



Διατμηματικό Πρόγραμμα Μεταπτυχιακών Σπουδών
Οικονομικά και Επιστήμη Δεδομένων



COURSE OUTLINES

ACADEMIC YEAR 2026-2027

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COURSE OUTLINE

GENERAL

SCHOOL	School of Economic and Administrative Studies School of Engineering		
ACADEMIC UNIT	Department of Economics Department of Computer Science and Engineering		
LEVEL OF STUDIES	Postgraduate		
COURSE CODE	ECSY01	SEMESTER	1
COURSE TITLE	Introduction to Data Visualization		
INDEPENDENT TEACHING ACTIVITIES <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>		WEEKLY TEACHING HOURS	CREDITS
Lectures		3	3.5 ECTS
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	General background		
PREREQUISITE COURSES:	-		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	-		

LEARNING OUTCOMES

Learning outcomes <i>The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.</i> <i>Consult Appendix A</i> • Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area • Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B • Guidelines for writing Learning Outcomes	
After successfully passing this course, the students will be able to: • Know the state-of-the-art and the historical evolution of the area under study • Understand in depth the fundamental concepts of data visualization (gestalt principles & clutter avoidance; pre-attentive attributes (size color, shape, etc)) • Understand and be able to manipulate fundamental types of data representation (tables, different types of charts, other); • Be able to use choice mechanisms and fine tuning of visualizations	
General Competences <i>Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?</i>	
<i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i> <i>Adapting to new situations</i> <i>Decision-making</i> <i>Working independently</i> <i>Team work</i> <i>Working in an international environment</i> <i>Working in an interdisciplinary environment</i>	<i>Project planning and management</i> <i>Respect for difference and multiculturalism</i> <i>Respect for the natural environment</i> <i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i> <i>Criticism and self-criticism</i> <i>Production of free, creative and inductive thinking</i> <i>.....</i>

<i>Production of new research ideas</i>	<i>Others...</i>
• Production of free, creative and inductive thinking • Search for, analysis and synthesis of data and information, with the use of the necessary technology • Team work • Algorithmic thinking • Abstraction ability for problem modeling • Apply research results in solving practical problems • Literature studying and management	

SYLLABUS

• Situational context understanding, including the audience, communication mechanism, and desired tone. • Common types of visuals and their appropriate usage; specific types of visuals (simple text, table, heatmap, line graph, vertical bar chart, vertical stacked bar chart, waterfall chart, horizontal bar chart, horizontal stacked bar chart, and square area graph); visuals to be avoided (pie, donut, 3D charts) • Gestalt Principles of Visual Perception; their application to visualizations such as tables and graphs. Alignment, strategic use of white space, and contrast. • Mechanisms of sight and memory; preattentive attributes (size, color, and position on page) and their usage; visual hierarchies of components; color as a strategic visualization tool • Decisions regarding the type of graph and ordering of data; visual (de) emphasis via color, thickness of lines, and relative size; alignment and positioning of components; use of words to title, label, and annotate. • Team-based project

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Face to face	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	• Use of projector and interactive board during lectures. • Course website maintenance. Announcements and posting of teaching material (lecture slides and notes, programs). • Announcement of assessment marks via the course web site. • Use of email and social media for information exchange and improved communication with students.	
TEACHING METHODS <i>The manner and methods of teaching are described in detail.</i> <i>Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art</i>	<i>Activity</i>	<i>Semester workload</i>
	Lectures	18 hrs
	Non-directed Study	31 hrs
	Projects	39 hrs

<i>workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i> <i>The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</i>		
	Course total	88 hrs
STUDENT PERFORMANCE EVALUATION <i>Description of the evaluation procedure</i> <i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</i> <i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i>	Methods of evaluation - At each lecture, the students are asked to be prepared on the material of the lecture and to participate in the critical discussions that arise. - At each lecture, the students are asked to answer to questions and exercises related to the learning outcomes of the previous lecture. - A programming assignment (project). - Final exam The evaluation procedure is accessible to students via the course website.	

ATTACHED BIBLIOGRAPHY

- <i>Suggested bibliography:</i> - Nussbaumer Knaf. <i>Storytelling with Data, A Data Visualization Guide for Business Professionals</i>. Willey, 2015. Κωδικός Βιβλίου στον Εύδοξο: 80503822 - Chun-houh Chen, Wolfgang Härdle, Antony Unwin. <i>Handbook of Data Visualization [electronic resource]</i>. 2008. Springer Berlin Heidelberg. ISBN 9783540330370 Κωδικός Βιβλίου στον Εύδοξο: 73240257 - Glenn J. Myatt, Wayne P. Johnson. <i>Making Sense of Data II : A Practical Guide to Data Visualization, Advanced Data Mining Methods, and Applications</i>. 2009, Wiley UBCM ebooks. Κωδικός Βιβλίου στον Εύδοξο: 91720096 - <i>Related academic journals:</i> - IEEE Transactions of Visualization and Computer Graphics - Information Visualization - Journal of Visual Languages and Computing - Visual Informatics
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COURSE OUTLINE

GENERAL

SCHOOL	School of Economic and Administrative Studies School of Engineering		
ACADEMIC UNIT	Department of Economics Department of Computer Science and Engineering		
LEVEL OF STUDIES	Postgraduate		
COURSE CODE	ECSY02	SEMESTER	1
COURSE TITLE	Microeconomics I		
INDEPENDENT TEACHING ACTIVITIES <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>		WEEKLY TEACHING HOURS	CREDITS
Lectures		3	4 ECTS
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	Special background		
PREREQUISITE COURSES:	-		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	-		

LEARNING OUTCOMES

Learning outcomes <i>The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.</i> Consult Appendix A • <i>Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area</i> • <i>Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B</i> • <i>Guidelines for writing Learning Outcomes</i>								
By the end of the course the student will be able to: • To know the economic tools for understanding and analyzing the decision-making of consumers. • Understand and analyze the decision-making of firms, the production process, production cost and technology. • To recognize and analyze the optimal pricing strategies of firms e.g., price discrimination, mark-up.								
General Competences <i>Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?</i> <table><tr><td><i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i></td><td><i>Project planning and management</i></td></tr><tr><td><i>Adapting to new situations</i></td><td><i>Respect for difference and multiculturalism</i></td></tr><tr><td><i>Decision-making</i></td><td><i>Respect for the natural environment</i></td></tr><tr><td></td><td><i>Showing social, professional and ethical responsibility and</i></td></tr></table>	<i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i>	<i>Project planning and management</i>	<i>Adapting to new situations</i>	<i>Respect for difference and multiculturalism</i>	<i>Decision-making</i>	<i>Respect for the natural environment</i>		<i>Showing social, professional and ethical responsibility and</i>
<i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i>	<i>Project planning and management</i>							
<i>Adapting to new situations</i>	<i>Respect for difference and multiculturalism</i>							
<i>Decision-making</i>	<i>Respect for the natural environment</i>							
	<i>Showing social, professional and ethical responsibility and</i>							

<i>Working independently</i> <i>Team work</i> <i>Working in an international environment</i> <i>Working in an interdisciplinary environment</i> <i>Production of new research ideas</i>	<i>sensitivity to gender issues</i> <i>Criticism and self-criticism</i> <i>Production of free, creative and inductive thinking</i> <i>.....</i> <i>Others...</i> <i>.....</i>
• Working independently • Decision-making • Working in an interdisciplinary environment • Criticism and self-criticism • Production of free, creative and inductive thinking	

SYLLABUS

• Consumer theory • Producer theory • Monopoly power and price discrimination • Empirical applications with the use of r software and maxima

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Face-to-face	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	e-mail is used for the communication with the students and an electronic platform is used for posting students' grades	
TEACHING METHODS <i>The manner and methods of teaching are described in detail.</i> <i>Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i> <i>The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</i>	Activity	Semester workload
	Lectures	18 hrs
	Non-directed study	43 hrs
	Projects	39 hrs
	Course total	100 hrs
STUDENT PERFORMANCE EVALUATION <i>Description of the evaluation procedure</i> <i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</i> <i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i>	• Written final exam • Project	

ATTACHED BIBLIOGRAPHY

- *Suggested bibliography:*

- *Related academic journals:*

- MasCollel, Whinston, Green “Microeconomic Theory”, Oxford University Press (1995).
- Thomas Nechyba, Microeconomics: An Intuitive Approach with Calculus, Cengage Learning; 2nd edition.
- Hammock, M. R., Mixon, J. W. Microeconomic Theory and Computation. Springer-Verlag New York, (2016).

COURSE OUTLINE

GENERAL

SCHOOL	School of Economic and Administrative Studies School of Engineering		
ACADEMIC UNIT	Department of Economics Department of Computer Science and Engineering		
LEVEL OF STUDIES	Postgraduate		
COURSE CODE	ECSY03	SEMESTER	1
COURSE TITLE	Computer Programming I		
INDEPENDENT TEACHING ACTIVITIES <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>		WEEKLY TEACHING HOURS	CREDITS
Lectures		3	4 ECTS
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	General background		
PREREQUISITE COURSES:	-		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	-		

LEARNING OUTCOMES

Learning outcomes <i>The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.</i> <i>Consult Appendix A</i> • Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area • Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B • Guidelines for writing Learning Outcomes											
After completing the course the students will be able to: • Understand a Python program • Write programs in Python • Use the data structures available in Python • Use the control structure of Python • Organize their programs using functions • Develop small applications, e.g. searching and sorting											
General Competences <i>Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?</i> <table> <tr> <td>Search for, analysis and synthesis of data and information, with the use of the necessary technology</td><td>Project planning and management</td></tr> <tr> <td>Adapting to new situations</td><td>Respect for difference and multiculturalism</td></tr> <tr> <td>Decision-making</td><td>Respect for the natural environment</td></tr> <tr> <td>Working independently</td><td>Showing social, professional and ethical responsibility and sensitivity to gender issues</td></tr> <tr> <td>Team work</td><td>Criticism and self-criticism</td></tr> </table>		Search for, analysis and synthesis of data and information, with the use of the necessary technology	Project planning and management	Adapting to new situations	Respect for difference and multiculturalism	Decision-making	Respect for the natural environment	Working independently	Showing social, professional and ethical responsibility and sensitivity to gender issues	Team work	Criticism and self-criticism
Search for, analysis and synthesis of data and information, with the use of the necessary technology	Project planning and management										
Adapting to new situations	Respect for difference and multiculturalism										
Decision-making	Respect for the natural environment										
Working independently	Showing social, professional and ethical responsibility and sensitivity to gender issues										
Team work	Criticism and self-criticism										

<i>Working in an international environment</i> <i>Working in an interdisciplinary environment</i> <i>Production of new research ideas</i>	<i>Production of free, creative and inductive thinking</i> <i>Others...</i>
• Production of free, creative and inductive thinking • Search for, analysis and synthesis of data and information, with the use of the necessary technology • Adapting to new situations • Analysis of requirements for problem solving • Algorithmic thinking • Abstraction ability for problem modeling • Working independently	

