

**ΟΙΚΟΝΟΜΙΚΟ  
ΠΑΝΕΠΙΣΤΗΜΙΟ  
ΑΘΗΝΩΝ**



ATHENS UNIVERSITY  
OF ECONOMICS  
AND BUSINESS

**SCHOOL OF BUSINESS**

**DEPARTMENT OF MANAGEMENT SCIENCE AND TECHNOLOGY**



MSc in  
**Business Analytics**

ATHENS UNIVERSITY OF  
ECONOMICS & BUSINESS

**PROGRAM GUIDE  
ATHENS, SEPTEMBER 2025**

## **PART I: INFORMATION ABOUT THE INSTITUTION**

### **CONTACT DETAILS (Name & Address)**

ATHENS UNIVERSITY OF ECONOMICS AND BUSINESS (AUEB)

Address: 76, Patission Str. GR-10434, Athens

Telephone number: +30-210-8203911

Website: <https://www.aueb.gr>

e-mail: [webmaster@aeub.gr](mailto:webmaster@aeub.gr)

Facebook: <https://www.facebook.com/aeubgreece>

Twitter: <https://twitter.com/aeub>

### **ACADEMIC AUTHORITIES**

The rectorate authorities consist of the Rector and the Vice Rectors:

#### **Rector:**

Professor Vasilios Vasdekis

#### **Vice Rectors:**

##### **Vice Rector for Academic Affairs and Personnel**

Professor Leonidas Doukakis

##### **Vice Rector for Research and Lifelong Learning**

Professor Georgia Siougle

##### **Vice Rector for Financial Planning and Infrastructure**

Associate Professor Eleanna Galanaki

##### **Vice Rector for International Cooperation and Development**

Professor Nancy Pouloudi

#### **School of Business**

Dean: Professor Angeliki Poulymenakou

#### **Department of Management Science and Technology**

Chair: Professor Ioannis Nikolaou

#### **Master's Program in Business Analytics**

Director: Professor Damianos Chatziantoniou

#### **Contact details**

Address: 47A Evelpidon & 33 Lefkados Str., GR-11362 Athens, Greece

Telephone number: (+30) 210 8203 676

Email: [ms-ba@aeub.gr](mailto:ms-ba@aeub.gr)

Website: <http://analytics.aueb.gr/>

## **ACADEMIC CALENDAR**

### ➤ **Fall Semester:**

Classes begin (1st period): Monday, September 29, 2025  
Classes end (1st period): Saturday, December 20, 2025

**Christmas Recess:** from 24 December 2025 until 6 January 2026

**Examination Period for the Winter Semester Courses:** from 22 December 2025 until 9 January 2026

### ➤ **National/Bank Holidays:**

October 28 Holiday - The Anniversary of the “No”, Tuesday, October 28, 2025  
The Anniversary of Polytechnio, Monday, November 17, 2025  
Epiphany, Tuesday, January 6, 2026

### ➤ **Spring Semester:**

Classes begin (2<sup>nd</sup> period): Monday, January 12, 2026  
Classes end (2<sup>nd</sup> period): Saturday, April 4, 2026  
**Examination Period for the Second Session of the Spring Semester Courses:** from 6 until 17 April 2026

Classes restart (3<sup>rd</sup> period): Monday, April 20, 2026

**Easter Recess:** from 8 to 14 April 2026

Classes end (3<sup>rd</sup> period): Saturday, July 11, 2026

**Examination Period for the Third Session of the Spring Semester Courses:** from 13 until 18 July 2026

### ➤ **National/Bank Holiday:**

The Three Holy Hierarchs, Friday, January 30, 2026  
Clean Monday, Monday February 23, 2026  
Greek Independence Day, Wednesday, March 25, 2024  
Pentecost Monday, Monday, June 1, 2026

## **AUEB's OPERATIONAL STRUCTURE**

The structure and operation of the Institution is defined by current legislation as in force. The Athens University of Economics and Business is under the supervision of the Ministry of Education, Research and Religious Affairs. Its governing bodies include:

The Governing Council  
The Senate  
The Rector  
The Vice-Rectors  
The Executive Director

Until the Governing Council assumes its duties, administration is exercised by the University's Rector's Council

### **AUEB's ACADEMIC STRUCTURE**

The Athens University of Economics and Business is structured by academic units of two (2) levels: a) the Schools, and b) the Departments

Each School is structured by at least two (2) Departments, covers a domain of related scientific areas, and ensures the interdisciplinary approach to teaching and research between its departments. The School is responsible for supervising and coordinating the operation of the Departments and the educational and research work produced, in accordance with the Internal Operating Regulations.

The bodies of the School, according to Law 4957/2022 (A 141) as applicable are: a) the Dean and b) the Dean's Council

The Department is the University's fundamental academic unit and aims to advance a specific field of science, technology, letters and arts through education and research. The Department consists of all the members of the Teaching & Research Staff (DEP), the members of the Special Education Staff (EEP), the members of the Laboratory Teaching Staff (EDIP) and the members of the Special Technical Laboratory Staff (ETEP).

Bodies of the Department according to Law 4957/2022 (A 141) as applicable are: a) the Assembly, b) the Board of Directors, c) the Head/Chair and d) the Deputy Head/Chair.

The Athens University of Economics and Business consists of three Schools & eight Departments:

#### **1. SCHOOL OF ECONOMIC SCIENCES**

Department of International and European Economic Studies

Department of Economics.

#### **2. SCHOOL OF BUSINESS**

Department of Management Science and Technology

Department of Business Administration

Department of Accounting and Finance

Department of Marketing and Communication.

#### **3. SCHOOL OF INFORMATION SCIENCE AND TECHNOLOGY**

Department of Informatics

Department of Statistics

### **ADMINISTRATIVE BODIES OF POSTGRADUATE STUDY PROGRAMS**

Competent bodies for the organization and operation of the Postgraduate Study Programs are:

a) the Senate,

b) the Assembly of the Department,

- c) the Coordinating Committee (CC), and
- d) the Director of the Postgraduate Program.

Especially for inter-departmental, inter-institutional and joint programs, the responsibilities of the Department's Assembly are exercised by the Curriculum Committee

### **UNIVERSITY STAFF**

The University staff consists of the following categories:

#### **- TEACHING STAFF:**

- Teaching & Research Staff (DEP)
- Emeritus Professors
- Visiting Professors
- Special Education Staff (E.E.P.)
- Laboratory Teaching Staff (E.DI.P.)
- Special Technical Laboratory Staff (E.T.E.P.)
- Auxiliary Teaching Staff
- Teaching Fellows
- Scientific Faculty Members
- Adjunct Instructors
- Secondet Teachers

#### **- ADMINISTRATIVE STAFF**

### **SERVICES**

The Athens University of Economics and Business provides both administrative and other services (meals, housing, library, sport facilities etc.) aiming at serving both its students and staff. More information on the organization and operation of the University's services can be found on the University's website (<http://www.aueb.gr/en>).

### **GENERAL DESCRIPTION OF THE UNIVERSITY**

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

AUEB is, in order of seniority, the third Higher Education Institution of the country and the first in the fields of Economics and Business Administration. Later, the scientific fields of Informatics and Statistics were added. Since its founding, in 1920, AUEB has a rich and noteworthy tradition of significant academic achievements that define the present and create excellent prospects for the future.

The University as a center of excellence, in academic research and teaching, is rated as one of the leading universities in its subject areas in Greece and one of the best internationally. The high level of its staff, the quality in teaching and research, the modern curriculum/courses, but also the high demand of its graduates significantly enhance the University's brand name and reputation, in Greece and abroad.

Detailed information on the study programs is provided in the study guides and departmental websites.

**Chief Regulations of the University (including academic recognition procedures)**

The regulations include, for example:

- The University's Internal Operating Regulations
- The Organization of Administrative Services
- The Regulations for the Operation of Postgraduate and Doctoral Study Programs
- The Internal Regulation for conducting postdoctoral research

**AUEB'S ECTS COORDINATOR**

The University's ECTS Coordinator is the Quality Assurance Chairperson, who ensures the University's compliance with the principles and rules of the European credit accumulation and transfer systems, supervises compliance and implementation and is responsible for the full recognition and transfer of credit units.

## **PARTII: INFORMATION ON DEGREE PROGRAMMES**

### **A. GENERAL DESCRIPTION**

#### **QUALIFICATION AWARDED**

The Postgraduate Program awards the MSc in Business Analytics.

