



## Statistics II

Academic Year: **2020/2021**

**Semester/Trimester**

Level of curricular unit: Undergraduate (1<sup>st</sup> cycle, as defined in the Framework of Qualifications for the European Higher Education Area)

Instructor(s):

**Theoretical Sessions:** Filipa Reis

**Practical Sessions:** Patricia Cruz; Pedro Carneiro; Filipa Santos Silva

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Biography:

**Filipa Reis:** Invited Assistant Professor of Data Science at Católica Lisbon School of Business and Economics. Filipa holds a PhD in Public Policy and Management from Carnegie Mellon University, a MSc from CLSBE, and bachelor's degree from Nova SBE. Her research focuses on media consumption patterns and the impact of digitization and convergence technologies on consumer choices and behaviors. She has also participated in experiment-driven business analytics consulting projects for policy formulation and evaluation in the telecommunications sector. Her work has been published in Management Science and presented at top peer-reviewed research conferences such as the International Conference of Information Systems and the Economics of Digitization Seminar Series of the National Bureau of Economic Research. Filipa teaches quantitative and data analysis courses at the undergraduate level including Statistics I, Statistics II, Statistics for Business and Economics, and Business Research Methods.

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Course overview and objectives:

Statistics II is a second year course of the undergraduate programs in Economics and Business Administration, including topics on sampling distributions, confidence interval estimation, hypothesis testing, and simple and multiple regression analysis.



Upon successful completion of this course, students should be able to complete the following tasks:

- Understand the basic concepts of sampling and inferential statistics and compute various inferential statistics;
- Perform hypothesis testing applying probability theory, quantifying the probability of committing an error and distinguishing the different types of statistical errors;
- Formalize regression models, perform the estimation of parameters and interpret the results;
- Understand the differences among various statistical techniques and identify the appropriate technique to be used in a specific problem;
- Explore data numerically and graphically, communicate the results in business and academic environments;
- Perceive the usefulness of statistics and be aware of the ethical issues pertaining to data collection, analysis, and reporting.

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#### Course Content:

1. Introduction
2. Random sampling and sampling distributions
3. Properties of estimators
4. Confidence interval estimation: single sample and two samples
5. Tests of hypothesis: single sample and two samples
6. Simple and Multiple regression analysis and additional topics in regression analysis

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#### Required background:

Students must have attended an introductory class in statistics covering, among others, fundamentals concepts in descriptive statistics, probability theory and random variables.

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#### Grading:

- Midterm (40%)
- Endterm (40%)
- Assignments/Quizzes (20%)

Necessary conditions to be waived from the final exam:

- Weighted average  $\geq 9.5$
- Grade  $\geq 7.5$  in both midterms
- Grade  $\geq 9.5$  in at least one midterm.

Necessary requisites to be admitted to the final exam:

- Weighted average  $\geq 7.5$ , and average of the midterms  $\geq 6.5$

**Midterm and Endterm:** Each test will cover half of the class contents. The tests are closed book and closed notes. Students may use an A4, two-sided sheet with formulas and notes.

**Assignments/ Quizzes:** Individual homework may be assigned occasionally. Grading will be based on completeness as well as accuracy (you must show all your work). On-line (Moodle), closed-answer format quizzes may take place in class (either lecture or lab) or be assigned as homework.

**Class Attendance and Participation:** Students are strongly encouraged to attend and actively participate in both theoretical and practical classes. Students can expect class engagement to be monitored in-class delivery of homework assignments, submission of work completed during class/lab, and/or attendance sheets.

**Final Exam:** The final exam will cover the entire course's program. The exam is closed book and closed notes. Students may bring two A4, two-sided sheets with formulas and notes. The final grade of students admitted to the final exam will be the weighted average of the continuous evaluation (50%) and the final exam (50%). A final exam grade below 9.5 will result in the student failing the course. Students with grades between 9.5 and 12 in the final exam will have this grade as final grade if it is higher than the weighted average indicated above.