SYLLABUS

• Introduction • Interactive interpreter • Data structures ○ Lists and tuples ○ Strings ○ Dictionaries • Control structures ○ Decision ○ Repetition • Functions and recursive functions • Searching and Sorting

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Face to face																
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	• Use of projector and interactive board during lectures. • Course website maintenance. Announcements and posting of teaching material (lecture slides and notes, programs). • Announcement of assessment marks via the course web site. • Use of email and social media for information exchange and improved communication with students.																
	TEACHING METHODS <i>The manner and methods of teaching are described in detail.</i> <i>Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i> <i>The student's study hours for each learning activity are given as well as the hours of non-</i>	<table><tr><th><i>Activity</i></th><th><i>Semester workload</i></th></tr><tr><td>Lectures</td><td>18 hrs</td></tr><tr><td>Non-directed study</td><td>37 hrs</td></tr><tr><td>Projects</td><td>45 hrs</td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr></table>	<i>Activity</i>	<i>Semester workload</i>	Lectures	18 hrs	Non-directed study	37 hrs	Projects	45 hrs							
<i>Activity</i>	<i>Semester workload</i>																
Lectures	18 hrs																
Non-directed study	37 hrs																
Projects	45 hrs																

directed study according to the principles of the ECTS		
	Course total	100 hrs
STUDENT PERFORMANCE EVALUATION <i>Description of the evaluation procedure</i> <i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</i> <i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i>	The evaluation is based on final exams and programming projects	

ATTACHED BIBLIOGRAPHY

• Introduction to Computation and Programming Using Python, John V. Guttag • Introduction to Programming with Python, Schneider David • Programming with Python, Stratos Kalafatoudis, Georgios Stamoulis • Introduction to Programming with the aid of Python, Electronic book, George Manis • Python Scripting for Computational Science [electronic resource], Hans Petter Langtangen • Beginning Python [electronic resource], Magnus Lie Hetland
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COURSE OUTLINE

GENERAL

SCHOOL	School of Economic and Administrative Studies School of Engineering		
ACADEMIC UNIT	Department of Economics Department of Computer Science and Engineering		
LEVEL OF STUDIES	Postgraduate		
COURSE CODE	ECSY04	SEMESTER	1
COURSE TITLE	Statistics & Probabilities		
INDEPENDENT TEACHING ACTIVITIES <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>		WEEKLY TEACHING HOURS	CREDITS
Lectures		3	3.5 ECTS
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	General background		
PREREQUISITE COURSES:	No		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	-		

LEARNING OUTCOMES

Learning outcomes <i>The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.</i> <i>Consult Appendix A</i> • <i>Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area</i> • <i>Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B</i> • <i>Guidelines for writing Learning Outcomes</i>
Upon successful completion of the course, students will be able to: • Understand the fundamental concepts of Statistics and Probability. • Recognize the importance of Statistics in the field of Economic Sciences and its application to real-world problems. • Collect, organize, present and analyze data. • Calculate and interpret descriptive statistical measures, including measures of central tendency and variability. • Apply fundamental concepts of probability theory and probability distributions for discrete and continuous random variables. • Apply the basic principles of estimation theory and perform point estimation of population parameters. • Calculate and interpret confidence intervals for key population parameters.

- Understand the fundamental principles of statistical hypothesis testing and interpret the results of basic hypothesis tests.

Upon completion of the course, students will have acquired the necessary theoretical background in the fundamental principles of Statistics and Probability Theory, enabling them to describe, analyze and interpret data, as well as to understand the basic principles of statistical inference.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology

Adapting to new situations

Decision-making

Working independently

Team work

Working in an international environment

Working in an interdisciplinary environment

Production of new research ideas

Project planning and management

Respect for difference and multiculturalism

Respect for the natural environment

Showing social, professional and ethical responsibility and

sensitivity to gender issues

Criticism and self-criticism

Production of free, creative and inductive thinking

.....

Others...

.....

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Data analysis
- Decision-making
- Production of free, creative and inductive thinking

SYLLABUS

- Introduction to Statistics and its significance in the field of economic sciences
- Basic concepts of Statistics: data, variables, populations, samples and statistical characteristics
- Data collection, organization, presentation and visualization
- Descriptive statistics: measures of central tendency and variability
- Probability theory: fundamental concepts, probability rules, conditional probability, independence, the law of total probability, Bayes' theorem and basic principles of combinatorial analysis
- Probability distributions of discrete random variables
- Probability distributions of continuous random variables
- Introduction to statistical inference and estimation theory
- Point estimation of population parameters
- Confidence intervals for the mean and proportion of a population
- Confidence intervals for the difference between two population means
- Confidence intervals for the difference between two population proportions (or risks)
- Introduction to statistical hypothesis testing

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Face-to-face																						
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	Email is used for communication with students, as well as the electronic platform of the secretary's office for posting students' grades.																						
TEACHING METHODS <i>The manner and methods of teaching are described in detail.</i> <i>Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i> <i>The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</i>	<table border="1"> <thead> <tr> <th><i>Activity</i></th><th><i>Semester workload</i></th></tr> </thead> <tbody> <tr> <td>Lectures</td><td>12</td></tr> <tr> <td>Directed Study</td><td>42</td></tr> <tr> <td>Non-Directed Study</td><td>46</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr> <td>Course total</td><td>100 hrs</td></tr> </tbody> </table>	<i>Activity</i>	<i>Semester workload</i>	Lectures	12	Directed Study	42	Non-Directed Study	46													Course total	100 hrs
<i>Activity</i>	<i>Semester workload</i>																						
Lectures	12																						
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Course total	100 hrs																						
STUDENT PERFORMANCE EVALUATION <i>Description of the evaluation procedure</i> <i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</i> <i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i>	Written final exams																						

ATTACHED BIBLIOGRAPHY

• "Statistics" from Robert S. Witte & John S. Witte • "Statistics for Business and Economics" from Paul Newbold, William L. Carlson, & Betty Thorne • "Statistics and Econometrics" from Orley Ashenfelter & Phillip B. Levine
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COURSE OUTLINE

GENERAL

SCHOOL	School of Economic and Administrative Studies School of Engineering		
ACADEMIC UNIT	Department of Economics Department of Computer Science and Engineering		
LEVEL OF STUDIES	Postgraduate		
COURSE CODE	ECSY05	SEMESTER	1
COURSE TITLE	Macroeconomics		
INDEPENDENT TEACHING ACTIVITIES <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>		WEEKLY TEACHING HOURS	CREDITS
Lectures		3	3.5 ECTS
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	General background		
PREREQUISITE COURSES:	-		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	-		

LEARNING OUTCOMES

Learning outcomes <i>The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.</i> <i>Consult Appendix A</i> • Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area • Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B • Guidelines for writing Learning Outcomes	
• Understanding of the neoclassical growth model and growth models with human capital. • Learning how to use key methodological tools in modern dynamic macroeconomics. • Establishment of a strong foundation for further study of modern macroeconomics. • Familiarity with the process of conducting research, including research ideas formation, literature review, conduct of analysis and presentation of results.	
General Competences <i>Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?</i> <i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i> <i>Adapting to new situations</i> <i>Decision-making</i> <i>Working independently</i> <i>Project planning and management</i> <i>Respect for difference and multiculturalism</i> <i>Respect for the natural environment</i> <i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i>	

<i>Team work</i> <i>Working in an international environment</i> <i>Working in an interdisciplinary environment</i> <i>Production of new research ideas</i>	<i>Criticism and self-criticism</i> <i>Production of free, creative and inductive thinking</i> <i>.....</i> <i>Others...</i> <i>.....</i>
• Working independently • Working in an international environment • Criticism and self-criticism • Production of free, creative and inductive thinking	

SYLLABUS

• Facts of economic growth • Solow growth model • Fundamentals of Neoclassical Growth • Neoclassical growth model • Human capital and economic growth

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Face-to-face	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	• Course material is available online through the e-course platform • Grades are submitted through ClassWeb. • Students are required to work with search engines for scientific journals	
TEACHING METHODS <i>The manner and methods of teaching are described in detail.</i> <i>Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i> <i>The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</i>	Activity	Semester workload
	Lectures	18 hrs
	Non-directed study	39 hrs
	Projects	31 hrs
	Course total	88 hrs
STUDENT PERFORMANCE EVALUATION <i>Description of the evaluation procedure</i> <i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</i> <i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i>	• Written problem set • Written final exam	

ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

- Acemoglu, Daron (2009) Introduction to Modern Economic Growth, Princeton Univ Press
- Barro R.J, Sala-i-Martin, X. (2003) Economic Growth, MIT Press.
- Romer, D. (2018) Advanced Macroeconomics, McGraw-Hill.

- Related academic journals:

Indicative:

- American Economic Review
- Journal of Economic Perspectives
- Quarterly Journal of Economics
- Review of Economics and Statistics
- Economic Journal

COURSE OUTLINE

GENERAL

SCHOOL	School of Economic and Administrative Studies School of Engineering		
ACADEMIC UNIT	Department of Economics Department of Computer Science and Engineering		
LEVEL OF STUDIES	Postgraduate		
COURSE CODE	ECSY07	SEMESTER	1
COURSE TITLE	Econometrics		
INDEPENDENT TEACHING ACTIVITIES <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>		WEEKLY TEACHING HOURS	CREDITS
Lectures		3	4 ECTS
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	Special background		
PREREQUISITE COURSES:	No		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	-		

LEARNING OUTCOMES

Learning outcomes <i>The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.</i> <i>Consult Appendix A</i> <i>Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area</i> <i>Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B</i> <i>Guidelines for writing Learning Outcomes</i>
By the end of the course the student will be able to: - understand and apply least squares and maximum likelihood estimation methods to the multiple regression model - prove and appreciate the small and large sample properties of the estimators under various conditions - prove and understand the fundamental theorems in econometrics: Gauss-Markov and Cramer-Rao - perform statistical testing hypothesis and find confidence intervals for the regression parameters based on well defined statistics under various conditions - perform predictions based on the regression model and find confidence intervals for future variables.

utilize and estimate time series models like AR and ARIMA models. Understand use and define concepts like spectral density function and frequency domain estimation.
General Competences <i>Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?</i> <i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i> <i>Adapting to new situations</i> <i>Decision-making</i> <i>Working independently</i> <i>Team work</i> <i>Working in an international environment</i> <i>Working in an interdisciplinary environment</i> <i>Production of new research ideas</i> <i>Project planning and management</i> <i>Respect for difference and multiculturalism</i> <i>Respect for the natural environment</i> <i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i> <i>Criticism and self-criticism</i> <i>Production of free, creative and inductive thinking</i> <i>.....</i> <i>Others...</i> <i>.....</i>
- Data Analysis - Develop econometric modelling abilities - Understand more deeply econometric tools useful for forecasting and economic policy analysis

SYLLABUS

- The multiple regression model - Least squares theory - Maximum likelihood estimation - Statistics for testing hypothesis, confidence intervals and predictions for the regression model. - The general regression model with autocorrelated residuals and/or heteroscedasticity - Predictions on the basis of the regression model