#### **ADMISSION REQUIREMENTS**

The selection criteria for candidates are defined in the notice and include in particular:

- I. Degree/s grade,
- II. Grades on the undergraduate courses, which are relevant to the courses of the MSc,
- III. Dissertation Performance, where this is provided for the undergraduate studies,
- IV. Duration and type of employment, if available,
- V. Other skills (grade in GMAT / GRE exams, IT skills, relevant seminars, etc.).

as well as the following quality criteria:

- VI. University and originating Department,
- VII. Type of research experience,
- VIII. C1 level of English language knowledge,
- IX. Knowledge of other foreign language,
- X. Interview,
- XI. Recommendation letters from faculty members or employers,
- XII. Any distinction/awards.

#### **ADMISSION/REGISTRATION PROCEDURE**

The registration of the each year's admitted postgraduate students takes place from June to October of each year, within deadlines set by the CC of the MSc.

The candidate, before registering, acquaints himself/herself of the Operation Regulation and the establishment act of the MSc and declares in writing that he/she accepts the Operation Regulation of the program. For reasons of exceptional necessity, the Assembly may decide, upon a reasoned request by the person concerned, that registration may take place within one month of the expiry of the deadline.

#### **EDUCATIONAL AND PROFESSIONAL GOALS**

The Postgraduate Studies Program (MSc) entitled "MSc in Business Analytics" aims at providing specialized postgraduate studies in the key areas of Business Analytics and focuses on the following subject areas:

- a) business performance and innovation management,
- b) quantitative methods in decision making,
- c) data analysis and management, and
- d) operational applications and analytics tools.

Purpose of the MSc is to prepare executives who will best combine knowledge in business management, data analysis and management techniques, and analytics tools based on statistical and operational research, with a view to making optimal business decisions. That is, to be able to handle the information of a fast and constantly changing world, full of data, in a way that is flexible, efficient and effective for their working environment.

**ACCESS TO FURTHER STUDIES**

It is possible to continue studies at the Doctoral level.

**COURSE STRUCTURE DIAGRAM WITH CREDITS**

1 <sup>st</sup> Semester	П.М.
Information Systems & Business Process Management	5
Large Scale Optimization	5
Fundamentals in Data Management	5
Statistics for Business Analytics I	5
Business Intelligence & Data Engineering	5
Data Visualization	2,5
Requirements Engineering for Analytics	2,5
Total of 1 <sup>st</sup> Semester	30
2 <sup>nd</sup> Semester	
Statistics for Business Analytics II	5
Python for Analytics & Artificial Intelligence	5
AI for Business Analytics	5
Business Analytics Use Cases	5
Advanced Topics in Data Analysis	2,5
Data Governance and Privacy	2,5
Innovation and Entrepreneurship	2,5
Cloud Infrastructures for Analytics	2,5
Total of 2 <sup>nd</sup> Semester	30
3 <sup>rd</sup> Semester	
Thesis/Field Study Project/Internship	30
Total of 3 <sup>rd</sup> Semester	30
TOTAL	90

The full-time program consists of one year of coursework, followed by a semester-long diploma thesis or field-study project or internship. The part-time program consists of two years of coursework, followed by a semester-long thesis or field-study project or internship.

### **FINAL EXAMINATION**

The two semesters in the full-time program are divided into three teaching periods and the four semesters in the part-time program are divided into six teaching periods. In both programs - full and part-time – examinations take place three times each academic year, in the following months: December/January, March/April and June/July. The courses/exercises and exams curriculum of each period shall be drawn up and communicated at least ten days before the beginning of the semester.

### **EXAMINATION AND ASSESSMENT REGULATIONS**

1. The final evaluation of each course is done either through written or oral examinations and/or assignments.
2. The final grade for each course is determined by the respective teachers. The individual and group assignments of the students can be included. Participation in the examination on the specific date announced in accordance with the Program is compulsory.
3. The grading scale is set from zero (0) to ten (10) with grades of the whole or half unit. Passing grades are considered the total grade of 5 and higher.
4. In the event that a student does not come unjustifiably on the specific examination date of a course, s/he loses the examination period and the course is considered as failed.
5. In case of exceeding the limit of absences, the postgraduate student is obliged to repeat the courses attendance. In case of failure in a course, a re-examination may be carried out twice, in accordance with the professor's instructions as regards the type of examination, but not a third time. The re-examination does not require a re-registering. Specific arrangements and cases are examined by the CC.
6. For the award of the MSc, a promotional grade is required in all postgraduate courses and in the dissertation or field study project or internship. If this condition is not met within the expected period, the postgraduate student is only entitled to a simple certificate of successful attendance of the courses, wherever s/he has received a promotional grade and the postgraduate student's attendance of the Program is completed.
7. The Administrative Science and Technology Department's Assembly upon the recommendation of the CC, may decide to delete postgraduate students if the failed courses exceed two per academic term.
8. In any case of deletion of the postgraduate student, any tuition fees paid shall not be reimbursed, unless there are special reasons and the Assembly shall justifiably decide otherwise upon the proposal of the CC of the MSc.

### **DISSERTATION OR FIELD STUDY PROJECT OR INTERSHIP**

The dissertation or field study project or internship is compulsory and performed both for full-time and part-time students upon completion of the course, i.e. the semester from August 1st to January 31st of the next year.

The students of the program may choose to pursue a field study project instead of a dissertation, with a few hours of weekly meetings of the student in the company, or b) Internship, lasting at least 3 months and working up to 40 hours per week, in a company-provider with the scope of solving real-life problems related to the subject of the dissertation, field study project or internship. The

above options will have the same impact and the same Credit Units as the dissertation, as mentioned in the studies regulation.

## **B. DESCRIPTION OF INDIVIDUAL COURSE UNITS**

### **CORE COURSES**

<b>Course title</b>	<b>Fundamentals in Data Management</b>
<b>Course code</b>	Full Time Program: m82117s Part Time Program: m82117s
<b>Type of course</b>	Core
<b>Level of course</b>	Master
<b>Year of study</b>	Full Time Program: 1 <sup>st</sup> Part Time Program: 1 <sup>st</sup>
<b>Trimester</b>	Full Time Program: 1 <sup>st</sup> trimester Part Time Program: 1 <sup>st</sup> trimester
<b>Number of credits allocated (based on the student workload required to achieve the objectives or learning outcomes)</b>	5 ECTS
<b>Objective of the course (preferably expressed in terms of learning outcomes and competences)</b>	<p>Upon completion of the course, students will be able to:</p> <ul style="list-style-type: none"> <li>- Model the data of a business or organization using entity-relationship diagrams or the relational model</li> <li>- Write simple or complex SQL queries to manage the schema of a relational database, insert/update data in a relational database, or retrieve data in various ways</li> <li>- Connect to a relational database using a programming language and retrieve data</li> <li>- Design the relational schema of a data warehouse using the star or snowflake methodology</li> <li>- Understand modern data management systems (NoSQL) and the modeling approaches they offer, specifically key-value stores, document stores, and graph databases</li> <li>- Use a data stream management system (stream analytics)</li> </ul>
<b>Course contents</b>	<ul style="list-style-type: none"> <li>- Introduction to data management and analysis</li> <li>- Data models: entity-relationship, relational, semi-structured</li> <li>- Relational databases: conceptual design, relational model, SQL query language, query processing algorithms, transactions, in-memory databases, parallel and distributed databases</li> </ul>

	<ul style="list-style-type: none"> <li>- Data warehouses: necessity, business needs, architecture, ETL process, modeling, multidimensional analysis</li> <li>- New data management systems: Hadoop, NoSQL, Stream Engines</li> </ul>
<b>Recommended reading</b>	<ul style="list-style-type: none"> <li>- Suggested bibliography: Database Systems: The Complete Book, by Hector Garcia-Molina, Jeff Ullman, Jennifer Widom.</li> <li>- Related academic journals: ACM SIGMOD, VLDB, ICDE</li> </ul>
<b>Language of instruction</b>	English

