Tools for Empirical Economic Analysis

Code: 106180
ECTS Credits: 6

Degree	Type	Year	Semester
2504216 Contemporary History, Politics and Economics	FB	1	1

Contact

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Use of Languages

Principal working language: english (eng)

Some groups entirely in English: Yes

Some groups entirely in Catalan: No

Some groups entirely in Spanish: No

Prerequisites

Although no formal requirements exist, it will be assumed that the student has achieved a basic knowledge of mathematics at secondary/high school level.
Most of the subjects are taught in English. A B2 level of English of the Common European Framework of Reference for Languages is required, although no specific test of English proficiency level is held to access the degree.

Objectives and Contextualisation

The main objective of this course is that students understand and are able to use data analysis and the basic probabilistic tools that are necessary to address the study of statistical inference. In this sense, the subject is clearly linked, in terms of its immediate application, to the course *Statistics*.

However, the skills in data analysis and probabilistic tools that the student has acquired in this course are also useful in other subjects and disciplines in which data analysis and random phenomena play an important role.

Competences

- Apply theoretical trends and classical and recent analytical approaches to international relations in practical case studies.
- Manage and apply data to solve problems.
- Students must be capable of applying their knowledge to their work or vocation in a professional way and they should have building arguments and problem resolution skills within their area of study.
- Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
- Students must have and understand knowledge of an area of study built on the basis of general secondary education, and while it relies on some advanced textbooks it also includes some aspects coming from the forefront of its field of study.
- Use the main mathematical and statistical instruments of applied economic analysis.
- Work cooperatively in multidisciplinary and multicultural teams implementing new projects.

Learning Outcomes

1. Analysing, summarising and assessing information.
2. Apply descriptive and causal quantitative techniques which allow analysis of the economic and social situation.
3. Efficiently searching information, discriminating irrelevant information.
4. Identify situations characterised by the presence of randomness and analyse them using basic probabilistic tools.
5. Representing and analysing quantitative and qualitative information referring to economic phenomena and variables.
6. Starting out in the formal study of the analysis of the relationship between variables.
7. Students must be capable of analysing, summarising, organising, planning and solving problems and making decisions.
8. Students must be capable of applying their knowledge to their work or vocation in a professional way and they should have building arguments and problem resolution skills within their area of study.
9. Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
10. Students must have and understand knowledge of an area of study built on the basis of general secondary education, and while it relies on some advanced textbooks it also includes some aspects coming from the forefront of its field of study.
11. Work as part of a team and be able to argue own proposals and validate or refuse the arguments of others in a reasonable manner.

Content

Unit 1 Data Analysis. Collecting data: Sampling and properties.Types of variables and frequency distribution tables. Measures of position, dispersion, shape, and relationship between variables. Graphical representations. Index numbers.

Unit 2 Probability theory. Random events and sample spaces.Probability computation and its properties. Conditional probability and Bayes formula.

Unit 3 Discrete random variables. Definition of random variable. Probability function, expectation and variance of a discrete random variable. Classical discrete distributions: Bernoulli, Binomial, Poisson and Geometric. Multidimensional random variables.

Unit 4 Continuous random variables. Density function, expectation and variance of a discrete random variable. Classical continuous distributions: Uniform, Exponential and Normal. Normal approximation to the Binomial and Poison distributions.

Methodology

The activities that will allow the students to learn the basic concepts included in this course are:

1. Theory lectures

The goal of this activity is to introduce in the classroom the basic notions of the subject and guide the student learning.

2. Problem sets

A problem set for the students to solve individually will be included in every unit. The goal of this activity is twofold. On one hand students will work with the theoretical concepts explained in the classroom, and on the other hand through this practice they will develop the necessary skills for problem solving.

3. Practice lectures to work on problem sets

The aim of this activity is to comment on and solve any possible question that students may have had solving the problem assignment. This way they will be able to understand and correct any errors they may have had during this process.

4. Computer sessions

In this activity the students will learn how to use computational tools for the analysis of data.

5. Tutoring hours

Students will have some individual tutor hours in which the subject instructor will help them solve any doubts they may have.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Practice Lectures (Exercises and Computer Sessions)	17	0.68	10, 8, 9, 7, 11
Theory Lectures	33	1.32	1, 2, 3, 4, 6, 10, 8, 9, 5
Type: Supervised			
Tutoring and monitoring work progress	16.5	0.66	2, 3, 8, 9
Type: Autonomous			
Individual study and completion of activities	80	3.2	1, 2, 3, 4, 10, 8, 9, 7, 11

Assessment

The evaluation of the students will be carried out according to the following activities:

1. A midterm exam

Written evidence in which the student will not be allowed to consult any kind of teaching or support material.