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Face-to-face																						
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	e-mail is used for the communication with the students and an electronic platform is used for posting students' grades																						
TEACHING METHODS <i>The manner and methods of teaching are described in detail.</i> <i>Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i> <i>The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</i>	<table> <tr> <th><i>Activity</i></th><th><i>Semester workload</i></th></tr> <tr> <td>Lectures</td><td>18 hrs</td></tr> <tr> <td>Non-directed study</td><td>43 hrs</td></tr> <tr> <td>Projects</td><td>39 hrs</td></tr> <tr> <td> </td><td> </td></tr> <tr> <td> </td><td> </td></tr> <tr> <td> </td><td> </td></tr> <tr> <td> </td><td> </td></tr> <tr> <td> </td><td> </td></tr> <tr> <td> </td><td> </td></tr> <tr> <td>Course total</td><td>100 hrs</td></tr> </table>	<i>Activity</i>	<i>Semester workload</i>	Lectures	18 hrs	Non-directed study	43 hrs	Projects	39 hrs													Course total	100 hrs
<i>Activity</i>	<i>Semester workload</i>																						
Lectures	18 hrs																						
Non-directed study	43 hrs																						
Projects	39 hrs																						
Course total	100 hrs																						
STUDENT PERFORMANCE EVALUATION <i>Description of the evaluation procedure</i>	written final exam																						

<i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</i> <i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i>	
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ATTACHED BIBLIOGRAPHY

• Amemiya, Takeshi (1985). Advanced Econometrics, Harvard University Press • Greene, William (2017). Econometric Analysis, Pearson.
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COURSE OUTLINE

GENERAL

SCHOOL	School of Economic and Administrative Studies School of Engineering		
ACADEMIC UNIT	Department of Economics Department of Computer Science and Engineering		
LEVEL OF STUDIES	Postgraduate		
COURSE CODE	ECSY08	SEMESTER	1
COURSE TITLE	Computer Programming II		
INDEPENDENT TEACHING ACTIVITIES <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>		WEEKLY TEACHING HOURS	CREDITS
Lectures		3	3.5 ECTS
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	Special background		
PREREQUISITE COURSES:	Computer Programming with Python		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	-		

LEARNING OUTCOMES

Learning outcomes <i>The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.</i> <i>Consult Appendix A</i> • Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area • Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B • Guidelines for writing Learning Outcomes
After completing the course the students will be able to: • Manage data in the disks ○ files ○ databases • Use Python packets ○ numpy ○ matplotlib • work with spreadsheets in Python • Use Pandas for applications on economics • Write object oriented programs with Python • Write simple machine learning applications with Python
General Competences <i>Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?</i> <i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i> <i>Adapting to new situations</i> <i>Project planning and management</i> <i>Respect for difference and multiculturalism</i> <i>Respect for the natural environment</i>

<i>Decision-making</i> <i>Working independently</i> <i>Team work</i> <i>Working in an international environment</i> <i>Working in an interdisciplinary environment</i> <i>Production of new research ideas</i>	<i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i> <i>Criticism and self-criticism</i> <i>Production of free, creative and inductive thinking</i> <i>Others...</i>
• Production of free, creative and inductive thinking • Search for, analysis and synthesis of data and information, with the use of the necessary technology • Adapting to new situations • Analysis of requirements for problem solving • Algorithmic thinking • Abstraction ability for problem modeling • Working independently	

SYLLABUS

• Management of data structures on the disk ○ files ○ databases • The numpy package • Data management with Pandas • Python and spreadsheets • The matplotlib library • Python and machine learning • Object oriented programming with Python
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TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Face to face	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	• Use of projector and interactive board during lectures. • Course website maintenance. Announcements and posting of teaching material (lecture slides and notes, programs). • Announcement of assessment marks via the course web site. • Use of email and social media for information exchange and improved communication with students.	
TEACHING METHODS <i>The manner and methods of teaching are described in detail.</i> <i>Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i> <i>The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</i>	<i>Activity</i>	<i>Semester workload</i>
	Lectures	18 hrs
	Non-directed study	31 hrs
	Projects	39 hrs
	Course total	88 hrs

STUDENT PERFORMANCE EVALUATION <i>Description of the evaluation procedure</i> <i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</i> <i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i>	The evaluation is based on final exams and programming projects
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ATTACHED BIBLIOGRAPHY

• Introduction to Computation and Programming Using Python, John V. Guttag • Introduction to Programming with Python, Schneider David • Programming with Python, Stratos Kalafatoudis, Georgios Stamoulis • Introduction to Programming with the aid of Python, Electronic book, George Manis • Python Scripting for Computational Science [electronic resource], Hans Petter Langtangen • Beginning Python [electronic resource], Magnus Lie Hetland
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COURSE OUTLINE

GENERAL

SCHOOL	School of Economic and Administrative Studies School of Engineering		
ACADEMIC UNIT	Department of Economics Department of Computer Science and Engineering		
LEVEL OF STUDIES	Postgraduate		
COURSE CODE	ECSE02	SEMESTER	2
COURSE TITLE	Special Topics in Linear Algebra		
INDEPENDENT TEACHING ACTIVITIES <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>		WEEKLY TEACHING HOURS	CREDITS
Lectures		3	3.5 ECTS
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	Special background		
PREREQUISITE COURSES:	-		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	-		

LEARNING OUTCOMES

Learning outcomes <i>The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.</i> <i>Consult Appendix A</i> • Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area • Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B • Guidelines for writing Learning Outcomes			
After successful attendance of the course the students are expected to: • Understand the importance of the relevant concepts in general and especially in Economics. • Know the basic methods and tools as well as their fields of application. • Can apply the relevant methods to solve problems with the help of a computer.			
General Competences <i>Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?</i> <table border="0" style="width: 100%;"> <tr> <td style="vertical-align: top;"> <i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i> <i>Adapting to new situations</i> <i>Decision-making</i> <i>Working independently</i> <i>Team work</i> <i>Working in an international environment</i> <i>Working in an interdisciplinary environment</i> <i>Production of new research ideas</i> </td><td style="vertical-align: top;"> <i>Project planning and management</i> <i>Respect for difference and multiculturalism</i> <i>Respect for the natural environment</i> <i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i> <i>Criticism and self-criticism</i> <i>Production of free, creative and inductive thinking</i> <i>.....</i> <i>Others...</i> </td></tr> </table>		<i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i> <i>Adapting to new situations</i> <i>Decision-making</i> <i>Working independently</i> <i>Team work</i> <i>Working in an international environment</i> <i>Working in an interdisciplinary environment</i> <i>Production of new research ideas</i>	<i>Project planning and management</i> <i>Respect for difference and multiculturalism</i> <i>Respect for the natural environment</i> <i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i> <i>Criticism and self-criticism</i> <i>Production of free, creative and inductive thinking</i> <i>.....</i> <i>Others...</i>
<i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i> <i>Adapting to new situations</i> <i>Decision-making</i> <i>Working independently</i> <i>Team work</i> <i>Working in an international environment</i> <i>Working in an interdisciplinary environment</i> <i>Production of new research ideas</i>	<i>Project planning and management</i> <i>Respect for difference and multiculturalism</i> <i>Respect for the natural environment</i> <i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i> <i>Criticism and self-criticism</i> <i>Production of free, creative and inductive thinking</i> <i>.....</i> <i>Others...</i>		
• Production of free, creative and inductive thinking • Decision-making.			

- Team work.
- Abstraction ability for problem modeling.
- Search for, analysis and synthesis of data and information, with the use of the necessary technology.

SYLLABUS

- Introduction and general concept.
- Linear transformations.
- Eigenvectors and Eigenvalues.
- Characteristic polynomial.
- Linear systems of equations.
- Linear programming and applications.

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Face to face	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	• Use of projector and computer during lectures. • Course website maintenance. Announcements and posting of teaching material (lecture slides and notes). • Announcement of assessment marks via the course website.	
TEACHING METHODS <i>The manner and methods of teaching are described in detail.</i> <i>Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i> <i>The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</i>	Activity	Semester workload
	Lectures	18 hrs
	Non-directed study	31 hrs
	Projects	39 hrs
	Course total	88 hrs
STUDENT PERFORMANCE EVALUATION <i>Description of the evaluation procedure</i> <i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</i> <i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i>	The evaluation is based on final exams and programming assignments	

ATTACHED BIBLIOGRAPHY

Suggested bibliography:

- Searle, S. R. (1982), Matrix Algebra Useful for Statistics, Wiley.
- Gilbert Strang (1999), Γραμμική Άλγεβρα και Εφαρμογές, Πανεπιστημιακές Εκδόσεις Κρήτης.

COURSE OUTLINE

GENERAL

SCHOOL	School of Economic and Administrative Studies School of Engineering		
ACADEMIC UNIT	Department of Economics Department of Computer Science and Engineering		
LEVEL OF STUDIES	Postgraduate		
COURSE CODE	ECSE01	SEMESTER	2
COURSE TITLE	Scientific Programming Languages		
INDEPENDENT TEACHING ACTIVITIES <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>		WEEKLY TEACHING HOURS	CREDITS
Lectures		3	4 ECTS
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	Special background		
PREREQUISITE COURSES:	-		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	-		

LEARNING OUTCOMES

Learning outcomes <i>The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.</i> <i>Consult Appendix A</i> <i>Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area</i> <i>Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B</i> <i>Guidelines for writing Learning Outcomes</i>
Upon successful completion of the course, students will be able to: - Recognize the fundamental principles of scientific computing and its role in solving problems in science and engineering. - Use MATLAB and Python, along with their core libraries, effectively to develop scientific computing applications. - Represent data using vectors, matrices, and multidimensional arrays, and perform efficient numerical computations. - Develop programs for solving linear and nonlinear mathematical problems using appropriate numerical algorithms. - Apply numerical techniques for interpolation, integration, differentiation, and the solution of ordinary differential equations. - Solve linear algebra problems, including systems of linear equations and the computation of eigenvalues and eigenvectors, using available computational libraries. - Visualize data and computational results using appropriate two-dimensional and three-dimensional plots, and interpret the resulting visualizations.