<b>Course title</b>	<b>Information Systems and Business Process Management</b>
<b>Course code</b>	Full Time Program: m82101f Part Time Program: m82101p
<b>Type of course</b>	Core
<b>Level of course</b>	Master
<b>Year of study</b>	Full Time Program: 1 <sup>st</sup> Part Time Program: 2 <sup>nd</sup>
<b>Semester/trimester</b>	Full Time Program: 1 <sup>st</sup> trimester Part Time Program: 4 <sup>th</sup> trimester
<b>Number of credits allocated (based on the student workload required to achieve the objectives or learning outcomes)</b>	5 ECTS
<b>Objective of the course (preferably expressed in terms of learning outcomes and competences)</b>	<p>This course introduces the notion of information systems (IS) used in enterprises, explains how technology supports business operations and strategy through the concept of enterprise architecture, and analyses business processes (BPs) as the fundamental element of modern enterprises and the management of their performance. The course provides practical knowledge and skills for business process modelling using the Archimate modelling language. The course also develops skills for the definition of KPIs business and process performance management, based on the Balanced Scorecard method. Students apply the knowledge acquired in an analysis and design project in a real-life organization.</p> <p>Upon completion of the course the students will be able to</p> <ul style="list-style-type: none"> <li>• Understand and apply concepts of Information Systems Analysis Design and Management in the context of an Enterprise (Enterprise Architecture)</li> <li>• Understand how business processes connect human resources, information systems and technologies and enterprise strategy</li> <li>• Apply techniques of business process analysis and modelling (Enterprise Architecture modelling) to extract requirements and to formulate specifications for business support through digital technologies</li> </ul>

	<ul style="list-style-type: none"> <li>• Understand and apply techniques for the definition of Key Performance Indicators (KPIs) in the context of Business Process Management</li> <li>• Understand and apply Business Analytics technologies for the management of KPIs</li> <li>• Understand and apply the Archimate modelling language to define business and technology enterprise architecture</li> </ul>
<b>Course contents</b>	<ul style="list-style-type: none"> <li>• Foundations of Information Systems for Enterprises: Business strategy, organizational structure, work roles, information technologies, business, and management processes. practical case examples of enterprise and inter-organizational systems</li> <li>• Information systems and business value creation – the concept of the value chain.</li> <li>• IT enabled work systems and the Work Centered Analysis methodology.</li> <li>• Embedding technology in business processes for operational support, managerial decision making and strategic management.</li> <li>• Analyzing organizations and their information technologies using the Work-centered analysis method</li> <li>• Evaluating organizational and IT architecture and performance</li> <li>• Developing performance measurement frameworks based on KPIs using the Balance Score Card method</li> <li>• Modelling processes using the Archimate modelling language</li> <li>• Hands-on ERP lab (SAP HANA or Microsoft) (optional)</li> </ul>
<b>Recommended reading</b>	<ul style="list-style-type: none"> <li>• P. Weill and J. Ross (2004) Information Technology Governance, Harvard Business School Press</li> <li>• J. Ross, P. Weill and D.C. Robertson, (2006) Enterprise Architecture Strategy, Harvard Business School Press</li> <li>• David Parmenter, (2019) Key Performance Indicators – developing, implementing and using winning KPIs (4th Edition), John Wiley &amp; Sons, Inc.</li> <li>• <u>ArchiMate® 3.1 Specification, a Standard of The Open Group</u> (Web link)</li> <li>• <u>Archi - Archimate Modelling Tool - User Guide</u> (Web link)</li> </ul> <p>Papers from selected journals including</p> <ul style="list-style-type: none"> <li>• Management Information Systems Quarterly</li> <li>• Decision Support Systems</li> <li>• Organisation Science</li> <li>• Harvard Business Review</li> <li>• Journal of the Association of Information Systems</li> </ul>

<b>Language of instruction</b>	English
<b>Course title</b>	<b>SAP Labs (in the context of the course “Information Systems and Business Process Management)</b>
<b>Course code</b>	Full Time Program: m82101f Part Time Program: m82101p
<b>Type of course</b>	Optional
<b>Level of course</b>	Master
<b>Year of study</b>	Full Time Program: 1 <sup>st</sup> Part Time Program: 2 <sup>nd</sup>
<b>Semester/trimester</b>	Full Time Program: 1 <sup>st</sup> trimester Part Time Program: 4 <sup>st</sup> trimester
<b>Number of credits allocated (based on the student workload required to achieve the objectives or learning outcomes)</b>	
<b>Objective of the course (preferably expressed in terms of learning outcomes and competences)</b>	<p>This 30-hour hands-on lab intends to introduce to Business Analytics students the use of ERP platforms in Enterprise Architectures to manage key transactions, processes and data in order to provide business with valuable intelligence from this data. The lab makes use of a live SAP service offered by TUM Germany in the context of the SAP Global University Alliances and University Competence Centers where AUEB is a member (Academic coordinator Prof. Angeliki Poulymenakou).</p> <p>The 30-hour SAP lab is an important element of the Information Systems and Business Process Management course. The lab performance counts towards 25% of the total IS&amp;BPM course for the students that opt to attend it.</p> <p>Upon completion of the course the students will be able to</p> <ul style="list-style-type: none"> <li>• Define the SAP Platform architecture in terms of the technology tiers and the SAP Modules</li> <li>• Understand how to use SAP functionality across modules to generate and implement critical business scenaria:               <ol style="list-style-type: none"> <li>(1) Requisitioning Process</li> <li>(2) Production</li> <li>(3) MRP i, MRP ii</li> <li>(4) Warehouse Management</li> <li>(5) Lead-to-cash</li> <li>(6) Financial Accounting</li> </ol> </li> <li>• Map, create Process maps of key business scenaria and define:               <ol style="list-style-type: none"> <li>(1) Master Data and Business Reporting &amp; Analytics Requirements</li> </ol> </li> </ul>

	<p>(2) Identify key SAP transactions &amp; documents involved in each scenario execution</p> <ul style="list-style-type: none"> <li>• Understand and apply in a test-project the full ERP implementation project lifecycle</li> <li>• Prepare (with extra study) to attend SAP certification exams.</li> </ul>
<b>Course contents</b>	<ul style="list-style-type: none"> <li>• Intercompany module mapping</li> <li>• Source to pay definition</li> <li>• Main business processes Design-to-Operate</li> <li>• Master Data</li> <li>• Lead-to-Cash</li> <li>• Record-to-Report</li> <li>• Transactional data for internal reports</li> <li>• SAP Implementation Stages and methodology</li> </ul>
<b>Recommended reading</b>	<p>Students attending the lab must register in the SAP UA/UCC student learning portal where all relevant lab material can be found</p> <p><a href="https://learning.sap.com/student-zone">https://learning.sap.com/student-zone</a></p>
<b>Language of instruction</b>	English

<b>Course title</b>	<b>Large Scale Optimization</b>
<b>Course code</b>	Full Time Program: m82102f Part Time Program: m82102p
<b>Type of course</b>	Core
<b>Level of course</b>	Master
<b>Year of study</b>	Full Time Program: 1 <sup>st</sup> Part Time Program: 2 <sup>nd</sup>
<b>Trimester</b>	Full Time Program: 1 <sup>st</sup> trimester Part Time Program: 4 <sup>th</sup> trimester
<b>Number of credits allocated (based on the student workload required to achieve the objectives or learning outcomes)</b>	5 ECTS
<b>Objective of the course (preferably expressed in terms of learning outcomes and competences)</b>	<ul style="list-style-type: none"> <li>• Understand the relation between Prescriptive Analytics and Combinatorial Optimization</li> <li>• Differentiate between solution shape and solution objective</li> <li>• Familiarize with three main types of Combinatorial Optimization problems</li> <li>• Understand the insufficiency of using mathematical programming methods for dealing with large-scale combinatorial optimization problems</li> </ul>

	<ul style="list-style-type: none"> <li>• Use a modern programming language to develop algorithms for dealing with optimization problems</li> <li>• Describe and apply local search-based optimization methodologies</li> <li>• Incorporate efficient guiding mechanisms into local search optimization frameworks</li> </ul>
<b>Course contents</b>	<ul style="list-style-type: none"> <li>• Combinatorial Optimization Problem Types</li> <li>• Sequencing Problems</li> <li>• Assignment Problems</li> <li>• Selection Problems</li> <li>• Greedy Algorithms</li> <li>• Python Basics</li> <li>• Development of Greedy Algorithms for Optimization Problems</li> <li>• Local Search</li> <li>• Local Search based metaheuristics</li> </ul>
<b>Recommended reading</b>	<ul style="list-style-type: none"> <li>• Instructor Notes</li> <li>• Handbook of Metaheuristics, Michel Gendreau &amp; Jean-Yves Potvin, International Series in Operations Research &amp; Management Science, 2019.</li> <li>• Introduction to Computation and Programming Using Python, John V. Guttag, With Application to Understanding Data, 2021</li> </ul>
<b>Language of instruction</b>	English