2. A final exam

Written evidence in which the student will not be allowed to consult any kind of teaching or support material, and will include all the contents of the course.
The exam is designed so that the student performs a last learning effort that is considered necessary to consolidate the previously acquired knowledge.

3. Submission of problem sets and/or essays

Students will submit, at the request of the teaching staff and following their instructions, exercises and/or essays to be solved individually and/or in groups.

4. Evaluation criteria

The grade of the midterm exam will weight a 25% of the average grade of the subject.

The grade of the final exam will weight a 50% of the average grade of the subject.

The average grade of the submission of exercises and/or essays will weight a 25% of the average grade of the subject.

Therefore, the average grade of the subject is computed as:

average grade of the subject = 30% (grade of the midterm exam) +
+ 50% (grade of the final exam) +
+ 20% (grade exercises/essays)

The subject will be considered "passed" if the average grade of the subject is equal to or greater than 5.

A student that, according to the criteria above, has not passed the subjet might qualify for the retake exam according to what is established in the section "Retake Process" below.

A student who has not participated in any of the assessment activities will be considered "Not evaluable"

Calendar of evaluation activities

The dates of the evaluation activities (exercises in the classroom, assignments, ...) will be announced well in advance during the semester though Campus Virutal

"The dates of evaluation activities cannot be modified, unless there is an exceptional and duly justified reason why an evaluation activitycannot be carried out. In this case, the degree coordinator will contact both the teaching staff and the affectedstudent, and a new date will be scheduled within the same academic period to make up for the missed evaluation activity." Section 1 of Article 115. Calendar of evaluation activities (Academic Regulations UAB).

Students who, in accordance with the previous paragraph, need to change an evaluation activity date must file a request through the degree coordinator.

Grade revision process

On carrying out each evaluation activity, students will be informed (via Moodle) of the date and method in which the grades will be published. Moreover, lecturers will also inform students (via Moodle) of the procedure, place, date and time for reviewing the grades awarded.

Retake Process

"To be eligible to participate in the retake process, it is required for students to have been previously been evaluated for at least two thirds of the total evaluation activities of the subject." Section 3 of Article 112nd. The retake process (UAB Academic Regulations).
Additionally, it is required that the student has obtained an average grade of the subject between 3.5 and 4.9.

The date of the retake exam will be posted in the calendar of evaluation activities of the Faculty. Students who take this exam and pass will get a grade of 5 for the subject. If the student does not pass the retake, the grade will remain unchanged.

Irregularities in evaluation activities

Notwithstanding other disciplinary measures deemed appropriate, and in accordance with current academic regulations, "in the case that the student makes any irregularity that could lead to a significant variation in the grade of an evaluation activity, it will be graded with a 0, regardless of the disciplinary process that can be instructed. In case of various irregularities occur in the evaluation of the same subject, the final grade of this subject will be 0". Section 10 of Article 116. Results of the evaluation. (UAB Academic Regulations).

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Final Exam	50%	2	0.08	1, 2, 3, 4, 6, 5
Midterm Exam	25%	1	0.04	1, 2, 3, 4, 6, 5

Submission of exercises and essays	25%	0.5	0.02	2, 10, 8, 9, 7, 11

Bibliography

Teaching materials that will cover all the course contents will be provided.

Additional recommended resources are:

- Illowskye, B., Dean, S. *Introductory Statistics.* Rice University. 2018. Open Access. [Direct link to the resource](#)
- Canavos, G.C. *Applied Probability and Statistical Methods.* McGraw-Hill. 1998.

Software

R and RStudio

R is a powerful programming language for doing statistics. It can be used for simple tasks, such as computing the average of a list of numbers, or for more advanced techniques such as linear and nonlinear models, statistical tests, time series analysis, classification, clustering, etc. As a matter of fact, *R* is considered to be one of the most widely used statistical analysis software in both industry and academia.
R is a very versatile and easy to expand [open source](#) project, which means that it is freely distributed and that there is a community of thousands of users and programmers who constantly contribute to the maintenance, improvement and expansion of *R*. One can discover everything R can do by visiting its website: "The Comprehensive R Archive Network" at [CRAN](#).
On the other hand, [R Studio](#) is a powerful IDE (Integrated Development Environment) to work with *R*, and is the tool that we will use during the course.