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?	
Search for, analysis and synthesis of data and information, with the use of the necessary technology	Project planning and management
Adapting to new situations	Respect for difference and multiculturalism
Decision-making	Respect for the natural environment
Working independently	Showing social, professional and ethical responsibility and sensitivity to gender issues
Team work	Criticism and self-criticism
Working in an international environment	Production of free, creative and inductive thinking
Working in an interdisciplinary environment	
Production of new research ideas	Others...
• Production of free, creative and inductive thinking • Search for, analysis and synthesis of data and information, with the use of the necessary technology • Adapting to new situations • Analysis of requirements for problem solving • Algorithmic thinking • Abstraction ability for problem modelling • Working independently	

SYLLABUS

The course introduces the principles and techniques of scientific computing using MATLAB and Python. The following topics are covered:

- Arrays and vectors
- Data visualization
- Mathematical functions
- Nonlinear equations
- Interpolation and curve fitting
- Numerical integration and differentiation
- Optimization
- Data processing
- Scientific computing applications

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY	
Face-to-face, Distance learning, etc.	Face to face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	• Use of projector and interactive board during lectures. • Course website maintenance. Announcements and posting of teaching material (lecture slides and notes, programs). • Announcement of assessment marks via the course web site. • Use of email and social media for information exchange and improved communication with students.
TEACHING METHODS	
<i>The manner and methods of teaching are described in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational</i>	Activity
	Lectures
	Programming Projects
	Study
Semester workload	
18 hrs	
30 hrs	
33 hrs	

<i>visits, project, essay writing, artistic creativity, etc.</i> <i>The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</i>		
	Course total	81 hrs
STUDENT PERFORMANCE EVALUATION <i>Description of the evaluation procedure</i> <i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</i> <i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i>	The evaluation is based on final exams and programming projects	

ATTACHED BIBLIOGRAPHY

• Programming in MATLAB, Marc E. Hernite, Cengage Learning, 2009 • Essential MATLAB for Engineers and Scientists, Brian H. Hahn and Daniel T. Valentine, Academic Press, 2017 • Υπολογισμοί και Προγραμματισμός με την Python, John V. Guttag, Κλειδάριθμος, 2015, Επιστημονική επιμέλεια μετάφρασης: Γεώργιος Μανής
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COURSE OUTLINE

GENERAL

SCHOOL	School of Economic and Administrative Studies School of Engineering		
ACADEMIC UNIT	Department of Economics Department of Computer Science and Engineering		
LEVEL OF STUDIES	Postgraduate		
COURSE CODE	ECSY06	SEMESTER	1
COURSE TITLE	Machine Learning I		
INDEPENDENT TEACHING ACTIVITIES <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>		WEEKLY TEACHING HOURS	CREDITS
Lectures		3	4 ECTS
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	General background		
PREREQUISITE COURSES:	-		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	-		

LEARNING OUTCOMES

Learning outcomes <i>The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.</i> <i>Consult Appendix A</i> • Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area • Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B • Guidelines for writing Learning Outcomes																	
• After successfully passing this course, the students will be able to: • Analyze complex data with modern mathematical models • Model complex machine learning problems • Apply parametric and non-parametric machine learning mechanisms • Design decision support machines • Apply basic mathematical tools and methods to practical issues appearing during machine learning problem solving																	
General Competences <i>Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?</i> <table> <tr> <td>Search for, analysis and synthesis of data and information, with the use of the necessary technology</td><td>Project planning and management</td></tr> <tr> <td>Adapting to new situations</td><td>Respect for difference and multiculturalism</td></tr> <tr> <td>Decision-making</td><td>Respect for the natural environment</td></tr> <tr> <td>Working independently</td><td>Showing social, professional and ethical responsibility and sensitivity to gender issues</td></tr> <tr> <td>Team work</td><td>Criticism and self-criticism</td></tr> <tr> <td>Working in an international environment</td><td>Production of free, creative and inductive thinking</td></tr> <tr> <td>Working in an interdisciplinary environment</td><td>.....</td></tr> <tr> <td>Production of new research ideas</td><td>Others...</td></tr> </table>		Search for, analysis and synthesis of data and information, with the use of the necessary technology	Project planning and management	Adapting to new situations	Respect for difference and multiculturalism	Decision-making	Respect for the natural environment	Working independently	Showing social, professional and ethical responsibility and sensitivity to gender issues	Team work	Criticism and self-criticism	Working in an international environment	Production of free, creative and inductive thinking	Working in an interdisciplinary environment		Production of new research ideas	Others...
Search for, analysis and synthesis of data and information, with the use of the necessary technology	Project planning and management																
Adapting to new situations	Respect for difference and multiculturalism																
Decision-making	Respect for the natural environment																
Working independently	Showing social, professional and ethical responsibility and sensitivity to gender issues																
Team work	Criticism and self-criticism																
Working in an international environment	Production of free, creative and inductive thinking																
Working in an interdisciplinary environment																	
Production of new research ideas	Others...																

• Production of free, creative, and inductive thinking • Search for, analysis and synthesis of data and information, with the use of the necessary technology • Adapting to new situations • Requirement analysis • Algorithmic thinking • Abstraction ability for problem modeling • Autonomous work

SYLLABUS

• Introduction, fundamental notions and problems of machine learning • Supervised learning • Linear regression • Classification with the k-nearest neighbours • The Perceptron algorithm • Neural networks-nonlinear regression • Multilayer neural networks • Support vector machines • Convolutional neural networks • Combinations of learning algorithms (Bagging, Boosting, Adaboost) • Stochastic methods • Maximum likelihood • Maximum a posteriori

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Face to face	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	• Use of slide projector • Use of computers for programming demonstration • Course website maintenance • Announcements and posting of teaching material (lecture slides and notes, programs) and marks through the University of Ioannina ecourse platform • Use of email and social media for information exchange and improved communication with students	
TEACHING METHODS <i>The manner and methods of teaching are described in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i>	Activity	Semester workload
	Lectures	18 hrs
	Non-directed study	37 hrs
	Projects	45 hrs

<i>The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</i>		
	Course total	100 hrs
STUDENT PERFORMANCE EVALUATION <i>Description of the evaluation procedure</i> <i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</i> <i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i>	Final exam and programming assignments	

ATTACHED BIBLIOGRAPHY

-Προτεινόμενη Βιβλιογραφία : • Μηχανική Μάθηση, Δ. Μπότσης, Κ. Διαμαντάρας, Εκδόσεις Κλειδάριθμος, 2019. • Αναγνώριση Προτύπων και Μηχανική Μάθηση, C. Bishop, Εκδόσεις Φουντάς, 2019 • Machine Learning: A Bayesian and Optimization Perspective, S. Theodoridis, Academic Press, 2020. • Understanding Deep Learning, S. Prince, MIT Press 2023. -Συναφή επιστημονικά περιοδικά: • IEEE Transactions on Pattern Analysis and Machine Intelligence • IEEE Transactions on Neural Networks and Learning Systems

COURSE OUTLINE

GENERAL

SCHOOL	School of Economic and Administrative Studies School of Engineering		
ACADEMIC UNIT	Department of Economics Department of Computer Science and Engineering		
LEVEL OF STUDIES	Postgraduate		
COURSE CODE	ECSE03	SEMESTER	2
COURSE TITLE	Machine Learning II		
INDEPENDENT TEACHING ACTIVITIES <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>		WEEKLY TEACHING HOURS	CREDITS
Lectures		3	4 ECTS
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	General background		
PREREQUISITE COURSES:	-		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	-		

LEARNING OUTCOMES

Learning outcomes <i>The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.</i> <i>Consult Appendix A</i> • Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area • Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B • Guidelines for writing Learning Outcomes
After successfully passing this course, the students will be able to: • Analyze complex data with modern mathematical models • Model complex machine learning problems • Apply parametric and non-parametric machine learning mechanisms • Design decision support machines • Apply basic mathematical tools and methods to practical issues appearing during machine learning problem solving
General Competences <i>Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?</i> <i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i> <i>Adapting to new situations</i> <i>Decision-making</i> <i>Project planning and management</i> <i>Respect for difference and multiculturalism</i> <i>Respect for the natural environment</i> <i>Showing social, professional and ethical responsibility and</i>

<i>Working independently</i> <i>Team work</i> <i>Working in an international environment</i> <i>Working in an interdisciplinary environment</i> <i>Production of new research ideas</i>	<i>sensitivity to gender issues</i> <i>Criticism and self-criticism</i> <i>Production of free, creative and inductive thinking</i> <i>.....</i> <i>Others...</i> <i>.....</i>
• Production of free, creative, and inductive thinking • Search for, analysis and synthesis of data and information, with the use of the necessary technology • Adapting to new situations • Requirement analysis • Algorithmic thinking • Abstraction ability for problem modeling • Autonomous work	

SYLLABUS

Unsupervised learning • Probability density estimation • Data clustering ○ The K-means algorithm ○ Spectral clustering ○ Mixture models Dimensionality reduction, and latent variable modeling • Singular value decomposition • Principal component analysis • Canonical correlation analysis • Linear discriminant analysis. • Nonlinear methods • Independent component analysis

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Face to face	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	• Use of slide projector • Use of computer for programming demonstration • Course website maintenance • Announcements and posting of teaching material (lecture slides and notes, programs) and marks through the University of Ioannina ecourse platform • Use of email and social media for information exchange and improved communication with students	
TEACHING METHODS <i>The manner and methods of teaching are described in detail.</i> <i>Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i> <i>The student's study hours for each learning activity are given as well as the hours of non-</i>	Activity	Semester workload
	Lectures	18 hrs
	Non-directed study	37 hrs
	Projects	45 hrs

directed study according to the principles of the ECTS		
	Course total	100 hrs
STUDENT PERFORMANCE EVALUATION <i>Description of the evaluation procedure</i> <i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</i> <i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i>	Final exam and programming assignments	

ATTACHED BIBLIOGRAPHY

<i>-Προτεινόμενη Βιβλιογραφία :</i> • Μηχανική Μάθηση, Δ. Μπότσης, Κ. Διαμαντάρας, Εκδόσεις Κλειδάριθμος, 2019. • Αναγνώριση Προτύπων και Μηχανική Μάθηση, C. Bishop, Εκδόσεις Φουντάς, 2019 • Machine Learning: A Bayesian and Optimization Perspective, S. Theodoridis, Academic Press, 2020. • Understanding Deep Learning, S. Prince, MIT Press 2023. <i>-Συναφή επιστημονικά περιοδικά:</i> • IEEE Transactions on Pattern Analysis and Machine Intelligence • IEEE Transactions on Neural Networks and Learning Systems

COURSE OUTLINE

GENERAL

SCHOOL	School of Economic and Administrative Studies School of Engineering		
ACADEMIC UNIT	Department of Economics Department of Computer Science and Engineering		
LEVEL OF STUDIES	Postgraduate		
COURSE CODE	ECSE04	SEMESTER	2
COURSE TITLE	Microeconomics II		
INDEPENDENT TEACHING ACTIVITIES <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>		WEEKLY TEACHING HOURS	CREDITS
Lectures		3	4 ECTS
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	Special background		
PREREQUISITE COURSES:	-		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	-		

LEARNING OUTCOMES

Learning outcomes <i>The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.</i> <i>Consult Appendix A</i> • Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area • Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B • Guidelines for writing Learning Outcomes	
By the end of the course the student will be able to: • To know the economic tools for understanding and analyzing (i) the structure of the market for products or services, (ii) the decision-making of companies regarding product pricing, product quality, their entry into a new product market. • Understand the strategic interactions between businesses. • To develop strategic thinking with Game Theory. • To recognize and analyze business strategies that limit competition.	
General Competences <i>Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?</i>	
<i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i> <i>Adapting to new situations</i> <i>Decision-making</i> <i>Working independently</i> <i>Team work</i> <i>Working in an international environment</i>	<i>Project planning and management</i> <i>Respect for difference and multiculturalism</i> <i>Respect for the natural environment</i> <i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i> <i>Criticism and self-criticism</i> <i>Production of free, creative and inductive thinking</i>