<b>Course title</b>	<b>Business Intelligence &amp; Data Engineering</b>
<b>Course code</b>	Full Time Program: m82118s Part Time Program: m82118s
<b>Type of course</b>	Core
<b>Level of course</b>	Master
<b>Year of study</b>	Full Time Program: 1 <sup>ο</sup> Part Time Program: 2 <sup>ο</sup>
<b>Trimester</b>	Full Time Program: 2 <sup>ο</sup> τρίμηνο Part Time Program: 5 <sup>ο</sup> τρίμηνο
<b>Number of credits allocated (based on the student workload required to achieve the objectives or learning outcomes)</b>	5 ECTS
<b>Objective of the course (preferably expressed in terms of learning outcomes and competences)</b>	<p>Upon completion of the course, students will be able to:</p> <ul style="list-style-type: none"> <li>- Understand the value of implementing a data warehouse in business decision-making</li> </ul>

	<ul style="list-style-type: none"> <li>- Comprehend the fundamental principles of data integration and the challenges it presents</li> <li>- Design the relational schema of a data warehouse using the star or snowflake methodology</li> <li>- Create data cubes based on a star/snowflake schema</li> <li>- Use a commercial or open-source relational database system to implement all of the above</li> </ul> <p>Gain in-depth understanding of each phase of the ETL (Extract, Transform, Load) process and become familiar with the tools, systems, and programming languages used to implement each phase</p>
<b>Course contents</b>	<ul style="list-style-type: none"> <li>- Introduction to Data Warehousing: role in business intelligence; comparison with operational databases; basic architecture</li> <li>- Data Warehouse Modeling: Dimensional modeling concepts; star and snowflake schemas; fact and dimension tables; OLAP and cube design; OLAP operations (roll-up, drill-down, slice, dice); building and querying data cubes</li> <li>- Data Integration Principles: Sources of data heterogeneity; data quality and cleaning; data mapping and transformation</li> <li>- ETL Processes: Overview of Extract, Transform, Load phases; tools, systems, and scripting languages used in each phase; scheduling, monitoring, and optimization</li> <li>- Hands-on Implementation: using a relational DBMS for schema design and queries; creating ETL workflows; building analytical queries over warehouse data</li> </ul>
<b>Recommended reading</b>	<ul style="list-style-type: none"> <li>- Suggested bibliography:  Multidimensional Databases &amp; Data Warehousing, by Christian S. Jensen, Torben Bach Pedersen, and Christian Thomsen.</li> <li>- Related academic journals:</li> </ul>
<b>Language of instruction</b>	English

<b>Course title</b>	<b>Statistics for Business Analytics I</b>
---------------------	--

<b>Course code</b>	Full Time Program: m82104f Part Time Program: m82104p
<b>Type of course</b>	Core
<b>Level of course</b>	Master
<b>Year of study</b>	Full Time Program: 1 <sup>st</sup> Part Time Program: 1 <sup>st</sup>
<b>Trimester</b>	Full Time Program: 1 <sup>st</sup> trimester Part Time Program: 1 <sup>st</sup> trimester
<b>Number of credits allocated (based on the student workload required to achieve the objectives or learning outcomes)</b>	5 ECTS
<b>Objective of the course (preferably expressed in terms of learning outcomes and competences)</b>	Primary aim of this course is the understanding and the application of statistical methods in real life business problems. Emphasis is given in the implementation of all methods using R and in problem solving. Interesting real-life datasets and problems are analyzed during this course with aim to provoke their attention and motivate them. Finally, the students are introduced to the basic principles of scientific report writing and storytelling by writing an assignment accompanied with a written scientific report.
<b>Course contents</b>	<ol style="list-style-type: none"> <li>1. Introduction to probability and distribution theory</li> <li>2. Statistical inference via point and interval estimation</li> <li>3. Hypothesis testing (t-tests, ANOVA, chi-square tests)</li> <li>4. Simple and Multiple Regression</li> <li>5. Lasso for multiple regression</li> </ol>
<b>Recommended reading</b>	<ol style="list-style-type: none"> <li>1. Diez, D., Barr, C., &amp; Cetinkaya-Rundel, M. (2019). <i>OpenIntro statistics</i> (Fourth Edition). Free Open Book; available at <a href="https://www.openintro.org/book/os/">https://www.openintro.org/book/os/</a></li> <li>2. Fox J. &amp; Weisberg H.S. (2011). <i>An R Companion to Applied Regression</i>. 2<sup>nd</sup> edition. SAGE Publications Inc.</li> <li>3. Faraway, J. (2002). <i>Practical regression and ANOVA using R</i>; available at <a href="http://cran.r-project.org/doc/contrib/Faraway-PRA.pdf">http://cran.r-project.org/doc/contrib/Faraway-PRA.pdf</a></li> <li>4. Ντζούφρας Ι. &amp; Καρλής Δ. (2015). <i>Εισαγωγή στον προγραμματισμό και στη στατιστική ανάλυση με R</i>. Αθήνα: Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών. <a href="http://hdl.handle.net/11419/2601">http://hdl.handle.net/11419/2601</a>, ISBN: 978-960-603-449-7</li> <li>5. Φουσκάκης Δ. (2013). <i>Ανάλυση Δεδομένων με Χρήση της R</i>. Εκδόσεις Τσότρας. Αθήνα. (Κωδικός Βιβλίου στον Εύδοξο: 33134029).</li> <li>6. Field A, Miles J and Field Z. (2012). <i>Discovering Statistics Using R</i>. Sage Publications. Μεταφρασμένη στα Ελληνικά έκδοση (2021): Ανακαλύπτοντας την Στατιστική με τη Χρήση της R. Εκδόσεις Προπομπός.</li> </ol>
<b>Language of instruction</b>	English

<b>Course title</b>	<b>Data Visualization</b>
<b>Course code</b>	Full Time Program: m82119s Part Time Program: m82119s
<b>Type of course</b>	Core
<b>Level of course</b>	Master
<b>Year of study</b>	Full Time Program: 1 <sup>st</sup> Part Time Program: 2 <sup>st</sup>
<b>Trimester</b>	Full Time Program: 2 <sup>nd</sup> trimester Part Time Program: 5 <sup>nd</sup> trimester
<b>Number of credits allocated (based on the student workload required to achieve the objectives or learning outcomes)</b>	2,5 ECTS
<b>Objective of the course (preferably expressed in terms of learning outcomes and competences)</b>	<p>After completion of the course the student will be able</p> <ul style="list-style-type: none"> <li>• understand how data visualization works, in terms of human visual perception and cognition</li> <li>• to understand about good and bad practices when plotting data</li> <li>• learn about practical data visualization, including methods to plot various types of data, interaction techniques, the grammar of graphics concept etc.</li> <li>• create data visualizations using R</li> <li>• To build a Tableau Application</li> </ul>
<b>Course contents</b>	<p>Basic concepts in data visualizations. Good and bad practices. Basic Principles for good graphs. Visual perception. Vision and psychology. Data to ink ratio. Color selection. Different color pallettes .</p> <p>Grammar of graphics: the different layers. A gallery of graphics: different plots for different data and purposes. Data for flows. Subsetting and trellis plots. Different types of maps. Dashboards and infographics.</p> <p>Story telling and communication of graphics. Interactive graphics. Basic principles like animation, hovering, filtering and other. Applications like shiny for interactive graphs.</p> <p>Introduction to Tableau. Basic ideas and principles of use. Functionalities and examples</p>
<b>Recommended reading</b>	<p>- <i>Suggested bibliography:</i></p> <ul style="list-style-type: none"> <li>• Chen, C., Hardle, W. K., &amp; Unin, A. (2007). Handbook of data visualization. Springer Science &amp; Business Media.</li> </ul>

	<ul style="list-style-type: none"> <li>• Ward, M.O., Grinstein, G. &amp; Keim, D., 2010. Interactive Data Visualization: Foundations, Techniques, and Applications, A K Peters Ltd.</li> <li>• Cleveland, W.S., 1993. Visualizing Data 1st ed., Summit, NJ, USA: Hobart Press.</li> <li>• Johnson, J., 2010. Designing with the Mind in Mind: Simple Guide to Understanding User Interface Design Rules, Morgan Kaufmann Publishers Inc.</li> <li>• Tufte, E.R., 2001. The Visual Display of Quantitative Information 2nd ed., Graphics Press.</li> <li>• Cleveland, W.S., 1994. The Elements of Graphing Data 2nd ed., Summit, NJ, USA: Hobart Press</li> <li>• <a href="https://help.qlik.com/en-US/sense/February2021/Content/Sense_Helpsites/Tutorials.htm">https://help.qlik.com/en-US/sense/February2021/Content/Sense_Helpsites/Tutorials.htm</a></li> <li>• Azure Machine Learning technology stack documentation</li> </ul> <p>- <i>Related academic journals:</i></p> <ul style="list-style-type: none"> <li>• Journal of Data Science, Statistics, and Visualisation</li> <li>• Journal of Computational and Graphical Statistics</li> <li>• Journal of Visualization</li> </ul>
<b>Language of instruction</b>	English

<b>Course title</b>	<b>Requirements Engineering for Analytics</b>
<b>Course code</b>	Full Time Program: <b>m82120s</b> Part Time Program: <b>m82120s</b>
<b>Type of course</b>	Core
<b>Level of course</b>	Master
<b>Year of study</b>	Full Time Program: 1 <sup>st</sup> Part Time Program: 2 <sup>nd</sup>
<b>Semester/trimester</b>	Full Time Program: 2 <sup>nd</sup> trimester Part Time Program: 5 <sup>th</sup> trimester
<b>Number of credits allocated (based on the student workload required to achieve the objectives or learning outcomes)</b>	2,5 ECTS
<b>Objective of the course (preferably expressed in terms of learning outcomes and competences)</b>	This course equips students with the principles, methods, and tools needed to translate business needs into clear and applicable requirements for analytics projects. It focuses on bridging the gap between business stakeholders, data professionals, and technical teams through structured elicitation, documentation, and validation of requirements specific to analytics solutions, such as dashboards, predictive models, machine learning systems, and decision support tools.

