus, P, Honkela, A, Rattray, M. Fast and accurate approximate inference of transcript expression from RNA-seq data. *Bioinformatics*, 2015
- Lönnstedt, Ingrid and Speed, Terry. Replicated Microarray data. *Statistica sinica*, 2002
- Smyth, G.K. Linear models and empirical Bayes methods for assessing differential expression in microarray experiments. *Statistical applications in genetics and molecular biology*, 2004

• **Planned learning activities and teaching methods**

The computational aspects of this course will be implemented in R, a free software environment for statistical computing and graphics. R can be downloaded at <https://www.r-project.org> and installed on all types of environments (Windows, Mac, Linux). The R programming language will be enhanced by the specialized method packages from the Bioconductor project <https://www.bioconductor.org>, such as limma, DeSeq2, edgeR, BitSeq, rsem-EBSeg. Supplementary command line tools (such as Bowtie2) will also be used.

• **Assessment methods and criteria**

There will be a total of 2 homework assignments that will contribute  $\approx 50\%$  in the final grade. The remaining  $\approx 50\%$  will be determined by the final exam.



## Statistical Machine Learning (Master Course)

Code: 9102

ECTS Credits: 7,5

Level of course: Postgraduate

Year of study: 1st year

Semester/trimester: Spring Semester

Objectives of the course:

Upon completion of the course, students will have the knowledge and the skills

- to implement statistical methods aiming to deal with the problem of data dimension reduction,
- to apply classification models/algorithms and access their performance
- to apply clustering and access its performance
- to be familiar with new methodologies developed to deal with big data

• **Prerequisites and co-requisites**

Statistical Inference

• **Recommended optional programme components**

None

• **Course contents**

A range of statistical and machine learning methods will be described for supervised and unsupervised learning problems. Unsupervised learning: clustering (hierarchical, partition clustering, k-means and its variants, model-based clustering ), data reduction methods. Model Assessment and Selection. Supervised learning: Methods of Linear Discriminant Analysis (LDA), Quadratic Discriminant Analysis (QDA), k-nn, decision trees, random forests, SVM, naïve Bayes and others. Cross-validation methods. Statistics for big data problems, new approaches. Regularizations. Statistical methods for networks. Smoothing approaches in regression.

• **Recommended or required reading**

- T. Hastie, R. Tibshirani and R. Friedman (2009) Elements of Statistical Learning, Springer.
- Witten, J, Hastie, T. and Tibshirani, R. (2011) Introduction to Statistical Learning with applications in R, Springer.
- C. Giraud (2015). Introduction to High-Dimensional Statistics. Philadelphia: Chapman and Hall/CRC.



- E. D. Kolaczyk (2014) *Statistical Analysis of Network Data* with R. Springer.

- **Planned learning activities and teaching methods**

Course lasts 12 3-hours lectures (one each week). Every week there will be exercises as homework (some to be submitted). There will be also a team project.

- **Assessment methods and criteria**

The final grade is the weighted average of the final examination grade (80%) and the assignment/projects (20%).



## Bayesian Models in Statistics (Master Course)

Code: 9103

ECTS Credits: 3

Level of course: Postgraduate

Year of study: 1st year

Semester/trimester: Spring Semester

Objectives of the course:

Upon completion of the course, students will be able to:

- Understand the basic theory and philosophy of Bayesian Statistics
- Understand the basic notions of Bayesian computation
- Analyze data using WinBUGS
- Build models (glm and hierarchical) in WinBUGS
- Perform Bayesian variable selection using WinBUGS and BAS package in R

• **Prerequisites** and co-requisites

The students should have a good quantitative and computational background. Specifically, knowledge in the fields of calculus, probability/distribution theory, statistical modelling and R programming will be necessary for this course

• **Recommended optional programme components**

None

• **Course contents**

This course will provide the introduction to the Bayesian approach in statistics both from the theoretic and the computational perspective using R and WinBUGS. The course syllabus includes: Bayesian inference. Conjugate Analysis. Simulation and random number generation. Markov models and hidden Markov (MCMC) methods. Metropolis-Hastings algorithm, Gibbs sampling. Introduction to WinBUGS. Bayesian inference for Regression and GLMs. Hierarchical models. Bayesian model and variable selection.