**Grade improvements:** Students who pass the course may take the final exam in order to improve their grade. The final grade of these students will be the weighted average of the continuous evaluation (50%) and the final exam (50%). Students have 15 minutes at the beginning of the final exam to decide whether or not they want to take it. Once this decision is made, it is final and the student's exam will be graded. Students must signal their intention of trying to improve their grade.

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#### Bibliography:

Newbold, P., W. L. Carlson and B. Thorne, Statistics for Economics and Business, 8th edition, Pearson, 2013

#### Other Recommended Textbooks:

- McClave, J.T, Sincich, T., Statistics, 12th edition, Pearson, 2013
- Heumann, C., Schomaker, M., Shalabh, Introduction to Statistics and Data Analysis With Exercises, Solutions, and Applications in R, Springer, 2016
- Caldwell, S., Statistics Unplugged, 4th edition, Cengage Learning, 2012

#### Free online Textbooks:

- OpenIntro Statistics, 3rd Edition: <https://www.openintro.org/stat/>
- Online Stat Book: <http://onlinestatbook.com/2/index.html>

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#### Miscellaneous information:

##### *Class Materials:*

- Recommended textbook: Newbold, P., W. L. Carlson and B. Thorne, Statistics for Economics and Business, 8th edition, Pearson, 2013

- Lecture slides
- Exercise book for practical sessions (chapters will be posted separately on Moodle)
- Scientific calculator (check with your TA if your calculator is appropriate and see Additional Resources on Moodle for instruction videos)

*Other free online resources:*

- Khan Academy: Statistics and Probability (Class code: T6K6SGFU)
- YouTube: JBStatistics
- YouTube : Statisticsfun
- YouTube: Statistics Learning Centre

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Code of conduct and ethics:

Católica Lisbon School of Business and Economics is a community of individuals with diverse backgrounds and interests who share certain fundamental goals. A crucial element to achieve these goals is the creation and maintenance of an atmosphere contributing to learning and personal growth for everyone in the community. The success of CATÓLICA-LISBON in attaining its goals and in maintaining its reputation of academic excellence depends on the willingness of its members, both collectively and individually, to meet their responsibilities.

Along with all the other members of our community, students are expected to follow professional standards and CATÓLICA-LISBON standards of Academic Integrity. Some details should be mentioned here: Please arrive on time for class with uninterrupted attendance for the duration of the class. Signing attendance sheet for anyone else in the class constitutes fraud and a violation of the CLSBE code of conduct. Use of computers and other electronic devices during the class is not allowed, unless expressly requested by the instructor of the course. Students who persistently act in a disruptive and disrespectful manner during the class session may be invited to leave.

Students are expected to behave at all times according to the fundamental principles of academic integrity, including honesty, trust, fairness, respect, and responsibility. In particular,

- In **individual graded assignments** of any type, students may not collaborate with others or use any materials without explicit permission from the instructor of the course;
- In **group assignments and reports**, all students listed as authors should have performed a substantial amount of work for that assignment;
- It is dishonest to fabricate or falsify data in experiments, surveys, papers, reports or other circumstances; fabricate source material in a bibliography or "works cited" list; or provide false information in other documents in connection with academic efforts;
- Plagiarizing**, i.e. "to steal and pass off the ideas or words of another as one's own and or to use another's production without crediting the source" (Merriam-Webster Dictionary) is an Academic Integrity breach. It can be avoided by using proper methods of documentation and acknowledgement. Visit this guide for additional resources on how to avoid plagiarism in your written submissions <http://en.writecheck.com/plagiarism-guide>
- In **exams** students must not receive or provide any unauthorized assistance. During an examination, students may use only material and items authorized by the faculty. Use of smartwatches or other communication devices is not permitted during the exam.

Academic integrity breaches will be dealt with in accordance with the school's code of Academic Integrity: <https://www.clsbe.lisboa.ucp.pt/system/files/assets/files/academicintegritycode.pdf>