	<p>The course combines classic requirements engineering practices with modern approaches specifically for business analytics and emphasizes interoperable communication, data utilization, and scalable development. Upon completion of the course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Understand the multidimensional nature of requirements engineering: (a) business/technical, (b) functional/non-functional (quality), (c) data/models and algorithms, (d) extraction/modeling/documentation/confirmation.</li> <li>2. Manage the project of defining the requirements for business analytics applications in terms of roles, activities, and deliverables.</li> <li>3. Apply methods and techniques for the collection, modelling, documentation and communication of requirements in the context of a business analytics project.</li> <li>4. Use software tools that support the requirements engineer's tasks.</li> </ol>
<b>Course contents</b>	<p>The course is structured in 6 three-hour lectures and 3 two-hour practical application workshops. It is examined with 25% written examination (concepts, terminology, global understanding) and 75% group project applying requirements engineering in a real case study.</p> <p>Teaching Modules</p> <ol style="list-style-type: none"> <li><b>1. Introduction:</b> General framework of requirements engineering and its specializations in business analytics. The role and tasks of the data engineer for business analytics. The deliverables of requirements engineering.</li> <li><b>2. Business dimension of requirements:</b> Business objectives, stakeholders, roles involved in the organization, user personas, business decision-making in the business environment under study.</li> <li><b>3. (a) Requirements elicitation techniques:</b> interviews, questionnaires/canvass tools, analysis of existing data and applications, workgroup sessions. <b>(b) Documentation of analytical requirements:</b> case framing, definition of KPIs, KPI Mapping, analytical queries, user stories, use cases (UML), business workflows.</li> <li><b>4. Data requirements:</b> data sources, datasheets, data catalogues, data flows, data-generating process flows (storytelling, journey mapping, ArchiMate application layer), data profiling, ingestion, data pipelines, non-functional data requirements (security, privacy, ethics, governance), data requirements specifications.</li> <li><b>5. (a) Model and algorithm requirements:</b> model types, suitability criteria (AI dendrogram), feature tools, model cards, performance criteria, explainability, fairness, evaluation criteria, MLops. <b>(b) Requirements for</b></li> </ol>

	<p><b>reporting and visualizations:</b> dashboards, wireframes, reporting logic, storytelling with data, design for user trust, clarity and decision support.</p> <p>6. <b>Documentation</b>, specifications and presentation of requirements for business analytics: document standards, acceptance criteria, traceability, prioritization, validation.</p>
<b>Recommended reading</b>	<p>-<i>Suggested Bibliography:</i></p> <ul style="list-style-type: none"> <li>• Brijs, B. (2016). <i>Business analysis for business intelligence</i>. CRC Press.</li> <li>• Pohl, K. (2016). <i>Requirements engineering fundamentals: a study guide for the certified professional for requirements engineering exam-foundation level-IREB compliant</i>. Rocky Nook, Inc..</li> <li>• Laplante, P. A., &amp; Kassab, M. (2022). <i>Requirements engineering for software and systems</i>. Auerbach Publications.</li> <li>• de Graaf, R. (2019). <i>Managing Your Data Science Projects: Learn Salesmanship, Presentation, and Maintenance of Completed Models</i>. Apress.</li> </ul> <p>-<i>Related academic journals:</i> Requirements engineering, Springer</p>
<b>Language of instruction</b>	English

<b>Course title</b>	<b>Innovation and Entrepreneurship</b>
<b>Course code</b>	Full Time Program: m82107f Part Time Program: m82107p
<b>Type of course</b>	Core
<b>Level of course</b>	Master
<b>Year of study</b>	Full Time Program: 1 <sup>st</sup> Part Time Program: 1 <sup>nd</sup>
<b>Trimester</b>	Full Time Program: 3 <sup>rd</sup> trimester Part Time Program: 3 <sup>th</sup> trimester
<b>Number of credits allocated (based on the student workload required to achieve the objectives or learning outcomes)</b>	2,5 ECTS
<b>Objective of the course (preferably expressed in terms of learning outcomes and competences)</b>	<p>a. Understand the skills, mindset, and drive necessary to be a successful entrepreneur.</p> <p>b. Identify personal strengths and weaknesses in terms of entrepreneurial competences.</p> <p>c. Understand the lean startup methodology and entrepreneurial process through a hands-on approach focusing on the business analytics and technology space.</p>

	<p>d. Develop initial concept, sales pitch, business model and mock-up of an innovative business venture to be used for business validation</p> <p>g. Identify the drivers and barriers behind a successful business venture and the power of the team.</p>
<b>Course contents</b>	<ol style="list-style-type: none"> <li>1. Entrepreneurship and Entrepreneurial Competences <ol style="list-style-type: none"> <li>a. Evolution of entrepreneurship in today's economy</li> <li>b. Entrepreneurial attributes, traits, competences</li> <li>c. Personal assessment</li> <li>d. Team formation</li> </ol> </li> <li>2. Ideas to Opportunities <ol style="list-style-type: none"> <li>a. Generating innovative business ideas</li> <li>b. Business model canvas</li> <li>c. Mock-up design</li> <li>d. Pitching presentation</li> </ol> </li> <li>3. Validating the opportunity <ol style="list-style-type: none"> <li>a. Feasibility analysis</li> <li>b. Customer identification</li> <li>c. Environmental scan</li> <li>d. Competitive assessment</li> <li>e. Financial model</li> </ol> </li> <li>4. Final Pitching Presentations</li> </ol>
<b>Recommended reading</b>	Steve Blanc, Why the Lean Start-Up Changes Everything, Harvard Business Review, May 2013

<b>Course title</b>	<b>Statistics for Business Analytics II</b>
<b>Course code</b>	Full Time Program: m82109f Part Time Program: m82109p
<b>Type of course</b>	Core
<b>Level of course</b>	Master
<b>Year of study</b>	Full Time Program: 1 <sup>st</sup> Part Time Program: 1 <sup>st</sup>
<b>Trimester</b>	Full Time Program: 2 <sup>nd</sup> trimester Part Time Program: 2 <sup>nd</sup> trimester
<b>Number of credits allocated (based on the student workload required to achieve the objectives or learning outcomes)</b>	5 ECTS
<b>Objective of the course (preferably expressed in terms of learning outcomes and competences)</b>	<p>After completion of the course the student will be able</p> <ul style="list-style-type: none"> <li>• To fit and understand regression models and their extensions.</li> <li>• Understand the classification problem and apply a wide range of methods, comparing them and being able to understand whether it is suitable for the problem or not.</li> </ul>

