ECON 227-005: Economic Statistics

Instructor: WenJing Cai
2020 Winter/2019 Fall

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Course Description

Distributions, averages, dispersions, sampling, testing, estimation, correlation, regression, index numbers, trends and seasonals.

Required Materials

(Paragraphe Book Store, 2220 McGill College Avenue)
Statistics for Business and Economics (any edition), McClave, Benson, and Sincich, Pearson/Prentice-Hall. Paragraphe has the less-expensive looseleaf version. If you find second-hand earlier editions, they will be perfectly all right for the course. Look for advertised copies and/or on the INTERNET.

Grading Policy

- **15%** Term 1 assignment and quiz
- **15%** Term 2 assignment and quiz
- **25%** Midterm examination
- **45%** Final examination
- Term 1 quiz: week of October 15
- Term 2 quiz: week of February 17
• Since this is full course (D1+D2) there is no supplemental for the Fall semester. The only supplemental, held the following August, is for D1+D2, the course as a whole. The supplemental grade counts for 100% of the course grade.

• Deferral of a midterm examination can be arranged with the instructor, but for the final must be arranged through the university.

• Transfers from ECON 257 to ECON 227: Economics and Service Point agreed on the following windows.

  Window 1: Up to the end of the week after the D1 midterm quiz. For students using this window the course grade depends solely on the subsequent performance in ECON 227.

  Window 2: The January add/drop period in the Winter semester. The course grade depends solely on the subsequent performance in ECON 227.

Learning goals

The schedule is tentative and subject to change.

• EDA (exploratory data analysis)
  – Introduction of data (definition, measurement, type, statistics description, Inference)
  – Descriptive Statistics: Tabular and Graphical Displays (pie chart, histogram)
  – Numerical Measure: Location, scale, distribution shape, covariance

• Probability theory, including the expected value and standard deviation of random variables
  – Definition of probability
  – Event, Laws of probability (Addition, Complement, Union, Intersection)
  – Conditional probability
  – Bayes’s Rule

• Discrete Probability Distribution
  – random variable, discrete distribution (Expectation, Variance), Covariance
  – Geometric, binomial, Poisson, and hypergeometric discrete random variables (Application)

• Continuous Probability Distribution
  – Uniform distribution
  – Normal distribution (probability calculation, standard normal distribution)
- Binomial and Normal
- Poisson and Exponential distribution

- Sampling distributions
  - Selecting sample from finite or infinite sample
  - Point estimation (sample mean, sample variance)
  - Distribution of sample means of random variable (expectation, standard deviation)
  - Central limited theorem
  - Distribution of the sample proportion
  - Unbiased, consistence, efficient of estimator

- Inference Based on a Single Sample: Test of Hypothesis
  - Elements of hypothesis: Null hypothesis, Alternative hypothesis, test statistics
  - Rejection rule (p value, rejection area),
  - Test a population mean, test population variance (Chi-Squared distribution)

- Inferences Based on Two Samples Confidence Intervals and Tests of Hypotheses
  - Comparing Two Population Mean: Independent Sample, Paired Different Sample
  - Comparing Two Population Proportion
  - Comparing Two Population Variance (F-distribution)

- Tests of goodness of fit (Chi-Squared distribution)
- Tests of Independence (Chi-Squared distribution)

- Sample Linear Regression
  - Linear regression model
  - Least squared Method
  - Coefficient of Determination
  - Model Assumption
  - Testing of significance
  - Residual Analysis: Outliers

- Multiple Regression
  - Estimating and making inference for coefficients $\beta$
  - Higher order model
  - Quantitative and Quality Variables
  - Comparing nested model
  - Residual Analysis: Checking the regression Assumption
Calculator

Students should have a calculator capable of statistics computations with two-variable capacity. In the winter term there will be MINITAB and EXCEL computer output.

Course Policies

McGill Code of Conduct

McGill University values academic integrity. Therefore all students must understand the meaning and consequences of cheating, plagiarism, and other academic offences under the Code of Student Conduct of Student Conduct and Disciplinary Procedures (see http://www.mcgill.ca/integrity for more information).

Credit

- Credit will be given for ONLY ONE of the following introductory statistics courses: AEMA 310, BIOL 373, ECON 227D1/D2, ECON 257D1/D2, GEOG 202, MATH 203, MGCR 271, MGCR 273, PSYC 204, SOCI 350.

- Credit will be given for ONLY ONE of the following intermediate statistics courses: AEMA 411, BIOL 373, ECON 227D1/D2, ECON 257D1/D2, GEOG 351, MATH 204, PSYC 305, SOCI 461 with the exception that you may receive credit for both PSYC 305 and ECON 227D1/D2 or ECON 257D1/D2

- If you have already received credit for MATH 324 or MATH 357, you will NOT receive credit for any of the following: AEMA 310, AEMA 411, BIOL 373, ECON 227D1/D2, ECON 257D1/D2, GEOG 202, GEOG 351, MATH 203, MATH 204, MGCR 271, MGCR 273, PSYC 204, PSYC 305, SOCI 350.

All work may be presented in English or French