Working in an interdisciplinary environment Production of new research ideas	 Others...
- Working independently - Working in an interdisciplinary environment - Decision-making - Criticism and self-criticism - Production of free, creative and inductive thinking	

SYLLABUS

- Game theory - Oligopoly and strategic interaction - Anticompetitive behavior and antimonopolistic policy - Empirical applications with the use of r software and maxima
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TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Face-to-face	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	e-mail is used for the communication with the students and an electronic platform is used for posting students' grades	
TEACHING METHODS <i>The manner and methods of teaching are described in detail.</i> <i>Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i> <i>The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</i>	Activity	Semester workload
	Lectures	18 hrs
	Non-directed study	43 hrs
	Projects	39 hrs
	Course total	100 hrs
STUDENT PERFORMANCE EVALUATION <i>Description of the evaluation procedure</i> <i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</i> <i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i>	- written final exam - written work	

ATTACHED BIBLIOGRAPHY

- *Suggested bibliography:*

- *Related academic journals:*

- MasColler, Whinston, Green “Microeconomic Theory”, Oxford University Press (1995).
- Thomas Nechyba, Microeconomics: An Intuitive Approach with Calculus, Cengage Learning; 2nd edition.
- Lynne Pepall, Dan Richards, George Norman, “Industrial Organization”, 2016, Blackwell Publishing.
- Game Theory for Applied Economists, Gibbons Robert, Princeton University Press.
- Hammock, M. R., Mixon, J. W. Microeconomic Theory and Computation, Springer-Verlag New York, (2016).

COURSE OUTLINE

GENERAL

SCHOOL	School of Economic and Administrative Studies School of Engineering		
ACADEMIC UNIT	Department of Economics Department of Computer Science and Engineering		
LEVEL OF STUDIES	Postgraduate		
COURSE CODE	ECSE05	SEMESTER	2
COURSE TITLE	Advanced Statistical Modelling		
INDEPENDENT TEACHING ACTIVITIES <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>		WEEKLY TEACHING HOURS	CREDITS
Lectures		3	4 ECTS
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	special background		
PREREQUISITE COURSES:	No		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	-		

LEARNING OUTCOMES

Learning outcomes <i>The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.</i> <i>Consult Appendix A</i> <i>Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area</i> <i>Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B</i> <i>Guidelines for writing Learning Outcomes</i>
Upon completion of the course, students will be able to: - Select and apply appropriate statistical methods according to the research question and the nature of the data. - Apply linear and logistic regression models for data analysis and interpretation. - Develop and evaluate statistical models for describing, predicting and investigating relationships between variables. - Apply multivariate data analysis techniques, including Principal Component Analysis (PCA), Factor Analysis and Cluster Analysis. - Apply fundamental Statistical Machine Learning methods for data analysis and prediction. - Use R and/or Stata for data management, statistical analysis and data visualization. - Evaluate the suitability, validity and interpretation of statistical methods and their results.

- Present and communicate the results of statistical analyses in a clear and scientifically sound manner.

Upon completion of the course, students will have acquired the theoretical knowledge and practical skills required to apply modern statistical methods to real-world data, as well as to interpret and effectively communicate the results of their analyses.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology

Adapting to new situations

Decision-making

Working independently

Team work

Working in an international environment

Working in an interdisciplinary environment

Production of new research ideas

Project planning and management

Respect for difference and multiculturalism

Respect for the natural environment

Showing social, professional and ethical responsibility and sensitivity to gender issues

Criticism and self-criticism

Production of free, creative and inductive thinking

.....

Others...

.....

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Data analysis
- Decision-making
- Production of free, creative and inductive thinking

SYLLABUS

- Introduction to R and/or Stata
- Hypothesis testing for quantitative and qualitative variables
- Non-parametric statistical methods
- Analysis of Variance (ANOVA)
- Correlation and investigation of relationships between variables
- Simple linear regression
- Multiple linear regression
- Logistic regression models
- Specialized regression models and their applications
- Multivariate data analysis methods: Principal Component Analysis (PCA), Factor Analysis and Cluster Analysis
- Introduction to modern Statistical Machine Learning methods for data analysis and prediction

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Face-to-face
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USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	Email is used for communication with students, as well as the electronic platform of the secretary's office for posting students' grades.	
TEACHING METHODS <i>The manner and methods of teaching are described in detail.</i> <i>Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i> <i>The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</i>	Activity	Semester workload
	Lectures	18 hrs
	Non-directed study	46 hrs
	Directed Study	42 hrs
STUDENT PERFORMANCE EVALUATION <i>Description of the evaluation procedure</i> <i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</i> <i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i>	Course total 100 hrs	
	Written final exam	

ATTACHED BIBLIOGRAPHY

• "Statistics" from Robert S. Witte & John S. Witte • "Statistics for Business and Economics" from Paul Newbold, William L. Carlson, & Betty Thorne • "Statistics and Data Analysis for Financial Engineering" from David Ruppert

COURSE OUTLINE

GENERAL

SCHOOL	School of Economic and Administrative Studies School of Engineering		
ACADEMIC UNIT	Department of Economics Department of Computer Science and Engineering		
LEVEL OF STUDIES	Postgraduate		
COURSE CODE	ECSE06	SEMESTER	2
COURSE TITLE	Advanced Financial Econometrics		
INDEPENDENT TEACHING ACTIVITIES <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>		WEEKLY TEACHING HOURS	CREDITS
Lectures		3	3.5 ECTS
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	General background		
PREREQUISITE COURSES:	Econometrics, Statistics and Probabilities		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	-		

LEARNING OUTCOMES

Learning outcomes <i>The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.</i> <i>Consult Appendix A</i> • Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area • Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B • Guidelines for writing Learning Outcomes	
After completing the course, students will be able to: • Analyze financial data of various frequencies to separate empirical properties and stylized facts of financial data. • Understand advanced financial risk analysis models. • Manage financial-economic models for the prediction, management and volatility of financial risk. • Use statistical/econometric packages to analyze financial data by evaluating the validity and accuracy of results in real world problems.	
General Competences <i>Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?</i> Search for, analysis and synthesis of data and information, with the use of the necessary technology Adapting to new situations Decision-making Working independently Team work Working in an international environment Project planning and management Respect for difference and multiculturalism Respect for the natural environment Showing social, professional and ethical responsibility and sensitivity to gender issues Criticism and self-criticism Production of free, creative and inductive thinking	

<i>Working in an interdisciplinary environment</i>	
<i>Production of new research ideas</i>	<i>Others...</i>
	
• Search, analysis and synthesis of data and information, using the necessary technologies • Data analysis • Decision making • Autonomous work • Teamwork • Exercise criticism and self-criticism • Promotion of free, creative and inductive thinking	

SYLLABUS

• Asset returns ○ Empirical properties and stylized facts ○ Market efficiency and predictability • Volatility modeling ○ Univariate and multivariate autoregressive conditional heteroskedasticity (ARCH) family of models ○ Stochastic volatility models ○ Applications to risk management and derivatives pricing • Extreme value theory and copulas ○ Univariate models ○ Multivariate models • Ultra high frequency time series ○ Market microstructure models ○ Realized variance, covariance and bi-power variation ○ Applications to volatility modeling and market microstructure models • Continuous time models ○ Common models for equity and interest rates ○ Applications to derivatives pricing ○ Relationship to realized variance	
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TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Distance learning	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	Email is used for communication with students, as well as the electronic platform of the secretary's office for posting students' grades.	
TEACHING METHODS <i>The manner and methods of teaching are described in detail.</i> <i>Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i> <i>The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</i>	Activity	Semester workload
	Lectures	18 hrs
	Non-directed study	39 hrs
	Projects	31 hrs
	Course total	88 hrs
STUDENT PERFORMANCE EVALUATION <i>Description of the evaluation procedure</i>	• essay/report	

<i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</i> <i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i>	• public presentation
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ATTACHED BIBLIOGRAPHY

- Suggested bibliography: - Related academic journals: • Taylor, S. (2005). Asset Price Dynamics, Volatility, and Prediction. Princeton University Press. • Jondeau, E., Poon, S.-H., and Rockinger, M. (2006). Financial Modeling Under Non-Gaussian Distributions, Springer-Verlag ebook. Available online from UW libraries. • Zivot, E. and Wang, J. (2006). Modeling Financial Time Series with S-PLUS, Second Edition. Springer-Verlag. • Tsay, R. (2006). Analysis of Financial Time Series, Second Edition. Wiley.

COURSE OUTLINE

GENERAL

SCHOOL	School of Economic and Administrative Studies School of Engineering		
ACADEMIC UNIT	Department of Economics Department of Computer Science and Engineering		
LEVEL OF STUDIES	Postgraduate		
COURSE CODE	ECSE14	SEMESTER	
COURSE TITLE	Introduction to Databases		
INDEPENDENT TEACHING ACTIVITIES <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>		WEEKLY TEACHING HOURS	CREDITS
Lectures		3	4 ECTS
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	Special background		
PREREQUISITE COURSES:	-		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	-		

LEARNING OUTCOMES

Learning outcomes <i>The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.</i> Consult Appendix A • Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area • Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B • Guidelines for writing Learning Outcomes	
After successfully passing this course, the students will be able to: - Understand in depth the fundamental concepts of relational databases - Design and organize the structure of a database along with the appropriate integrity constraints, such that the data can be appropriately represented with quality guarantees - Query databases with SQL - Be able to relate real-world query requirements to SQL queries	
General Competences <i>Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?</i> Search for, analysis and synthesis of data and information, with the use of the necessary technology Adapting to new situations Decision-making Working independently Team work Working in an international environment Working in an interdisciplinary environment Production of new research ideas Project planning and management Respect for difference and multiculturalism Respect for the natural environment Showing social, professional and ethical responsibility and sensitivity to gender issues Criticism and self-criticism Production of free, creative and inductive thinking Others...	

• Production of free, creative and inductive thinking • Search for, analysis and synthesis of data and information, with the use of the necessary technology • Team work • Algorithmic thinking • Abstraction ability for problem modeling • Design & implementation of data intensive information systems

SYLLABUS

• Overview of the area of relational databases. • Coverage of fundamental database concepts • Relational query languages: relational algebra and SQL. • Database integrity constraints. • Project development.
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TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Weekly Lectures	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	• Use of projector and interactive board during lectures. • Course website maintenance. Announcements and posting of teaching material (lecture slides and notes, programs). • Announcement of assessment marks via the course web site. • Use of email and social media for information exchange and improved communication with students.	
TEACHING METHODS <i>The manner and methods of teaching are described in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i> <i>The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</i>	Activity	Semester workload
	Lectures	18 hrs
	Non-directed study	37 hrs
	Projects	45 hrs
	Course total	100 hrs
STUDENT PERFORMANCE EVALUATION <i>Description of the evaluation procedure</i> <i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</i>	• At each lecture, the students are asked to be prepared on the material of the lecture and to participate in the critical discussions that arise. • At each lecture, the students are asked to answer to questions and exercises related to the learning outcomes of the previous lecture. • A programming assignment (project). • Final exam	

Specifically-defined evaluation criteria are given, and if and where they are accessible to students.

