Applied Data Analytics

Academic Year: **2019/2020**   **2nd Semester**

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

Instructor(s): Antonio Fidalgo (lectures); Bhaswar Chakma (practical sessions)

Contact(s) and Office hours: antonio.fidalgo@ucp.pt, office hours by appointment

Biography:

Antonio Fidalgo is an Affiliated Professor at the CATÓLICA-LISBON School of Business & Economics. He has a M.A. in Economics (Universitat Pompeu Fabra, Spain) and a Ph.D. in Economics (Lausanne University, Switzerland). He was a Lecturer at Fresenius University of Applied Sciences, (Germany) and also taught at Boston University (USA) and the University of Magdeburg (Germany). His research focuses on long run economic development, employing a quantitative empirical approach and informed by economic theory. Outside academia, he worked as a consultant in data analysis for Stackdriver (Google).

Course overview and objectives:

This intermediate course offers a modern approach to statistics with a twofold objective.
On one hand, building on the students' knowledge of the fundamental notions and methods of statistics, this course introduces students to the theory and practice of three main statistical concepts: i. estimation algorithms, ii. inference on these latter and iii. simple statistical modeling.
On the other hand, this course introduces students to the free software R as a tool for data analysis. The structure and the scope of this introduction to R will follow and complement the treatment of the theoretical concepts. The aim is to allow students to carry statistical analyses on real-world data as well as to produce and learn from simulated data.

Course Content:

(Preliminary)

1. Random sampling and sampling distributions
2. Introduction to R
3. Estimators and their properties
4. Hypothesis testing
5. Regression analysis
6. Simulations
7. Further statistical models

<u>Required background:</u>

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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<u>Grading</u>:

The final grade for this class obtained in continuous evaluation only will be a weighted average of the following components:
- Assignments (25%)
- Quizzes (25%)
- Midterm (25%)
- Endterm (25%)

Necessary conditions to be waived from the final exam (all must be satisfied):
- weighted average ≥ 9.5,
- grade ≥ 7.5 in both the midterm and the endterm,
- grade ≥ 9.5 in either the midterm or the endterm.

Necessary requisites to be admitted to the final exam (both must be satisfied):
- weighted average ≥ 7.5,
- average of the midterm and the endterm ≥ 6.5.

Midterm and Endterm: Each test covers half of the class contents. The tests are closed book and closed notes. For the midterm, students may bring <u>one</u> A4, two-sided sheet with formulas and notes. For the endterm, students may bring <u>two</u> A4, two-sided sheets with formulas and notes

Final Exam: The final exam will cover the entire course's program. The exam is closed book and closed notes. Students may bring <u>two</u> 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.

Class Participation: Students are encouraged to actively engage with the course and attend and participate in both theoretical and practical classes. Class attendance may be monitored through attendance sheets. A student's class participation and engagement with the course can be taken into account in border situations.

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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<u>Bibliography</u>:

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

Further material:
- Lecture notes
- Scientific calculator (check with your TA if your calculator is appropriate)

Other Recommended Textbooks:

- McClave, J.T, Sincich, T., Statistics, 12th edition, Pearson, 2013
- Diez, D. M., Barr, C. D., & Cetinkaya-Rundel, M., OpenIntro Statistics, 4th edition, OpenIntro, 2019
- Diez, D. M., Barr, C. D., & Cetinkaya-Rundel, M., Introductory Statistics with Randomization and Simulation, OpenIntro, 2014
- 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

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<u>Miscellaneous information</u>:

Empirical work requiring a recent laptop will be done in class.

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<u>Code of conduct and ethics</u>:

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,

a) 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;
b) In **group assignments and reports**, all students listed as authors shoud have performed a substantial amount of work for that assignment;
c) 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;
d) **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" (Merrian-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

e) 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

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