• **Recommended or required reading**

- Ntzoufras, I. (2009). Bayesian Modeling Using WinBUGS. Wiley. Hoboken. USA.



- Carlin B. and Louis T. (2008), *Bayes and Empirical Bayes Methods for Data Analysis*. 3rd Edition, London: Chapman and Hall.
- Gelman A., Carlin J.B., Stern H.S., Dunson, D.B., Vehtari, A. and Rubin D.B. (2013). *Bayesian Data Analysis*. Third Edition. Chapman and Hall/CRC.
- P. Dellaportas and P. Tsiamirtzis, "Introduction to Bayesian Statistics" (in Greek)

• **Planned learning activities and teaching methods**

- Live teaching in a lecture room or computer labs
- Informal labs for using R and WinBUGS/OpenBUGS/JAGS
- Evaluation of current knowledge using Kahoot web game
- Interim optional exercises
- Personalized assignment/project

• **Assessment methods and criteria**

The course is examined by a big project/assignment that contributes 100% of the final grade. The students can break the final outcome/assignment in smaller landmark exercises (optional) that will help him to construct the final project report.



## Applied Stochastic Modelling (Master Course)

Code: 9104

ECTS Credits: 3

Level of course: Postgraduate

Year of study: 1st year

Semester/trimester: Spring Semester

Objectives of the course:

On successful completion of the module, students will:

- Appreciate the importance of computing for modern statistical analysis.
- Appreciate the breadth and importance of modern statistical methods.
- Be able to describe a number of practical areas where statistical modelling is of importance.
- Have enhanced their computer skills.
- Have encountered a range of complex data.
- Have an appreciation of how probability models may be formulated for atypical data sets.
- Have a good understanding of how likelihood-based classical procedures operate in practice.
- Have experience of running a wide range of modern statistical procedures through running computer programs in R.

• **Prerequisites and co-requisites**

Probability and Inference. Regression. R.

• **Recommended optional programme components**

None

• **Course contents**

The aim of this module is to present modern statistical methods and associated theory for the construction, fitting and evaluation of statistical stochastic models. Highlighting modern computational methods, the module provides students with the practical experience of scientific computing in applied statistics through a range of interesting real-world applications from the natural and social sciences. In more complex situations this will mean using optimisation routines to obtain maximum likelihood estimates for the





parameters. You will also learn how to take advantage of advanced likelihood tools, and simulation techniques, for inference. The module is a blend of descriptions of statistical methods, and the associated computational algorithms needed to perform the methods. The programming language R is used to illustrate the statistical computing algorithms, in the context of fitting models to data.

Lecture Syllabus:

Introduction and examples: Motivation through a range of real examples. Model fitting by maximum-likelihood: Progression from explicit estimates to non-linear problems. Importance of modelling through example results. Function optimisation: Modern deterministic and stochastic methods. Newton vs EM. Computational Likelihood Tools: profile likelihood; use of information criteria; Wald tests, likelihood ratio tests; confidence interval construction. Fundamental principles of modelling: Parameterisation: staying in range; delta method; orthogonality. Application to multinomials, mixtures, truncated data. Simulation techniques: Monte Carlo inference; confidence interval construction; bootstrap; goodness of fit testing. Case studies: Hierarchical Models. Capture-recapture. Hidden Markov.

• **Recommended or required reading**

- Morgan, BJT 2009 Applied Stochastic Modelling, 2nd Edition. Chapman and Hall

• **Planned learning activities and teaching methods**

18 hours of lectures and terminal classes. 60 hours independent study

• **Assessment methods and criteria**

The unit is assessed by continuous assessment. Continuous Assessment: This will consist of several open book written assessments started in the terminal sessions and completed in independent study hours. These consist of questions on numerical problems along with R computing problems which test the learning outcomes.