The evaluation procedure is accessible to students via the course website.

ATTACHED BIBLIOGRAPHY

Suggested bibliography:

Βιβλίο [22683637]: Θεμελιώδεις αρχές συστημάτων βάσεων δεδομένων, Συγγραφείς: Elmasri Ramez, Navathe Shamkant B., Έκδοση: 6η Έκδοση Αναθεωρημένη/2012, ISBN: 978-960-531-281-7, Διαθέτης (Εκδότης): ΔΙΑΥΛΟΣ Α.Ε. ΕΚΔΟΣΕΙΣ ΒΙΒΛΙΩΝ

Βιβλίο [18548901]: Συστήματα διαχείρισης βάσεων δεδομένων, Συγγραφείς: Ramakrishnan Raghu, Gehrke Johannes, Έκδοση: 3η Έκδοση/2011, ISBN: 978-418-960-371-5, Διαθέτης (Εκδότης): ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ Α.Ε.

Βιβλίο [12535833]: Συστήματα Βάσεων Δεδομένων, Συγγραφείς: Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Έκδοση: 6η έκδ./2011, ISBN: 978-960-512-623-0, Διαθέτης (Εκδότης): Χ. ΓΚΙΟΥΡΔΑ & ΣΙΑ ΕΕ

- Related academic journals:

- Information Systems, Elsevier
- IEEE Transactions on Knowledge and Data Engineering
- The VLDB Journal, Springer
- ACM Transactions on Database Systems

COURSE OUTLINE

GENERAL

SCHOOL	School of Economic and Administrative Studies School of Engineering		
ACADEMIC UNIT	Department of Economics Department of Computer Science and Engineering		
LEVEL OF STUDIES	Postgraduate		
COURSE CODE	ECSE07	SEMESTER	2
COURSE TITLE	Time Series Analysis		
INDEPENDENT TEACHING ACTIVITIES <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>		WEEKLY TEACHING HOURS	CREDITS
Lectures		3	3.5 ECTS
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	Special background		
PREREQUISITE COURSES:	-		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	-		

LEARNING OUTCOMES

Learning outcomes <i>The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.</i> Consult Appendix A • Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area • Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B • Guidelines for writing Learning Outcomes	
After completing the course the students will be able to: • Understand the concept of a discrete-time signal • Analyse linear time-invariant systems • Use the discrete-time Fourier transform and the discrete Fourier transform • Understand the concept of a stochastic process • Understand the concepts of autocorrelation function and power spectral density • Practically obtain the power spectral density of a stochastic signal	
General Competences <i>Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?</i> Search for, analysis and synthesis of data and information, with the use of the necessary technology Adapting to new situations Decision-making Working independently Team work Working in an international environment Working in an interdisciplinary environment Production of new research ideas Project planning and management Respect for difference and multiculturalism Respect for the natural environment Showing social, professional and ethical responsibility and sensitivity to gender issues Criticism and self-criticism Production of free, creative and inductive thinking Others...	

• Production of free, creative and inductive thinking • Search for, analysis and synthesis of data and information, with the use of the necessary technology • Adapting to new situations • Analysis of requirements for problem solving • Algorithmic thinking • Abstraction ability for problem modeling • Working independently
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SYLLABUS

• Time series and discrete-time signals • Linear time-invariant systems • Discrete-time Fourier Transform and Discrete Fourier Transform • Discrete-time stochastic processes • Correlation function and power spectral density • Spectral estimation
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TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Face to face	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	• Use of slide projector • Use of computers for programming demonstration • Course website maintenance • Announcements and posting of teaching material (lecture slides and notes, programs) and marks through the University of Ioannina ecourse platform • Use of email and social media for information exchange and improved communication with students	
TEACHING METHODS <i>The manner and methods of teaching are described in detail.</i> <i>Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i> <i>The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</i>	Activity	Semester workload
	Lectures	18 hrs
	Non-directed study	31 hrs
	Projects	39 hrs
	Course total	88 hrs
STUDENT PERFORMANCE EVALUATION <i>Description of the evaluation procedure</i> <i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical</i>	The evaluation is based on final exams and programming projects	

<i>examination of patient, art interpretation, other</i> <i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i>	
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ATTACHED BIBLIOGRAPHY

• Probability, Random Variables and Stochastic Processes, 4th Edition, A. Papoulis, S.U. Pillai • Discrete Time Signal Processing, A. Oppenheim, R. W. Schaffer

COURSE OUTLINE

GENERAL

SCHOOL		School of Economic and Administrative Studies School of Engineering	
ACADEMIC UNIT		Department of Economics Department of Computer Science and Engineering	
LEVEL OF STUDIES		Postgraduate	
COURSE CODE		ECSE08	SEMESTER 2
COURSE TITLE		Dynamic Macroeconomics	
INDEPENDENT TEACHING ACTIVITIES <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>		WEEKLY TEACHING HOURS	CREDITS
Lectures		3	3.5 ECTS
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>		General background	
PREREQUISITE COURSES:		-	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:		Greek	
IS THE COURSE OFFERED TO ERASMUS STUDENTS		No	
COURSE WEBSITE (URL)		-	

LEARNING OUTCOMES

Learning outcomes <i>The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.</i> <i>Consult Appendix A</i> • Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area • Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B • Guidelines for writing Learning Outcomes	
• Learning the tools for solving, simulating, and interpreting modern dynamic macroeconomic models. • Learning to use programming languages like Matlab to illustrate how dynamic models can be applied to simulate economic scenarios. • Acquiring skills in analyzing time-series data to comprehend economic trends, fluctuations, and cycles using statistical and econometric methods. • Familiarity with executing research, conducting review of existing literature, performing rigorous analyses, and effectively communicating findings through result presentations.	
General Competences <i>Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?</i> <i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i> <i>Adapting to new situations</i> <i>Decision-making</i> <i>Working independently</i> <i>Team work</i> <i>Project planning and management</i> <i>Respect for difference and multiculturalism</i> <i>Respect for the natural environment</i> <i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i> <i>Criticism and self-criticism</i>	

<i>Working in an international environment</i> <i>Working in an interdisciplinary environment</i> <i>Production of new research ideas</i>	<i>Production of free, creative and inductive thinking</i> <i>Others...</i>
• Working independently • Working in an international environment • Criticism and self-criticism • Production of free, creative and inductive thinking	

SYLLABUS

• Tools for Dynamic Optimization in discrete time • Aggregate fluctuations, stylized business cycle facts • Real Business Cycle (RBC) models • Using MATLAB to solve and simulate dynamic general equilibrium models

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Distance learning	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	• Course material is available online through the e-course platform • Grades are submitted through ClassWeb. • Students are required to work with search engines for scientific journals	
TEACHING METHODS <i>The manner and methods of teaching are described in detail.</i> <i>Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i> <i>The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</i>	Activity	Semester workload
	Lectures	18 hrs
	Non-directed study	39 hrs
	Projects	31 hrs
	Course total	88 hrs
STUDENT PERFORMANCE EVALUATION <i>Description of the evaluation procedure</i> <i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</i> <i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i>	• Assignment • Written final exam	

ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

- Wickens, Michael. Macroeconomic Theory: A Dynamic General Equilibrium Approach.
- Thomas Cooley, ed., Frontiers of Business Cycle Research.
- George McCandless, The ABCs of RBCs: An Introduction to Dynamic Macroeconomic Models.
- Carl Walsh, Monetary Theory and Policy.
- David Romer, Advanced Macroeconomics.
- Lars Ljungqvist and Thomas Sargent, Recursive Macroeconomic Theory.
- Olivier Blanchard and Stanley Fischer, Lectures on Macroeconomics.
- Jerome Adda and Russell Cooper, Dynamic Economics-Quantitative Methods and Applications.

- Related academic journals:

- American Economic Review
- Journal of Monetary Economics
- European Journal of Political Economy
- Review of Economic Dynamics

COURSE OUTLINE

GENERAL

SCHOOL	School of Economic and Administrative Studies School of Engineering		
ACADEMIC UNIT	Department of Economics Department of Computer Science and Engineering		
LEVEL OF STUDIES	Postgraduate		
COURSE CODE	ECSE09	SEMESTER	2
COURSE TITLE	Special Topics in Microeconomics		
INDEPENDENT TEACHING ACTIVITIES <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>		WEEKLY TEACHING HOURS	CREDITS
Lectures		3	4 ECTS
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	Special background		
PREREQUISITE COURSES:	Microeconomics I and II		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	-		

LEARNING OUTCOMES

Learning outcomes <i>The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.</i> <i>Consult Appendix A</i> • <i>Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area</i> • <i>Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B</i> • <i>Guidelines for writing Learning Outcomes</i>		
The course focuses on firms’ choices and imperfectly competitive markets. Particularly on the role of networks and the behaviour of platforms. In the last part of the course, we will cover techniques for computing optimal actions in asymmetric-information games focusing on bidding in auctions. Students will be able to understand: • Firms’ decisions related to the design and diffusion of technology. • The role of economics of information.		
General Competences <i>Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?</i> <table><tr><td><i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i> <i>Adapting to new situations</i> <i>Decision-making</i> <i>Working independently</i> <i>Team work</i> <i>Working in an international environment</i></td><td><i>Project planning and management</i> <i>Respect for difference and multiculturalism</i> <i>Respect for the natural environment</i> <i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i> <i>Criticism and self-criticism</i> <i>Production of free, creative and inductive thinking</i></td></tr></table>	<i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i> <i>Adapting to new situations</i> <i>Decision-making</i> <i>Working independently</i> <i>Team work</i> <i>Working in an international environment</i>	<i>Project planning and management</i> <i>Respect for difference and multiculturalism</i> <i>Respect for the natural environment</i> <i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i> <i>Criticism and self-criticism</i> <i>Production of free, creative and inductive thinking</i>
<i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i> <i>Adapting to new situations</i> <i>Decision-making</i> <i>Working independently</i> <i>Team work</i> <i>Working in an international environment</i>	<i>Project planning and management</i> <i>Respect for difference and multiculturalism</i> <i>Respect for the natural environment</i> <i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i> <i>Criticism and self-criticism</i> <i>Production of free, creative and inductive thinking</i>	

Working in an interdisciplinary environment Production of new research ideas	 Others...
• Working Independently • Decision Making • Criticism and Self-criticism • Production of free and inductive thinking	

SYLLABUS

• Markets with network goods: Network effects; Empirical evidence on network effects; Markets for a single network good: Modelling the demand for a network good; Provision of a network good • Topics on Platforms and Two-sided Markets: Monopoly platform pricing; Platforms competition; Media markets • Asymmetric-information games and Bayesian-Nash equilibrium; Auctions