	<ul style="list-style-type: none"> <li>• Understand the clustering problem and apply several methods, together with diagnostics to understand the success of them</li> <li>• Use R for the models taught.</li> </ul>
<b>Course contents</b>	Topics in Regression modelling. Generalizing the Regression, smoothing regression, generalized Linear model. Logistic regression, Poisson regression, multinomial logistic regression, regression trees. Classification: basic principles, discriminant analysis, k-nn method, decision trees, naïve Bayes approach, Support Vector Machines. Diagnostics and measures for goodness of prediction. Variable selection problems. Clustering, distances, hierarchical clustering, K-means and variants, Model Based Clustering, DBSCAN algorithm. Measures for clustering success, clustering for big datasets. Real Data applications with R
<b>Recommended reading</b>	<p>Gareth James, Daniela Witten, Trevor Hastie and Robert Tibshirani (2014) An Introduction to Statistical Learning with Applications in R, 4th edition Springer text in statistics. <a href="http://www-bcf.usc.edu/~gareth/ISL/ISLR%20Fourth%20Printing.pdf">http://www-bcf.usc.edu/~gareth/ISL/ISLR%20Fourth%20Printing.pdf</a></p> <p>Trevor Hastie and Robert Tibshirani, Jerome Friedman (2009) The Elements of Statistical Learning: Data Mining, Inference, and Prediction. 2nd Edition, Springer text in statistics. <a href="http://statweb.stanford.edu/~tibs/ElemStatLearn/">http://statweb.stanford.edu/~tibs/ElemStatLearn/</a></p> <p>Rui Miguel Forte (2015) Master predictive modeling and build your own data analysis toolbox with R. Packt Publishing <a href="https://www.packtpub.com/application-development/mastering-predictive-analytics-r">https://www.packtpub.com/application-development/mastering-predictive-analytics-r</a></p>
<b>Language of instruction</b>	English

<b>Course title</b>	<b>Python for Analytics &amp; Artificial Intelligence</b>
<b>Course code</b>	Full Time Program: <b>m82121s</b> Part Time Program: <b>m82121s</b>
<b>Type of course</b>	Core
<b>Level of course</b>	Master
<b>Year of study</b>	Full Time Program: 1 <sup>st</sup> Part Time Program: 1 <sup>nd</sup>
<b>Semester/trimester</b>	Full Time Program: 2 <sup>nd</sup> trimester Part Time Program: 2 <sup>th</sup> trimester

<b>Number of credits allocated (based on the student workload required to achieve the objectives or learning outcomes)</b>	5 ECTS
<b>Objective of the course (preferably expressed in terms of learning outcomes and competences)</b>	The aim of the course is to provide a broad coverage of the field of Machine Learning and Artificial Intelligence, through an applied approach using the Python programming language. Students will engage with all stages related to Business Analytics, Machine Learning, and Artificial Intelligence, from data cleaning and processing to advanced neural network architectures and issues of ethics, bias, discrimination, impartiality, and fairness. At the same time, the broad coverage aims to give students a comprehensive understanding of the subject, including basic Machine Learning techniques, so that they can select the most appropriate tool for each task, depending on the specific requirements.
<b>Course contents</b>	<ul style="list-style-type: none"> <li>• Data Cleaning and Data Processing</li> <li>• Data Analysis</li> <li>• Data Visualization</li> <li>• Statistical Analysis, Statistical Significance, Statistical Power</li> <li>• Machine Learning Methods and Models (supervised and unsupervised)</li> <li>• Evaluation of Machine Learning Models</li> <li>• Hyperparameters Optimization</li> <li>• Neural Networks</li> <li>• Neural Network Architectures</li> <li>• Attention and Transformers</li> <li>• Large Language Models – LLMs</li> <li>• Generative AI</li> <li>• Ethics, Bias, Discrimination, Fairness</li> <li>• Interpretability</li> <li>• Security</li> </ul>
<b>Recommended reading</b>	Due to the rapid pace of progress in the field, as well as the applied nature of the course, the course material will be Python notebooks provided by the teacher, and the bibliography will be constantly updated.
<b>Language of instruction</b>	English

<b>Course title</b>	<b>AI for Business Analytics</b>
<b>Course code</b>	Full Time Program: <b>m82122s</b> Part Time Program: <b>m82122s</b>
<b>Type of course</b>	Core
<b>Level of course</b>	Master
<b>Year of study</b>	Full Time Program: 1 <sup>st</sup> Part Time Program: 2 <sup>st</sup>
<b>Trimester</b>	Full Time Program: 3 <sup>rd</sup> trimester

	Part Time Program: 6 <sup>rd</sup> trimester
<b>Number of credits allocated (based on the student workload required to achieve the objectives or learning outcomes)</b>	5 ECTS
<b>Objective of the course (preferably expressed in terms of learning outcomes and competences)</b>	<p>The course aims to equip students with the appropriate skills and the necessary knowledge and abilities to apply AI techniques, practices and tools in a range of applications. Specifically, upon successful completion of the course, the student will:</p> <ul style="list-style-type: none"> <li>• Have a solid understanding of the capabilities and challenges of AI and be prepared to participate and get involved in the development of cutting-edge AI technologies,</li> <li>• Be able to design, develop, fine-tune and adapt AI tools in various fields and applications,</li> <li>• Has gained programming experience in cutting-edge technologies such as TensorFlow/Pytorch,</li> <li>• Has mastered good practices in big data integration into AI applications,</li> <li>• Be capable of designing and synthesizing solutions that integrate AI Agentic workflows,</li> <li>• Has gained hands-on experience by collaborating and co-working with fellow students to solve a real-world problem and present an integrated solution.</li> </ul>
<b>Course contents</b>	Artificial Neural Networks, Intro and basic principles of Deep Neural Networks, Modern Semantic Representations - Embedding models, Neural Network Topologies in Big Data Architectures, Tensorflow/Pytorch Frameworks, Sequential Models and Applications, Recursive Long Short Term Memory Networks (LSTM), Examples and their uses in data analysis, Transformers, Large Language Models (LLMs) - Fine-tuning, Prompt Engineering, Reasoning, RAG-based techniques, Convolutional Neural Networks and applications, Examples and uses in image and video stream analysis, Multimodal LLMs, Agentic Frameworks.
<b>Recommended reading</b>	<p>- <i>Suggested bibliography:</i></p> <p>[1] Ian Goodfellow, Yoshua Bengio, Aaron Courville, "Deep Learning" (Adaptive Computation and Machine Learning series), MIT Press, 2016</p> <p>[2] François Chollet, "Deep Learning with Python", Manning Publications, 2021</p> <p>[3] Sebastian Raschka, "Build a Large Language Model (From Scratch)", Manning Publications, Oct 29, 2024</p> <p>[4] Mike Taylor, "Prompt Engineering for Generative AI", Oreilly 2024</p> <p>[5] Michael Albada, "Building Applications with AI Agents", Oreilly 2025</p> <p>- <i>Related academic journals:</i></p> <ul style="list-style-type: none"> <li>• Journal of Machine Learning Research</li> </ul>

	<ul style="list-style-type: none"> <li>• The Conference on Neural Information Processing Systems</li> <li>• The International Conference on Learning Representations - ICLR</li> <li>• The Conference on Empirical Methods in Natural Language Processing - EMNLP</li> <li>• The AAAI Conference on Artificial Intelligence</li> </ul> <p>SIGKDD Conference on Knowledge Discovery and Data Mining</p>
<b>Language of instruction</b>	English

<b>Course title</b>	<b>Advanced Topics in Data Analysis</b>
<b>Course code</b>	Full Time Program: m82123s Part Time Program: m82123s
<b>Type of course</b>	Core
<b>Level of course</b>	Master
<b>Year of study</b>	Full Time Program: 1st Part Time Program: 1st
<b>Trimester</b>	Full Time Program: 3rd trimester Part Time Program: 3rd trimester
<b>Number of credits allocated (based on the student workload required to achieve the objectives or learning outcomes)</b>	2,5 ECTS
<b>Objective of the course (preferably expressed in terms of learning outcomes and competences)</b>	<p><i>Upon completion of the course, students will be able to:</i></p> <ul style="list-style-type: none"> <li>• <i>Model different types of entities and relationships as nodes and edges and represent this information as relational data.</i></li> <li>• <i>Design and perform analysis calculations on time series, networks, and other complex structures</i></li> <li>• <i>Use advanced network analysis software to create visualizations and perform empirical studies on network data.</i></li> <li>• <i>Use Neo4j to store and process network data.</i></li> <li>• <i>Know and use data mining techniques on big data.</i></li> <li>• <i>Understand the advantages and disadvantages of different data representations (e.g., as points, vectors, sets, graphs) in data modeling and analysis.</i></li> <li>• <i>Select appropriate data mining techniques for emerging big data applications.</i></li> <li>• <i>Understand the basic concepts of time series.</i></li> <li>• <i>Work with time series data or network data and apply them on a wide range of problems.</i></li> </ul>

