MAT 223 (010) Statistics for Data Science, Fall 2023

9:30 AM – 10:45 AM (T Th) face to face in Tarpley 312

Instructor: Kyung Il Lee, PhD
Office Location: Tarpley 317
Office Phone: (770) 720-5512
Email Address: Kyungil.Lee@reinhardt.edu

Office Hours: 2:10–4:10 PM (M W) and 1:50–3:50 PM (Th). Make an appointment. (`https://calendly.com/kyungil-lee/office-hours-fall-2022`) Otherwise, first come, first served.

Disability Accommodation: The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you have a documented disability requiring an accommodation, please contact the Academic Support Office (ASO).

Reinhardt University is committed to providing reasonable accommodations for all persons with disabilities. Therefore, if you are seeking classroom accommodations under the Americans with Disabilities Act, you are required to register with the Academic Support Office (ASO). ASO is located in the basement of Lawson Building. Phone is (770) 720-5567. To receive academic accommodations for this class, please obtain the proper ASO letters/forms.

Course Materials:

1. The Statistics and Calculus with Python Workshop, by P. Farrell, A. Fuentes, A. Kolhe, Q. Nguyen, A. Sarver and M. Tsatsos, 2020. (Required)

Course Description: This Statistics for Data Science with Python course introduces the mathematical techniques of statistical methods, which apply to analyzing data and to solving a variety of data science problems. Topics include data gathering, organizing data using descriptive statistics, visualizing data, finding relationships between variables, probability distributions, expected values, hypothesis testing, introduction to ANOVA (analysis of variance), regression and correlation analysis. These statistical ideas will be implemented in Python, so you will gain a hands-on experience of statistical analysis using Python and Jupyter Notebooks. This course is required to complete a culminating project to apply various statistical tools in the course to real-world data science problem and to demonstrate an understanding of statistical procedures of data analysis. *Prerequisite: grade of C or better in MAT 103 and in MAT 215.*

Objectives & Learning Outcomes

Conceptual Framework:

1. The Mathematics Department at Reinhardt University believes that all students should have an exposure to the ideas of science and the scientific method. This includes exposure to laboratory procedures, familiarity with some of the vocabulary of science and ability to read scientific articles in the newspaper or in popular magazines.
2. The Mathematics Department at Reinhardt University believes that all students should be familiar with the systematic development of science through history. This includes an understanding of the effects that science has had on history and that history has had on scientists.

Course Objectives: As a result of passing this course a student should be able

1. Calculate and apply measures of central tendency and measures of dispersion to grouped and ungrouped data.
2. Summarize, display, and visualize data in a way that is clear, concise, and provides a practical insight for non-statisticians needing the results.
3. Identify appropriate hypothesis tests to use for data sets.
4. Conduct hypothesis tests, correlation tests, and regression analysis.
5. Demonstrate proficiency in statistical analysis using Python and Jupyter Notebooks.
6. Be able to use data science libraries like NumPy, pandas, matplotlib, statsmodels, and sklearn.

Course Learning Outcomes: Students will demonstrate

1. Integrative, critical thinking and inquiry-based learning using evidence, logic, reasoning, and calculation.
2. Knowledge of various research methodologies; information, technological, and scientific literacy.
3. Familiarity with the statistical procedures of data analysis.

Mathematics Program Objectives: The Mathematics Program at Reinhardt University offers courses geared to

MP01 Analyze and solve problems by using reasoning, logic and evidence, and by bringing knowledge from a wide range of mathematical areas.
MP02 Use effective written and oral expression of mathematical concepts in the creation of a mathematical argument by recognizing a wide range of mathematical terms and vocabulary.
MP03 Apply axiomatic systems.
MP04 Apply mathematical research methodologies by using libraries, informational technologies, computer programming and numerical methods in order to create solutions to problems.
MP05 Apply ethical, legal, and policy issues to Information Technology
MP06 Create IT solutions to solve organizational problems.

Mathematics Program Student Learning Outcomes: Taking this course, students will be able to

SL01 Solve a word problem by applying the appropriate mathematical setup, obtaining the mathematical solution, and interpreting this solution in the context.
SL02 Solve a theoretical problem by identifying the appropriate mathematical context, interpreting the question and the nature of the solution, and checking that the solution is correct.
SL03 Complete a proof or produce a mathematical object that satisfies specific properties.
SL04 Solve a problem by consulting various resources, applying appropriate technological tools, and using adequate approximations.
SL05 Analyze how information technology affects ethical and legal issues.
SL06 Synthesize appropriate solutions to organizations' problems.