## Topics in Computational Statistics: Data Engineering (Master Course)

Code: 9105

ECTS Credits: 3

Level of course: Postgraduate

Year of study: 1st year

Semester/trimester: Spring Semester

Objectives of the course:

Upon completion of the course, students will

- Understand the principles of data engineering and their significance on statistical analysis.
- Have a solid foundation in SQL and Python programming.
- Comfortably perform standard data engineering tasks with focus on statistical modeling.
- Have hands on experience on in-memory computing technologies.

• **Prerequisites and co-requisites**

None

• **Recommended optional programme components**

None

• **Course contents**

The course lays proper foundations in Data Engineering with emphasis on Statistical and Data Science applications. We will begin with basic SQL concepts such as queries, joins and aggregation as well as fundamental databases and in-memory analytics notions. In addition, we will introduce standard Python syntax, modules, data types and structures, operations control flow and input/output operations and database connectivity. Then, topics from the entire data lifecycle will be covered including data ingestion, transformation, loading, visualization, modeling, deployment, update, monitoring, maintenance, and documentation. More advanced or modern subjects with software engineering flavor such as parallelism, cloud computing, error handling, testing and version control will also be sampled for exposition.

• **Recommended or required reading**



- McKinney, Wes. Python for data analysis: Data wrangling with Pandas, NumPy, and IPython. "O'Reilly Media, Inc.", 2012.
- Fangohr, Hans. Python for Computational Science and Engineering. Online Resource 2022
- Crickard, Paul. Data Engineering with Python: Work with massive datasets to design data models and automate data pipelines using Python. Packt Publishing Ltd, 2020.
- Beaulieu, Alan. Learning SQL: master SQL fundamentals. " O'Reilly Media, Inc.", 2009.
- Tanimura, Cathy. SQL for Data Analysis. " O'Reilly Media, Inc.", 2021

• **Planned learning activities and teaching methods**

The course is delivered in six weekly 3-hour lectures. Every week homework will be assigned (some to be submitted). A team project will also be assigned.

• **Assessment methods and criteria**

The final grade is the weighted average of the final examination grade (50%) and the assignment/projects.



## Official Statistics (Reading Course)

Code: 9058

ECTS Credits: 3

Level of course: Undergraduate

Year of study: 3rd year

Semester/trimester: Spring (6th Semester)

Objectives of the course:

After successfully completing the course, students will be able to understand the basic concepts and principles of international and National official statistics. They will also be able to know the basic concepts and principles of constructing, estimating and using index numbers.

• **Prerequisites and co-requisites**

None

• **Recommended optional programme components**

N/A

• **Course contents**

Introduction, indices, simple and complex numbers, simple size indices, individual indices behavior, base, base change, errors, heterogeneity, sampled indices in EU. Family budget surveys, Metadata. Describing and using data and surveys by EUROSTAT, OECD, UN, etc.

• **Recommended or required reading**

- OECD (2008) "Handbook on Constructing Composite Indicators – Methodology And User Guide.
- Notes

• **Planned learning activities and teaching methods**

Teaching includes: Reading course with a few Class lectures. Field exercise. Bibliography study and analysis. Educational Visits. Conducting a study. Assignments. Self study.

• **Assessment methods and criteria**

Written exam. Project presentation. Practical exercises.



# INDEPENDENT COURSES



FALL & SPRING SEMESTER

## Greek Language

Code: 9029

ECTS credits: 6

### Course Description

This lesson addresses those who are taught Greek as a foreign language. It is an instructive lesson focusing on students who belong to the beginners' level (A1) and attend an intensive and short course on Modern Greek language. The aim of the lesson is to help learners obtain basic skills, so as to be able to respond to real-life communication circumstances and formulate an indicative perception of the Greek culture and civilization. In shaping the course what has been taken into consideration is the relevant curriculum of Athens University as well as the levels of language proficiency, defined by the Common European Framework of Reference for Languages (CEFR).

During the lessons, we try to employ a variety of current communication circumstances with timely themes and present many phenomena of grammar and syntax, which are essential to this level. The lessons is framed by images, sketches and songs, aimed at making even more lively the journey of language learning and the acquaintance with the Greek civilization. The exercises that have been selected cover the spectrum of both grammar and vocabulary of beginners' levels as well as the range of skills needed to understand and produce verbal and written speech.