Scientific Data Analysis
FIN-ISS403

Course Description

This course is designed to help the students understand the importance of scientific data and how it can be processed and analyzed. The students will gain knowledge in statistical tools which will enhance their abilities to visualized and summarized scientific data, and how to use the information to come up with educated conclusion and predictions. RStudio will be utilized in this course.

Required Texts

Mind on statistics by Helen MacGillivray, Jessica M Utts, and Robert F Heckard
A Portable Introduction to Data Analysis by Michael Bulmer

Course Requirements

During the term, there will be a research project (20%), one midterm exam (20%), one final exam (30%), three quizzes (10%), and an essay (10%). Class participation will be 10% of your final grade.

Evaluation and Grading

A	93-100	B-	80-82	D+	67-69
A-	90-92	C+	77-79	D	63-66
B+	87-89	C	73-76	D-	60-62
B	83-86	C-	70-72	F	0-59

Course Hours

The course has 20 class sessions in total. Each class session is 150 minutes in length, for a total of 3000 minutes of in-class time. Students are expected to spend 15-20 hours per week outside of class to awards **4** credits for this course. Different universities may count course credits differently. Consult officials at your own home institution.

Attendance

Occasionally, due to illness or other unavoidable circumstance, a student may need to miss a class. The University's policy requires a medical certificate to be excused. Any absence may impact on the student's grade. Moreover, **the University's policy is that a student who has more than 3 absences will fail the course. Arriving late or leaving early will count as a partial absence.**

Academic Honesty

The University expects all students to do their own work. Instructors will fail assignments that show evidence of plagiarism or other forms of cheating and will also report the student's name to the University administration. A student reported to the University for cheating is placed on disciplinary probation; a student reported twice is suspended or expelled.

Disability Accommodation

Any student who needs special accommodation due to the impact of disability should inform the University within 10 days before the program starts.

Tentative Schedule

Lecture	Topics
1	• Course overview • Introduction to RStudio • Variability • Designing Studies
2	• Visualizing Distributions • Quantiles • Averages
3	• Visualizing Relationships • Linear Relationships • Correlation
4	• Probability • Random Variables • Conditional Probability
5	• Expectation • Discrete Distributions
6	• The Normal Distribution • Sampling Distribution of the Mean
7	• Central Limit Theorem • Confidence Intervals
8	• Decisions • Means • Types of Errors • Improving Power
9	• Review for midterm
	Midterm
10	• Scientific Ethics • Scientific Integrity • Related Rules and Laws
11	• Comparing Two Means • Confidence Intervals • Hypothesis Tests
12	• Inferences for Proportions • Inferences for Regression
13	• Analysis of Variance • Multiple Comparisons
14	• Multiple Regression • Contingency Tables
15	• Scientific Experiment Design • Project Design
16	• Logistic Regression
17	• Nonparametric Methods
18	• Work on Project
19	• Review
20	• Review

	Final Exam