<b>Course contents</b>	<p>Network Modeling as a Graph (Elements of Graph Theory). Network Models: Random Networks and Small World. Structural Properties of Social Networks. Behavioral Characteristics of Social Networks. Processes in Social Networks, e.g., Diffusion, Influence Maximization, Learning, and Herding. Case Studies of Social Network Analysis.</p> <p>Time Series Models. Autocorrelation and Partial Autocorrelation Functions. Basic Models, Holt-Winters Method, Exponential Smoothing, Trend, and Seasonality. Box and Jenkins Approach. ARIMA Models. Principles of Forecasting. More Advanced Models, ARCH and GARCH.</p> <p>Advanced Techniques for Extracting Patterns from Data. Association Rules, Their Mining and Use. Rule Mining Using SVD Technique. Dimensionality reduction, clustering and ranking techniques. Hyperlink analysis, pageRank and HITS measures, centrality measures, graph augmentation, graph partitioning. Similarity calculations, nearest neighbor queries, collaborative filtering, text similarity, similarity-sensitive segmentation. Data stream analysis.</p>
<b>Recommended reading</b>	<p>- <i>Suggested bibliography:</i></p> <ul style="list-style-type: none"> <li>• <i>David Easley and Jon Kleinberg, Networks, Crowds and Markets: Reasoning about a Highly Connected World, Cambridge University Press, 2010.</i></li> <li>• <i>Mark Newman, Networks: An Introduction, Oxford University Press, 2009.</i></li> <li>• <i>Matthew O. Jackson, Social and Economic Networks, Princeton University Press, 2008.</i></li> <li>• <i>Hamilton, James D. Time Series Analysis. Princeton, New Jersey: Princeton University Press, 1994.</i></li> <li>• <i>Enders, Walter. Applied Econometric Time Series. New York: Wiley, 2010.</i></li> <li>• <i>Cryer, Jonathan D., and Chan Kung-Sik. Time Series Analysis with Applications in R. Springer Texts in Statistics, 2010.</i></li> <li>• <i>Mining of Massive Datasets, Jure Leskovec, Anand Rajaraman, Jeff Ullman, <a href="http://www.mmds.org/">http://www.mmds.org/</a></i></li> </ul> <p>- <i>Related academic journals:</i></p>
<b>Language of instruction</b>	English

<b>Course title</b>	<b>Data Governance and Privacy</b>
---------------------	------------------------------------

<b>Course code</b>	Full Time Program: m82124s Part Time Program: m82124s
<b>Type of course</b>	Core
<b>Level of course</b>	Master
<b>Year of study</b>	Full Time Program: 1 <sup>st</sup> Part Time Program: 1 <sup>st</sup>
<b>Trimester</b>	Full Time Program: 3 <sup>rd</sup> trimester Part Time Program: 3 <sup>rd</sup> trimester
<b>Number of credits allocated (based on the student workload required to achieve the objectives or learning outcomes)</b>	2,5 ECTS
<b>Objective of the course (preferably expressed in terms of learning outcomes and competences)</b>	<p>Upon completion of this course, students will be able to:</p> <ul style="list-style-type: none"> <li>• identify the key regulatory, legal and ethical issues related to fundamental rights and freedoms with focus on privacy and (personal) data protection and understand the adequacy and relevance of the existing law and the regulatory frameworks in privacy and data protection in the digital environments and especially with regard to Artificial Intelligence.</li> <li>• identify security threats and risks for personal data, get familiar with security requirements and technical measures and achieve a relative technical background that may support activities/ jobs like this of DPO</li> <li>• understand and measure the intersection of different domains and use this approach while designing their technology and/or business project</li> <li>• understand and integrate their studies and professional background into a general social, economic and institutional context.</li> </ul>
<b>Course contents</b>	<p>Introduction into basic terms/notions: privacy, data protection, confidentiality, security. Information: regulation and governance. Analysis of the main concepts, approaches and requirements of General Data Protection Regulation (legal grounds, principles, rights of data subjects). Data Protection by Design and Data Protection Impact Assessment. Big Data Analytics and Data protection principles. Profiling and Decision making. Artificial Intelligence/ Machine learning and processing of personal data with focus on accountability, transparency and explainability of AI.</p> <p>Data governance elements and models, to ethics and data protection (personal data protection, data altruism, control and ownership).</p>
<b>Recommended reading</b>	<p>- <i>Suggested bibliography:</i> Fundamental Rights Agency – Council of Europe – Handbook on European Data Protection Law, 2018</p>

	<p>Douwe Korff and Marie Georges, The DPO Handbook Guidance for data protection officers in the public and quasi-public sector on how to ensure compliance with the European Union General Data Protection Regulation, 2019</p> <p>European Parliament, The Impact of the General Data Protection Regulation on Artificial Intelligence, 2021</p> <p>Council of Europe, GUIDELINES ON THE PROTECTION OF INDIVIDUALS WITH REGARD TO THE PROCESSING OF PERSONAL DATA IN A WORLD OF BIG DATA, 2017</p> <p>S. Zuboff, The Surveillance Capitalism</p> <p>L. Floridi, The Logic of Information</p> <p>A European Strategy for data COM(2020) 66 final Report on a European strategy of data 2020/2217(INI)</p> <p>Bizer, Christian, Tom Heath, and Tim Berners-Lee. "Linked data: The story so far." Semantic services, interoperability and web applications: emerging concepts. IGI global, 2011. 205-227.</p> <p>Vafopoulos, Michalis N. "The web economy: goods, users, models, and policies." <i>Michalis Vafopoulos (2012) "The Web Economy: Goods, Users, Models, and Policies", Foundations and Trends® in Web Science 3.1-2 (2012): 1-136</i></p> <p>- Related academic journals:</p> <p>Computer Law and Security Review European Data Protection Law AI and Society</p>
Language of instruction	English

Course title	Cloud Infrastructures for Analytics
Course code	Full Time Program: <b>m82125s</b> Part Time Program: <b>m82125s</b>
Type of course	Core
Level of course	Master
Year of study	Full Time Program: 1 <sup>st</sup> Part Time Program: 1 <sup>nd</sup>

<b>Trimester</b>	Full Time Program: 3 <sup>rd</sup> trimester Part Time Program: 3 <sup>rd</sup> trimester
<b>Number of credits allocated (based on the student workload required to achieve the objectives or learning outcomes)</b>	2,5 ECTS
<b>Objective of the course (preferably expressed in terms of learning outcomes and competences)</b>	<p><i>By the end of the course, students will be able to:</i></p> <ul style="list-style-type: none"> <li>• <i>Understand and compare the data analytics services offered by Azure, AWS, and GCP</i></li> <li>• <i>Design and implement data pipelines using Azure Data Factory and Databricks</i></li> <li>• <i>Use Azure Synapse and Databricks for large-scale data processing and analytics</i></li> <li>• <i>Perform basic analytics using AWS (Redshift, Glue, Athena) and GCP (BigQuery, Dataflow, Dataproc)</i></li> <li>• <i>Evaluate trade-offs between platforms in terms of scalability, integration, and pricing</i></li> <li>• <i>Navigate security, governance, and compliance aspects in cloud-based analytics environments</i></li> </ul>
<b>Course contents</b>	This course offers a practical and comparative overview of major cloud platforms for data analytics, with an emphasis on Microsoft Azure and Databricks. Students will learn the key components and services offered by Azure, AWS, and Google Cloud Platform (GCP) for storing, processing, and analyzing data. Through hands-on labs and demos, the course explores data pipelines, cloud storage, compute engines, and managed services for big data and machine learning. One lecture will focus on AWS analytics services and another on GCP's offerings, while Azure and Databricks will be used as the primary platforms for hands-on work.
<b>Recommended reading</b>	<p><i>- Suggested bibliography:</i></p> <p><i>- Related academic journals:</i></p>
<b>Language of instruction</b>	English

<b>Course title</b>	<b>Business Analytics Use Cases</b>
<b>Course code</b>	Full Time Program: m82115f Part Time Program: m82115p
<b>Type of course</b>	Core
<b>Level of course</b>	Master
<b>Year of study</b>	Full Time Program: 1 <sup>st</sup>

	Part Time Program: 2 <sup>nd</sup>
<b>Trimester</b>	Full Time Program: 3 <sup>rd</sup> trimester Part Time Program: 6 <sup>th</sup> trimester
<b>Number of credits allocated (based on the student workload required to achieve the objectives or learning outcomes)</b>	5 ECTS
<b>Objective of the course (preferably expressed in terms of learning outcomes and competences)</b>	<p>Upon completion of the course, students will be able to:</p> <ul style="list-style-type: none"> <li>- Understand the end-to-end process in analytics applications (business goals, data collection, data integration, analysis, interpretation, delivery),</li> <li>- Understand the requirements and types of analysis in analytics applications in different domains (e.g. healthcare, banking, finance, energy, insurance, etc.)</li> <li>- Design architectures for analytics applications</li> </ul>
<b>Course contents</b>	<p>The course is organized into six workshop-style lectures (six hours) – each lecture has the form of a workshop. Each lecture (workshop) presents an end-to-end analytics application in a specific domain, a vertical sector of the economy – usually banking, insurance, finance, health, energy, etc. End-to-end means: description of business goals to be achieved through data analysis, available data sources, data extraction and integration, building the data warehouse or any other model, presentation of the statistical or machine learning algorithms used, visualizations and interpretation and business actions. These lectures are co-organized with leading companies/organizations of the private and public sector, which they present real-world implementations.</p>
<b>Recommended reading</b>	Selected business and research articles
<b>Language of instruction</b>	English

## **PART III: STUDENT INFORMATION**

### **GENERAL STUDENT INFORMATION**

The Athens University of Economics and Business provides not only high-quality education but also high-quality student services. The adoption of the Presidential Decree 387/83 and Law 1404/83 defines the operation, organization, and administration of Student Clubs at Universities, which aim at improving the living conditions of the students and enhance their social and intellectual wellbeing through engagement and socialization initiatives.