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Face to face	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	– The material for the lesson will be available electronically through the e-course platform – Grades will be submitted using class-web – Students will be obliged to use search machines on the internet for scientific journals	
TEACHING METHODS <i>The manner and methods of teaching are described in detail.</i> <i>Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i> <i>The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</i>	Activity	Semester workload
	Lectures	18 hrs
	Non-directed study	43 hrs
	Projects	39 hrs
	Course total	100 hrs
STUDENT PERFORMANCE EVALUATION <i>Description of the evaluation procedure</i> <i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</i> <i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i>	Final written exam	

ATTACHED BIBLIOGRAPHY

- P. Belleflamme, M. Peitz | industrial organization: markets and strategies
- Gibbons R. | game theory for applied economists
- Martin J. Osborne and Ariel Rubinstein | a course in game theory
- David Easley and Jon Kleinberg, Networks, Crowds, and Markets: reasoning about a highly connected world, Cambridge University Press.
- Armstrong M. | “Competition in Two-sided Markets”, (2006), Rand Journal of Economics 37: 668-691

COURSE OUTLINE

GENERAL

SCHOOL	School of Economic and Administrative Studies School of Engineering		
ACADEMIC UNIT	Department of Economics Department of Computer Science and Engineering		
LEVEL OF STUDIES	Postgraduate		
COURSE CODE	ECSE10	SEMESTER	2
COURSE TITLE	Introduction to Business Intelligence		
INDEPENDENT TEACHING ACTIVITIES <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>		WEEKLY TEACHING HOURS	CREDITS
Lectures		3	4 ECTS
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	Special background		
PREREQUISITE COURSES:	-		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	-		

LEARNING OUTCOMES

Learning outcomes <i>The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.</i> <i>Consult Appendix A</i> <i>Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area</i> <i>Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B</i> <i>Guidelines for writing Learning Outcomes</i>													
After successfully passing this course the students will be able to: - Know the state-of-the-art and the historical evolution of the area under study - Understand in depth the fundamental concepts of business intelligence - Understand in depth the critical elements of a data warehouse architecture - Design and organize the structure of a data warehouse using appropriate data representations both at the logical and conceptual levels, such that the data can be easily and efficiently retrieved - Query data warehouses with SQL and OLAP operators													
General Competences <i>Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?</i> <table> <tr> <td>Search for, analysis and synthesis of data and information, with the use of the necessary technology</td><td>Project planning and management</td></tr> <tr> <td>Adapting to new situations</td><td>Respect for difference and multiculturalism</td></tr> <tr> <td>Decision-making</td><td>Respect for the natural environment</td></tr> <tr> <td>Working independently</td><td>Showing social, professional and ethical responsibility and sensitivity to gender issues</td></tr> <tr> <td>Team work</td><td>Criticism and self-criticism</td></tr> <tr> <td>Working in an international environment</td><td>Production of free, creative and inductive thinking</td></tr> </table>		Search for, analysis and synthesis of data and information, with the use of the necessary technology	Project planning and management	Adapting to new situations	Respect for difference and multiculturalism	Decision-making	Respect for the natural environment	Working independently	Showing social, professional and ethical responsibility and sensitivity to gender issues	Team work	Criticism and self-criticism	Working in an international environment	Production of free, creative and inductive thinking
Search for, analysis and synthesis of data and information, with the use of the necessary technology	Project planning and management												
Adapting to new situations	Respect for difference and multiculturalism												
Decision-making	Respect for the natural environment												
Working independently	Showing social, professional and ethical responsibility and sensitivity to gender issues												
Team work	Criticism and self-criticism												
Working in an international environment	Production of free, creative and inductive thinking												

Working in an interdisciplinary environment Production of new research ideas	 Others...
• Production of free, creative and inductive thinking • Search for, analysis and synthesis of data and information, with the use of the necessary technology • Team work • Algorithmic thinking • Abstraction ability for problem modeling • Apply research results in solving practical problems • Literature studying and management	

SYLLABUS

• Overview of the area of data warehousing and OLAP. • Review of fundamental database concepts and SQL. • Multidimensional models, hierarchies, data warehouse architectures. • Data warehouse design. • OLAP & data analytics. • Project development.

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Weekly Lectures	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	• Use of projector and interactive board during lectures. • Course website maintenance. Announcements and posting of teaching material (lecture slides and notes, programs). • Announcement of assessment marks via the course web site. • Use of email and social media for information exchange and improved communication with students.	
TEACHING METHODS <i>The manner and methods of teaching are described in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i> <i>The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</i>	Activity	Semester workload
	Lectures	18 hrs
	Non-directed study	37 hrs
	Projects	45 hrs
	Course total	100 hrs
STUDENT PERFORMANCE EVALUATION <i>Description of the evaluation procedure</i> <i>Language of evaluation, methods of evaluation, summative or conclusive, multiple</i>	• At each lecture, the students are asked to be prepared on the material of the lecture and to participate in the critical discussions that arise.	

choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other

Specifically-defined evaluation criteria are given, and if and where they are accessible to students.

- At each lecture, the students are asked to answer to questions and exercises related to the learning outcomes of the previous lecture.
- A programming assignment (project).
- Final exam

The evaluation procedure is accessible to students via the course website.

ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

- Available via Springerlink: Data Warehouse Systems: Design and Implementation, A. Vaisman & E. Zimanyi, Springer, 2nd edition 2022, <https://doi.org/10.1007/978-3-662-65167-4>
- Book [22683637]: Θεμελιώδεις αρχές συστημάτων βάσεων δεδομένων, Συγγραφείς: Elmasri Ramez, Navathe Shamkant B., Έκδοση: 6η Έκδοση Αναθεωρημένη/2012, ISBN: 978-960-531-281-7, Διαθέτης (Εκδότης): ΔΙΑΥΛΟΣ Α.Ε. ΕΚΔΟΣΕΙΣ ΒΙΒΛΙΩΝ
- Book [18548901]: Συστήματα διαχείρισης βάσεων δεδομένων, Συγγραφείς: Ramakrishnan Raghu, Gehrke Johannes, Έκδοση: 3η Έκδοση/2011, ISBN: 978-418-960-371-5, Διαθέτης (Εκδότης): ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ Α.Ε.
- Book [12535833]: Συστήματα Βάσεων Δεδομένων, Συγγραφείς: Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Έκδοση: 6η έκδ./2011, ISBN: 978-960-512-623-0, Διαθέτης (Εκδότης): Χ. ΓΚΙΟΥΡΔΑ & ΣΙΑ ΕΕ

- Related academic journals:

- ACM Transactions on Database Systems
- IEEE Transactions on Knowledge and Data Engineering
- The VLDB Journal, Springer
- Information Systems, Elsevier

COURSE OUTLINE

GENERAL

SCHOOL	School of Economic and Administrative Studies School of Engineering		
ACADEMIC UNIT	Department of Economics Department of Computer Science and Engineering		
LEVEL OF STUDIES	Postgraduate		
COURSE CODE	ECSE11	SEMESTER	2
COURSE TITLE	Comparative Effectiveness Research		
INDEPENDENT TEACHING ACTIVITIES <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>		WEEKLY TEACHING HOURS	CREDITS
Lectures		3	4 ECTS
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	Special background		
PREREQUISITE COURSES:	-		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	-		

LEARNING OUTCOMES

Learning outcomes <i>The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.</i> <i>Consult Appendix A</i> • Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area • Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B • Guidelines for writing Learning Outcomes
Upon completion of the course, students will be able to: • Understand the basic principles of survival analysis and its application to time-to-event data. • Apply survival models and conduct risk analysis on real-world data. • Grasp the fundamental principles of post-analysis and be able to summarize results from various studies. • Evaluate the quality of post-analyses and assess the risk of bias. • Comprehend the design and statistical analysis of clinical trials and apply the relevant methods to real data. • Apply their analytical skills to practical problems in economic evaluation of treatments and interventions. • Utilize statistical software such as STATA/R for data analysis and the implementation of the aforementioned methodologies.
General Competences <i>Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma</i>

Supplement and appear below), at which of the following does the course aim?	
Search for, analysis and synthesis of data and information, with the use of the necessary technology	Project planning and management
Adapting to new situations	Respect for difference and multiculturalism
Decision-making	Respect for the natural environment
Working independently	Showing social, professional and ethical responsibility and sensitivity to gender issues
Team work	Criticism and self-criticism
Working in an international environment	Production of free, creative and inductive thinking
Working in an interdisciplinary environment	
Production of new research ideas	Others...
	
• Search for, analysis and synthesis of data and information, with the use of the necessary technology • Data analysis • Decision-making • Production of free, creative and inductive thinking	

SYLLABUS

Introduction to Survival Analysis • Survival Time Distribution • Estimation and Verification of Survival Functions • Risk Analysis • Multivariable Models • Applications in Economics Introduction to Meta-Analysis • Applications in Intervention Outcome Studies • Methodology for Combining Study Results • Summary Meta -Analyses • Meta -Analyses with Multiple Outcomes • Applications in Economics Introduction to Clinical Trials • Basic Concepts of Clinical Trial Design • Randomized Clinical Trial Design • Statistical Methods for Clinical Trial Analysis • Applications in Clinical Trials and Economic Evaluation
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TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Face-to-face	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	Email is used for communication with students, as well as the electronic platform of the secretary's office for posting students' grades.	
TEACHING METHODS <i>The manner and methods of teaching are described in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational</i>	Activity	Semester workload
	Lectures	18 hrs
	Non-directed study	43 hrs
	Projects	39 hrs

<i>visits, project, essay writing, artistic creativity, etc.</i> <i>The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</i>		
	Course total	100 hrs
STUDENT PERFORMANCE EVALUATION <i>Description of the evaluation procedure</i> <i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</i> <i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i>	Written final exam	

ATTACHED BIBLIOGRAPHY

• "Applied Survival Analysis: Regression Modelling of Time-to-Event Data" from David W. Hosmer Jr., Stanley Lemeshow & Susanne May. • "Statistical Methods for Meta-Analysis" from Larry V. Hedges & Ingram Olkin. • "Design and Analysis of Clinical Trials: Concepts and Methodologies" from Shein-Chung Chow, Jen-Pei Liu, & Yi-Lin Wu.
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COURSE OUTLINE

GENERAL

SCHOOL	School of Economic and Administrative Studies School of Engineering		
ACADEMIC UNIT	Department of Economics Department of Computer Science and Engineering		
LEVEL OF STUDIES	Postgraduate		
COURSE CODE	ECSE12	SEMESTER	2
COURSE TITLE	Microeconometrics		
INDEPENDENT TEACHING ACTIVITIES <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>		WEEKLY TEACHING HOURS	CREDITS
Lectures		3	4 ECTS
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	Special background		
PREREQUISITE COURSES:	Microeconomics, Statistics		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	-		

