SHAHJALAL UNIVERSITY OF SCIENCE & TECHNOLOGY
DEPARTMENT OF ECONOMICS

ECO274 LAB; Spring 2022
Application of Statistics in Economics

Instructor

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Office hours: MON 9-11am (D-2021) or by appointment.

This ECO274LAB course is the science of analyzing data and arriving at reasonable and intelligent conclusions based on that analysis. The course will familiarize students with the fundamental concepts of data science and statistical analysis and their applications in economics. Students will learn how to use the statistical software R for data analysis. The software will give them an understanding of the fundamentals of the structured programming language and the essential statistical functions needed to excel in introductory courses in data science. Data science is a multidisciplinary field that includes statistics, computer science, economics, finance, machine learning, and domain expertise to get knowledge and insights from data. Data science usually ends up developing a data product. We will cover using R programming for descriptive statistics, inferential statistics, regression analysis, and data visualizations. The main focus is on the empirical implementation of statistical concepts and data science tools. Therefore, the contents of this course are designed for a seamless transition from theory to applications in economics.

Course objective

- To provide basics of data mining, visualizations, hypothesis test, and regression techniques

- To familiarize how to apply basic data science tools & statistical functions using R

-To produce a complete data analysis project/portfolio students may use in their job interview.

Expected outcome

- Participants understand the basics of data frames, use and interpret tables and charts.
- Participants understand basic calculations of summary statistics.
- Participants understand the basics of probability.
- Participants understand the basic properties of the normal distribution and sampling distributions in general.
- Participants learn the methods of hypothesis testing.
- Participants learn how to perform one-way and two-way ANOVA.
- Participants learn how to use the statistical software R for data analysis and cloud computing.

COURSE OUTLINE

Date	Topic	Readings/Text
Week1	Getting started with R	Lecture/Text 1 & 2
Week2	Big Data: volume, velocity, variety, R: importing & reading data frame, creating new data files	Lecture/ Text 1
Week3	Data mining, business understanding, sorting, filtering, missing values, inspection, cleaning, transformation, merging data sets	Text 1 & 2
Week4	R: Data visualization using ggplot2, R-shiny	Text 1 & 2
Week5	Logical Statements, loops, for loop, while loop, break and next keywords, repeat loop, functions.	Text 1 & 2
Week6	Descriptive statistics, creating and editing charts	Text 1 & 2
Week7	Inferential statistics: mean, median, higher moments, One sample t-test, Mann-Whitney U-test	Text 1 & 2
Week8	Paired difference t-test, Wilcoxon Sign-Rank test, Power analysis	Text 1 & 2
Week9	One sample binomial test and Chi-square test	Text 1 & 2
Week10	Power analysis for the proportion, one way and two-way ANOVA	Text 1 & 2
Week11	Cloud computing, Scientific publishing with Quarto	Text 1 & 2
Week12	Machine learning techniques in economics	Text 1 & 2
Week13	Final project	

-The above course outline is tentative and therefore subject to change during the process.

Required Text

1. Statistical Analysis with R For Dummies by Joseph Schmuller. ISBN-13: 978-1119337065.
2. The Book of R: A First Course in Programming and Statistics by Tilman M. Davies. ISBN-13: 978-1593276515.
3. R for Data Science: Import, Tidy, Transform, Visualize, and Model Data by Garrett Grolemund, Hadley Wickham. ISBN-13: 978-1491910399. (Supplementary text)
4. Learn R for Applied Statistics: With Data Visualizations by Eric Goh Ming Hui (Supplementary text)

- All course materials will be available on my GitHub page: https://github.com/masud-alam/ECO274.

Software: **R** (available at https://www.r-project.org/) and **R Studio** (https://www.rstudio.com/)
Class meeting times and location: MON 11-12.50pm (D-4001), TUE 2-3.50pm (D-4001)

Evaluation/Grades

Grades for the course will be based on:

Activities	Percentage
Class Test (5 tests)	40
Final project/field study report and presentation	50
Class participation	10

Class test

Class tests are comprehensive (40 minute) in-class tests. They will be given at the start/end of class. They are designed to provide you with an incentive not to get too far behind on the course material. They will also provide rapid feedback in terms of how you are doing. Because you can drop one test grade (10 point each), there will be no make-up tests.

Final project

The final project will ask you to conduct a statistical/data science/machine learning model using R language and discuss the results. Your grade will depend on both whether or not you in fact estimate what you are asked to estimate and get the correct answer, and on how well you interpret your results. Both are valuable skills. You may work in group, but each student must turn in his or her own version of the report in their own words. Details will be provided later.

Additional information

Attendance is mandatory and recorded. Unexcused absence lowers the grade accordingly. Also, a student will not be allowed to participate in the final examination if his/her class attendance is less than 50 percent. It is the students' responsibility to check course related email regularly. For every hour spent in class it is expected of the students to invest 2 hours per week outside of class in homework, reviewing material, assignments, etc.

Communication

Our primary means of communication outside the classroom is email. I will be using students **sust.edu** email to post additional course materials and announcements. Do login regularly. **And I prefer and welcome your emails (instead of phone calls) whenever you have any questions.**

Classroom Courtesy

Coming late to class or/and leaving the classroom during the lecture will inevitably create an unnecessary disturbance for all your fellow classmates. Being late once or twice due to unforeseen reasons is understandable, but if this happens constantly, there will be actions. I count on your judgement and discipline regarding the uses of electronic devices in the classroom. Exercise your discipline and respect other students and the instructor.

Accessibility statement

Any student requiring academic accommodation due to a disability or mental health condition should let his or her faculty member know as soon as possible. In addition, students who need academic accommodations based on the impact of a disability/mental health will be encouraged to contact the department's head and student advisor if they have not done so already.

Student feedback

I value and prioritize interactive approaches to learning and teaching that enhance the student experience. So, I appreciate the feedback from students in various ways, including ongoing engagement in the class, email, and in-person discussion during my office hours. Please, feel free to inform my teaching practice, lectures modes, pace about the course materials, and course curriculum design. Your feedback will support

me to assess how effectively I am facilitating the learning environments and delivering course materials that are the key to helping student engagement and learning outcomes.