Master Course Syllabus

For additional course information, including prerequisites, corequisites, and course fees, please refer to the Catalog: https://catalog.uvu.edu/

Semester: Spring
Year: 2025
Course Prefix: STAT
Course and Section #: 2040-010
Course Title: Principles of Statistics
Credits: 4

Course Description

Includes summarizing data, measures of central location, measures of variation, probability, mathematical expectation, probability distributions, sampling and sampling distributions, estimation, hypothesis testing, analysis of variance, regression analysis, and correlation.

Course Attributes

This course has the following attributes:

☐ General Education Requirements
☐ Global/Intercultural Graduation Requirements
☐ Writing Enriched Graduation Requirements
☒ Discipline Core Requirements in Program
☒ Elective Core Requirements in Program
☐ Open Elective

Other: *Click here to enter text.*

Instructor Information

Instructor Name: Dr. Debanjan Bhattacharjee

Student Learning Outcomes

1	Differentiate between controlled experiments and observational experiments
2	Summarize data numerically and graphically
3	Use the sampling distributions of statistic to find the p-value for a test statistic
4	Compute confidence intervals for different parameters of interest
5	Conduct significance tests for one, two, and more than two sample cases
6	Use statistical methods - linear regression, chi-square tests, and ANOVAs
7	Use statistical power in estimating sample size for the experiment
8	Use current programming language and software to perform data analyses

Course Materials and Texts

- Textbook: Statistics Unlocking the Power of Data, by Robin H. Lock, Patti Frazer Lock, Kari LockMorgan, Eric F. Lock, Dennis F. Lock, 3 edition
- Internet access
- Computer with R software for statistical computing
- WileyPlus integrated to CANVAS

Course Requirements

Course Assignments, Assessments, and Grading Policy

- Weekly Homework using WileyPlus Homework System (15%)
- Mid-semester Exams in class (50%)
- Final Exam in class (35%)

Required or Recommended Reading Assignments

Statistics Unlocking the Power of Data, by Robin H. Lock, Patti Frazer Lock, Kari Lock Morgan, Eric F. Lock, Dennis F. Lock, 3rd edition

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General Description of the Subject Matter of Each Lecture or Discussion

Week	Materials	Chapter	Assessment
1	§ **Sampling from populations, Observational studies, and controlled experiments** § **Design of Experiments** o Completely Randomized Design o Match-Pairs Design o Randomized Block Design	Ch. 1	Exam 1, Final, Take home project
2	§ **Organizing and Displaying qualitative data** o Bar chart, Pie chart, creating contingency table § **Organizing and visualizing quantitative data** o Stem-plot, Dot plot, Frequency distribution, Histogram § **Measures of central tendency** o Mean, Median, Mode	Ch. 2	Exam 1, Final, Take home project

3	§ **Measures of Dispersions-** o Range, Variance, Standard deviation, Interquartile range (IQR) § Finding outliers and measures of position – o Percentile, Quartile, Boxplot for the five-number summary	Ch.2	Exam 1, Final, Take home project
4	§ **Normal Distribution** o The rules of Normal Distribution in statistical inference and its Applications o Assessing normality	Ch. 5	Exam 2, Final, Take home project
5	§ **Sampling Distribution** o Concept of sampling distribution and Central Limit theorem (CLT) o Distribution of the sample mean – t-distribution o Distribution of sample proportion o The ratio of two independent sample variances- F-distribution	Ch. 5	Exam 2, Final, Take home project
6	§ **Confidence Intervals** o Understanding and interpreting confidence interval o Constructing confidence interval for a population mean, and a population proportion	Ch. 3	Exam 2, Final, Take home project
7	§ Confidence intervals o a difference in two population means and proportions o Bootstrap confidence intervals	Ch. 3	Exam 3, Final, Take home project
8	§ **Hypothesis Testing** o Measuring evidence with p-values o Determining statistical significance o Hypothesis Tests for a population mean, and a population proportion	Ch. 4, 5, 6	Exam 3, Final, Take home project