Math PO	Math SLO	RU SLO
1	1	$1, 2, 4$
2	2	$1 - 4$
3	3	$1 - 4$
4	4	$1 - 4$
5	5	$1 - 4, 7$
6	6	$1 - 4$

Course Policies & Procedures

Academic Integrity: All students are expected to adhere to the highest standards of academic integrity, and to abide by the Reinhardt Honor Code. Also, all students are expected to be familiar with the Reinhardt policy on academic dishonesty stated in the University Catalog and in the Student Handbook. Academic integrity and honorable behavior are essential parts of the professionalism that will be required well beyond graduation. Academic dishonesty (whose activities include plagiarism, cheating, collusion, etc.) in the class will not be tolerated and will yield a grade of F. Consequences for academic dishonesty:

(a) State your policy for violation of academic integrity policy.

(b) The Office of the Vice President for Academic Affairs will be notified of actions taken against students who violate the academic integrity policy, which may result in further consequences, including designation of "academic warning" on your official transcript, academic suspension, or expulsion for academic reasons.

Attendance: Students are required to be present at every session. No late entry and no early leave. Students who are absent for more than three class meetings will fail the course. Please arrive to class on time. Any pair of two from unexcused tardy and/or unexcused early leave will be considered one unexcused absence.

Classroom Guidelines and Expectations:

1. You are expected to be courteous and respectful to all students, teachers, and guests.
2. Students are expected to pay attention and participate in class.
3. Cell phones must be turned off or to silent.
4. Use of any type of earbuds or headphones are prohibited.
5. Playing games and watching movies etc. will not be allowed.
6. No bathroom break.
7. Disregard for these guidelines may result in disciplinary action, which could include the student being excused from class and marked absent for that day to being suspended from that class.

Method of Evaluation: Your grade for the course will be based on the following approximate numbers and percentages:

Three Midterm Exams:	40%
Homework & Class Participation:	30%
Final Exam:	30%
Total:	100%

∗ Closed Note Exams: There will be no make-up exams and quizzes without emergencies or serious schedule clashes. Appropriate evidence and/or prior notification will be required to be provided if you wish to request the weight of the missed midterm to be transferred to the final examination. No calculating devices and programs are allowed. No bathroom break is allowed.

∗ Homework: A 10% per day penalty will be applied.

Grading: Final grades in this course will be based on the following scale:
A = 90%–100%, B = 80%–89.9%, C = 70%–79.9%, D = 60%–69.9%, F = 59% or Below

For Free Tutoring and Help with Homework: The Center for Student Success (CSS) located on the upper (top) floor of the library, Room 313, is a free tutoring service available to all students. For appointments–go to Reinhardt webpage; click on Academics. When the next page appears, click Center for Student Success. On that screen, click Student Appointment Form. Fill out required fields and then submit. If you would prefer to call, the number is (770) 720-9232.

University Policies

COVID-19: Reinhardt University's COVID-19 Policy applies to all students, faculty, staff, administration and guests. The policy is subject to changes based on conditions and guidance from CDC, state and local health experts. Current policies and procedures can be found at: `https://www.reinhardt.edu/back-to-campus`. If you have any questions, please refer to the website or contact Reinhardt University at the numbers below.

1. Campus Nurse within the Student Health Center: `studenthealthcenter@reinhardt.edu`, (770) 720-5542 or `https://www.reinhardt.edu/nurse`.

2. Public Safety: Non-Emergency Phone: (770) 720-5789, Emergency Phone: (770) 720-5911, `publicsafety@reinhardt.edu`

3. Dean of Students: `deanofstudents@reinhardt.edu`, (770) 720-5540

4. Office of the Vice President for Academic Affairs: `VPAA@reinhardt.edu`, (770) 720-9102.

Tentative Schedule

1. Course Introduction and Python Basics
2. Basics of Descriptive Statistics
3. Data Visualization
4. Probability and Probability Distributions
5. Hypothesis Testing
6. Regression Analysis

** This syllabus is subject to change with announcement emails **