

Semester 1

Statistics I

Course # MEDS 5103

Pre-requisites and Co-requisites: Undergraduate-level calculus and introductory probability and statistics; introductory economics. Students are expected to be enrolled concurrently in Mathematical Foundations for Data Analysis, which provides supporting material in calculus and linear algebra.

Course Description

‘Statistics I’ course equips students with the tools to interpret, evaluate and apply data in real-world policy and economic settings. Each week opens with a policy or economic question: ‘Is a relationship real or noise?’, ‘Did a reform change the average outcome?’ and works backward to the statistical tool needed to answer it, using real economic data throughout. Students actively engage in analyzing uncertainty, drawing inferences, and constructing statistical models to inform evidence-based decision-making. The first half of the course builds a solid foundation in probability and statistical inference, tested at the midterm; the second half puts that foundation to work through simple and multiple regression, culminating in the judgment to assess whether a regression-based study is credible. Emphasis is placed on developing a critical understanding of statistical findings and effectively communicating results in policy-relevant contexts. This course strengthens students’ analytical confidence and prepares them to be thoughtful users and producers of statistical evidence across economics domains.

Course Learning Outcomes

Upon the completion of the course, students will be able to:

- Apply foundational concepts of probability, sampling, and statistical inference to real-world economic and policy problems.
- Evaluate estimators, including the sample mean and OLS regression coefficients, in terms of bias, consistency, and efficiency, and explain why these properties matter for trustworthy inference.
- Explain the sampling distribution of an estimator and use it to reason about standard errors and uncertainty, the ideas that Applied Econometrics will assume students already have.
- Estimate and interpret linear regression models to analyze relationships between variables in applied contexts.
- Use Python (Pandas, NumPy, SciPy, statsmodels) to manage data, perform analysis, and produce reproducible results.
- Evaluate the validity and limitations of statistical evidence used in policy reports and academic research.

Course Assessments and Grading

The grading follows the Grading System outlined in the UCA Academic Policies.

Item	Description	Due date	Weight	Weight decomposition
Quizzes	Checking ongoing knowledge and preparing for upcoming midterm and final exams	Week 4 and 12 (10.11.2026, 19.01.2027)	10%	5% each quiz
Individual project	Working Python code and presentation, during lecture and lab sessions	Week 7 (3.12.2026)	10%	5% - Python code, 5% - presentation
Midterm exam	In-class/online (TBC), covers materials on Weeks 1-6, duration - 2 hours	Week 8 (10.12.2026)	20%	15% - MCQs, 1% for correct answer, 5 open-ended questions
Group project	Conducting data analysis and presentation, during lecture and lab sessions	Week 15 (11.02.2027)	30%	10% - Python code 10% - Analysis/Judgement 10% - Presentation
Final exam	In-class/online (TBC), covers materials on Weeks 1-15, duration - 2 hours	Week 16 (18.02.2027)	30%	20% - MCQs, 10% - open-ended questions
Total			100%	

Note: Retakes of the midterm or final examination will be considered only in cases of documented personal emergencies, in accordance with UCA Academic Policies.