LEARNING OUTCOMES

Learning outcomes <i>The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.</i> <i>Consult Appendix A</i> • Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area • Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B • Guidelines for writing Learning Outcomes											
Upon successful completion of the course, students will be able to: • understand the basic principles of microeconomic analysis, • apply and interpret linear regression, logit, and probit models, • apply instrumental variables methods and panel data models, • select the appropriate econometric method depending on the data and the research question, • analyse empirical data using the R econometric software and critically evaluate the results.											
General Competences <i>Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?</i> <table> <tr> <td><i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i></td><td><i>Project planning and management</i></td></tr> <tr> <td><i>Adapting to new situations</i></td><td><i>Respect for difference and multiculturalism</i></td></tr> <tr> <td><i>Decision-making</i></td><td><i>Respect for the natural environment</i></td></tr> <tr> <td><i>Working independently</i></td><td><i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i></td></tr> <tr> <td><i>Team work</i></td><td><i>Criticism and self-criticism</i></td></tr> </table>		<i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i>	<i>Project planning and management</i>	<i>Adapting to new situations</i>	<i>Respect for difference and multiculturalism</i>	<i>Decision-making</i>	<i>Respect for the natural environment</i>	<i>Working independently</i>	<i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i>	<i>Team work</i>	<i>Criticism and self-criticism</i>
<i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i>	<i>Project planning and management</i>										
<i>Adapting to new situations</i>	<i>Respect for difference and multiculturalism</i>										
<i>Decision-making</i>	<i>Respect for the natural environment</i>										
<i>Working independently</i>	<i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i>										
<i>Team work</i>	<i>Criticism and self-criticism</i>										

<i>Working in an international environment</i> <i>Working in an interdisciplinary environment</i> <i>Production of new research ideas</i>	<i>Production of free, creative and inductive thinking</i> <i>.....</i> <i>Others...</i> <i>.....</i>
• Search, analysis and synthesis of data and information, with the use of the necessary technology • Working independently	

SYLLABUS

The course content includes:

- Introduction: basic concepts and data
- Simple and multiple regression
- Limited dependent variable models: logit and probit
- Instrumental variables (IV) models
- Panel data models

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Face-to-face	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	e-mail is used for the communication with the students and an electronic platform is used for posting students' grades. Plagiarism is prohibited. Assignments are checked using Turnitin. The use of Artificial Intelligence is allowed only with the permission of the instructor.	
TEACHING METHODS <i>The manner and methods of teaching are described in detail.</i> <i>Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i> <i>The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</i>	Activity	Semester workload
	Lectures	18 hrs
	Directed study	12 hrs
	Non-directed study	30 hrs
	Written assignment	40 hrs
	Course total	100 hrs
STUDENT PERFORMANCE EVALUATION <i>Description of the evaluation procedure</i> <i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</i> <i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i>	Short answer questions and written assignment with presentation.	

ATTACHED BIBLIOGRAPHY

- *Suggested bibliography:*

- *Related academic journals:*

- Asteriou, D., & Hall, S. (2021). Applied Econometrics, Macmillan International.
- Wooldridge, J. (2013). Introduction to Econometrics, National Geographic Learning.

COURSE OUTLINE

GENERAL

SCHOOL	School of Economic and Administrative Studies School of Engineering		
ACADEMIC UNIT	Department of Economics Department of Computer Science and Engineering		
LEVEL OF STUDIES	Postgraduate		
COURSE CODE	ECSE13	SEMESTER	2
COURSE TITLE	Dynamic Systems Modelling		
INDEPENDENT TEACHING ACTIVITIES <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>		WEEKLY TEACHING HOURS	CREDITS
Lectures		3	4 ECTS
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	General background		
PREREQUISITE COURSES:	-		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	NO		
COURSE WEBSITE (URL)	-		

LEARNING OUTCOMES

Learning outcomes <i>The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.</i> <i>Consult Appendix A</i> • Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area • Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B • Guidelines for writing Learning Outcomes			
After successful attendance of the course the students are expected to: • Understand the importance of differential equations in system modeling • Understand the basic facts for initial value problems and can solve differential equations and systems of differential equations. • Know the basic numerical methods for initial value problems. • Are in a position to implement these numerical methods in a computer.			
General Competences <i>Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?</i> <table border="0" style="width: 100%;"> <tr> <td style="vertical-align: top;"> <i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i> <i>Adapting to new situations</i> <i>Decision-making</i> <i>Working independently</i> <i>Team work</i> <i>Working in an international environment</i> <i>Working in an interdisciplinary environment</i> <i>Production of new research ideas</i> </td><td style="vertical-align: top;"> <i>Project planning and management</i> <i>Respect for difference and multiculturalism</i> <i>Respect for the natural environment</i> <i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i> <i>Criticism and self-criticism</i> <i>Production of free, creative and inductive thinking</i> <i>.....</i> <i>Others...</i> </td></tr> </table>		<i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i> <i>Adapting to new situations</i> <i>Decision-making</i> <i>Working independently</i> <i>Team work</i> <i>Working in an international environment</i> <i>Working in an interdisciplinary environment</i> <i>Production of new research ideas</i>	<i>Project planning and management</i> <i>Respect for difference and multiculturalism</i> <i>Respect for the natural environment</i> <i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i> <i>Criticism and self-criticism</i> <i>Production of free, creative and inductive thinking</i> <i>.....</i> <i>Others...</i>
<i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i> <i>Adapting to new situations</i> <i>Decision-making</i> <i>Working independently</i> <i>Team work</i> <i>Working in an international environment</i> <i>Working in an interdisciplinary environment</i> <i>Production of new research ideas</i>	<i>Project planning and management</i> <i>Respect for difference and multiculturalism</i> <i>Respect for the natural environment</i> <i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i> <i>Criticism and self-criticism</i> <i>Production of free, creative and inductive thinking</i> <i>.....</i> <i>Others...</i>		
• Production of free, creative and inductive thinking • Decision-making.			

- Team work.
- Abstraction ability for problem modeling.
- Search for, analysis and synthesis of data and information, with the use of the necessary technology.

SYLLABUS

- Dynamic systems modeling methods.
- Examples of system modeling using differential equations.
- The initial value problem for ordinary differential equations.
- Systems of differential equations.
- Numerical methods.

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Weekly Lectures	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	• Use of projector and computer during lectures. • Course website maintenance. Announcements and posting of teaching material (lecture slides and notes). • Announcement of assessment marks via the course website.	
TEACHING METHODS <i>The manner and methods of teaching are described in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i> <i>The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</i>	Activity	Semester workload
	Lectures	18 hrs
	Non-directed study	37 hrs
	Projects	45 hrs
	Course total	100 hrs
STUDENT PERFORMANCE EVALUATION <i>Description of the evaluation procedure</i> <i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</i> <i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i>	The evaluation is based on final exams and programming assignments	

ATTACHED BIBLIOGRAPHY

Suggested bibliography:

- Αριθμητικές Μέθοδοι για Συνήθεις Διαφορικές Εξισώσεις. Γ. Δ. Ακρίβης, Β. Α. Δουγαλής. Πανεπιστημιακές Εκδόσεις Κρήτης, Ηράκλειο. Δεύτερη έκδοση, 2013, πρώτη ανατύπωση, 2015.
- Αριθμητική Ανάλυση: Συνήθεις Διαφορικές Εξισώσεις. Μ. Ν. Βραχάτης. Εκδόσεις Κλειδάριθμος, Αθήνα, 2012.
- Elementary Differential Equations and Boundary Value Problems. William E. Boyce, Richard C. DiPrima, John Wiley & Sons, Inc.

COURSE OUTLINE

GENERAL

SCHOOL	School of Economic and Administrative Studies School of Engineering		
ACADEMIC UNIT	Department of Economics Department of Computer Science and Engineering		
LEVEL OF STUDIES	Postgraduate		
COURSE CODE	ECSD01	SEMESTER	3
COURSE TITLE	Diploma Thesis		
INDEPENDENT TEACHING ACTIVITIES <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>		WEEKLY TEACHING HOURS	CREDITS
			30 ECTS
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	Skills Development - specialised		
PREREQUISITE COURSES:	-		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek/English		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	-		

LEARNING OUTCOMES

Learning outcomes <i>The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.</i> <i>Consult Appendix A</i> • Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area • Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B • Guidelines for writing Learning Outcomes
The Diploma Thesis is a specialized project aimed at the synthesis of knowledge, problem solving, the use of tools and methods in line with the latest developments in research and technology, the learning of techniques, the conduct of research, the study and analysis of bibliography and the analysis and evaluation of results. The Thesis's topic is unique and gives the student the opportunity to get deeper in a specific area of specialization, which is of course part of the broader area of the current Postgraduate Course. At the end of the Diploma Thesis, the student will be able to: - Collect and integrate the available information on state-of-the-art techniques in the study area. - Develop a plan and apply the known theory and methodologies to reach the solution to the given problem. - Adapt the above techniques and methods to the specificities of the given problem with originality. - Evaluate alternatives to the given problem and consciously pick one based on the prioritization of the dimensions of the problem. - Organize and communicate results via a technical report (in the form of a dissertation), which, in addition to being submitted in writing, is also orally defended in a public defense

- Develop initiatives to facilitate the above tasks and take responsibility for their achievement.	
General Competences <i>Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?</i>	
<i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i> <i>Adapting to new situations</i> <i>Decision-making</i> <i>Working independently</i> <i>Team work</i> <i>Working in an international environment</i> <i>Working in an interdisciplinary environment</i> <i>Production of new research ideas</i>	<i>Project planning and management</i> <i>Respect for difference and multiculturalism</i> <i>Respect for the natural environment</i> <i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i> <i>Criticism and self-criticism</i> <i>Production of free, creative and inductive thinking</i> <i>.....</i> <i>Others...</i>
- Search for, analysis and synthesis of data and information, with the use of the necessary technology - Adapting to new situations - Decision-making - Working independently - Working in an interdisciplinary environment - Project planning and management - Production of free, creative and inductive thinking - Project planning and management for Computer Science projects	

SYLLABUS

Thesis is an important part of the educational. During the preparation of the thesis report students are asked to synthesize their knowledge, apply their skills, apply what they learned during their studies, solve problems and using cutting-edge tools and methods in line with the latest developments in research and technology.

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Face to face supervision from a faculty member	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	- Bibliographic search and result integration via the exploitation of online libraries - Use of cutting-edge techniques and tools in the area	
TEACHING METHODS <i>The manner and methods of teaching are described in detail.</i> <i>Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i> <i>The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</i>	<i>Activity</i>	<i>Semester workload</i>
	Bibliographic search and integration	150 hrs
	Solution design	150 hrs
	Solution implementation	300 hrs
	Compilation of the final report	150 hrs
	Course total	750 hrs
STUDENT PERFORMANCE EVALUATION <i>Description of the evaluation procedure</i> <i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination,</i>	ASSESSMENT METHOD: - Diploma thesis submission - Public presentation - Students who undertake a diploma thesis must complete and submit the text of the final	

<i>public presentation, laboratory work, clinical examination of patient, art interpretation, other</i> <i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i>	report and present the results of their work in a public lecture. - The diploma thesis is examined and graded by a three-member committee of instructors.
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ATTACHED BIBLIOGRAPHY

<i>Suggested bibliography:</i>