To fulfill this objective the University ensures the required infrastructure for housing, meals, and sports activities through the operation of a student restaurant, reading rooms, library, organization of lectures, concerts, theatrical performances, and excursions in Greece and abroad. Further in this context, the University supports the development of international student relations, organizes foreign language classes, computer/software literacy classes, and courses in modern Greek as a foreign language for foreign students and expatriated Greek students.

Detailed information on meals, housing, fitness, foreign languages, cultural activities, scholarships, financial aid, is provided on the website of AUEB's Student Club at <https://lesxi.aueb.gr/>

### **Electronic Services**

A significant number of procedures related to both attendance and student care are carried out electronically through applications of the University or the Ministry of Education and Religious Affairs. All applications are accessible with the same codes (username & password).

- **E-mail account:**

Detailed instructions for using the Webmail Service are provided at <https://www.aueb.gr/el/content/webmail-manual>

- **Electronic Secretariat (Student Register)**

The Electronic Secretariat application is the information system through which students can be served by the Department's Secretariat via the web.

- **Wireless network**

Using their personal codes, students have access to a wireless network in all areas of the Athens University of Economics and Business buildings/campus.

- **E-Learning Platform – ECLASS**

The Open eClass platform is an integrated Electronic Course Management System and is the proposal of the Academic Internet (GUnet) to support Asynchronous Distance Education Services.

Instructions are provided at <https://eclass.aueb.gr/info/manual.php>

### **Medical Services, Insurance / Healthcare**

Undergraduate, postgraduate and PhD students at the University who have no other medical and hospital care are entitled to full medical and hospital care in the National Health System with coverage of the relevant costs by the National Health Service Provider. A psychiatric counseling service also operates at the University, staffed with a physician specializing in the treatment of mental health issues.

More information at <https://www.aueb.gr/en/content/health-care> .

### **Services/Facilities to Students with Special Needs**

The Athens University of Economics and Business ensures the facilitation of students with special needs, through the design, implementation, and environmental adaptations, for access to the university building facilities. In the main building there are specially configured lifting machines, ramps, and elevators. There are also special regulations for conducting exams for students with special needs.

The Athens University of Economics and Business has established a Committee for Equal Access for people with disabilities and people with special educational needs. The Commission is an advisory body and submits recommendations to the competent bodies for the formulation and implementation of the policy of equal access for persons with disabilities and persons with special educational needs.

Through the Library services, students with physical disabilities are granted electronic access to the recommended Greek bibliography of the courses taught at the University. In this context, the Association of Greek Academic Libraries (SEAB) has developed a multimodal electronic library called AMELib.

More information is available at <https://www.aueb.gr/el/lib/content/amea-atoma-me-idiateires-anages>.

### **Studies Advisor**

The Study Advisor informs and provides advice to the Postgraduate Students both on their studies and on wider academic matters. The MSc in Business Analytics has appointed Professors-Advisors according to their subject to guide and inform students in the context of their studies.

### **Library and Study Rooms**

The Library & Information Center of the University operates at the University's main building. The AUEB Library is a member of the Hellenic Academic Libraries Association (Heal-LINK), the European Documentation Centers Europe Direct and the Economic Libraries Cooperation Network (DIOBI).

Three Documentation Centers operate within the library:

- The European Documentation Center
- The Organization for Economic Cooperation and Development (OECD) Documentation Center
- The Delegation Center of the World Tourism Organization (WHO)

The library contributes substantially both to meeting the needs for scientific information of the academic community and to supporting studying and research. The library provides access to:

- printed collection of books and scientific journals,
- course books used in modules,
- collection of electronic scientific journals& books
- postgraduate theses and doctoral theses that are produced in Athens University of Economics and Business and deposited in digital form at the PYXIDA institutional repository
- sectoral studies
- statistical series by national and international organizations
- audiovisual material
- information material (encyclopedias, dictionaries)
- databases on the topics used by the University

- printed collections of other academic libraries

The library lends all its printed collections, except for magazines and statistical series, in accordance with its internal rules of operation. The Library and Information Center offers reading rooms, computer workstations for visitors, photocopiers and printing machines, and interlibrary loan of books and journal articles from other academic libraries that are members of its network. More information at <https://www.aueb.gr/en/library>.

#### International Programs and Information on International Student Mobility

Athens University of Economics and Business is actively involved in the Erasmus+ Program since 1987 promoting cooperation with universities, businesses, and international organizations of the European Union (EU) as well as in the mobility of students, teaching, and administrative staff.

In addition, strengthening its internationalization objectives, it creates new opportunities through the Erasmus+ International Mobility Program. Within this framework, mobility scholarships are granted through the State Scholarships Foundation (SSF) to incoming and outgoing students of the three study cycles, according to the funding approved each year by the State Scholarship Foundation for the University. Outgoing students have the possibility to spend a period of study at a Partner Institution outside the EU with full academic recognition through the application of the ECTS credits system <https://www.aueb.gr/en/content/erasmus-programme>

#### Connecting with the Job Market and Entrepreneurship

D.A.STA.O.P.A. (<https://www.aueb.gr/el/dasta>) is the administrative unit of the University that plans, coordinates and implements the actions of the Athens University of Economics and Business in the following areas:

- a) development of entrepreneurship and innovation
- b) connecting students and graduates with the labor market
- c) connecting the academic community with businesses
- d) student internship programs and,
- e) supporting research utilization actions

#### Student Associations

Various student clubs and associations are active within the community of the Athens University of Economics and Business

(<https://www.aueb.gr/el/content/student-associations>).

### **Alumni Network**

Adhering to a long tradition of educating future top executives in the economic, social, and political life of the country, AUEB is proud that thousands of its graduates hold leading positions in companies, organizations, research institutes and universities in Greece and abroad. Understanding the importance of developing and strengthening the bond with its graduates, AUEB created its Alumni network including a platform <https://alumni.aueb.gr> where all graduates of the University can register. The main objectives of the Network are the connection of the graduates with their colleagues and former fellow students, and diffusion of information about activities, services, and events in and around the University that concern them.

Additional information on Clubs and Alumni Associations is available on the website <https://www.aueb.gr/el/content/organizations-and-associations-of-students-and-alumni>.

### **Volunteer Program**

Within the framework of its strategies, the "AUEB Volunteers" Volunteering Program was launched in September 2017. The aim of the Program is to highlight important social issues and the value of participation and practical contribution, but also to raise community awareness regarding the 17 UN Sustainable Development Goals. Actions are developed around two pillars: (a) actions addressed to AUEB's Community, which have as their main objective the maintenance of the quality of the University's infrastructure based on their aesthetics and functionality, and (b) actions addressed to Greek society. (<https://auebvolunteers.gr/>).

### **Quality Assurance**

The Athens University of Economics & Business implements a quality assurance policy to continuously improve the quality of its study programs, research activities and administrative services, and upgrade the academic and administrative processes and the University's operations. The Quality Assurance Unit (MODIP) operating at AUEB coordinates and supports evaluation processes. Particularly the quality assurance of the educational process is achieved using the module/teaching evaluation questionnaire completed by AUEB students. (<https://aueb.gr/modip>).

### **Training and Lifelong Learning Center**

The Center for Training and Lifelong Learning (**KEDIVIM**) is an AUEB unit which ensures the coordination and interdisciplinary cooperation in the development of training programs, continuing education, training and in general lifelong learning, which complement, modernize and/or upgrade knowledge, competences, and skills, acquired from formal education, vocational education and initial vocational training systems or from work experience, facilitating integration or reintegration in the labor market, job security and professional and personal development.

(<https://www.aueb.gr/el/content/dia-vioy-mathisi-kedivim-opa>).