9	§ Hypothesis Testing: o Hypothesis testing for the equality of two population proportion o Hypothesis testing for the equality of two population means when samples are independent o Hypothesis testing for the equality of two population means when samples are dependent	Ch 4, 5, 6	Exam 3, Final, Take home project
10	§ Hypothesis testing for categorical data o Goodness of fit-chi-square test o Tests for independence and the homogeneity of proportions (chi-square tests)	Ch.7	Exam 4, Final, Take home project
11	§ **Analysis of Variance (ANOVA)** o Power analysis and its application in determining sample size for the experiments o Comparing three or more Means (One-way Analysis of Variance) o Post Hoc Tests on One-Way Analysis of Variance – Tukey Test	Ch. 8	Exam 4, Final, Take home project
12	§ **Analysis of Variance (ANOVA)** o Randomized Complete Block Design o Two -Way Analysis of Variance o Factorial designs and split plot designs (Brief discussion if time permits) o Nonparametric Kruskal- Wallis One-Way ANOVA	Ch. 8 and supplemental materials	Exam 4, Final, Take home project
13	§ **Correlation and Regression** o Concept of correlation and causation and finding the correlation and Testing the significance of the correlation o Least -Squares Regression for single variables	Ch. 2, 9	Final, Take home project
14	§ Multiple Regression o Least -Square regression model for multiple factors o Testing the significance of the least -square regression model § Logistic Regression o Logistic regression analysis and its applications (Supplemental Materials)	Ch. 10	Final, Take home project

15	Review the statistical methods and concepts learned and any necessary topic left out.	Final, Take home project

Grading Scale (in %):

93-100 A	83-86 B	73-76 C	63-66 D
90-92 A-	80-82 B-	70-72 C-	60-62 D-
87-89 B+	77-79 C+	67-69 D+	00-59 E

Required Course Syllabus Statements

Generative AI

This course requires you to complete assignments that assess your understanding, application, and problem-solving ability applied to chemistry. You are expected to do your own work. Problem solving and scientific thinking are tools that are necessary for students to learn in this course. The use of artificial intelligence (AI) tools, such as chatbots, text generators, paraphrasers, summarizers, or solvers, is strictly prohibited for any part of your assignments. Using these tools will be considered academic dishonesty and will be handled according to the university's academic honesty policy. If you have questions about acceptable use of AI tools, please consult the instructor before submitting your work.

Using Remote Testing Software

☒ This course does not use remote testing software.

☐ This course uses remote testing software. Remote test-takers may choose their remote testing locations. Please note, however, that the testing software used for this may conduct a brief scan of remote test-takers' immediate surroundings, may require use of a webcam while taking an exam, may require the microphone be on while taking an exam, or may require other practices to confirm academic honesty. Test-takers therefore shall have no expectation of privacy in their test-taking location during, or immediately preceding, remote testing. If a student strongly objects to using test-taking software, the student should contact the instructor at the beginning of the semester to determine whether alternative testing arrangements are feasible. Alternatives are not guaranteed.

Required University Syllabus Statements

Accommodations/Students with Disabilities

Students needing accommodations due to a permanent or temporary disability, pregnancy or pregnancy-related conditions may contact UVU Accessibility Services at accessibilityservices@uvu.edu or 801-863-8747.

Accessibility Services is located on the Orem Campus in BA 110.

Deaf/Hard of Hearing students requesting ASL interpreters or transcribers can contact Accessibility Services to set up accommodations. Deaf/Hard of Hearing services can be contacted at DHHservices@uvu.edu

DHH is located on the Orem Campus in BA 112.

Academic Integrity

At Utah Valley University, faculty and students operate in an atmosphere of mutual trust. Maintaining an atmosphere of academic integrity allows for free exchange of ideas and enables all members of the community to achieve their highest potential. Our goal is to foster an intellectual atmosphere that produces scholars of integrity and imaginative thought. In all academic work, the ideas and contributions of others must be appropriately acknowledged and UVU students are expected to produce their own original academic work.

Faculty and students share the responsibility of ensuring the honesty and fairness of the intellectual environment at UVU. Students have a responsibility to promote academic integrity at the university by not participating in or facilitating others' participation in any act of academic dishonesty. As members of the academic community, students must become familiar with their rights and responsibilities. In each course, they are responsible for knowing the requirements and restrictions regarding research and writing, assessments, collaborative work, the use of study aids, the appropriateness of assistance, and other issues. Likewise, instructors are responsible to clearly state expectations and model best practices.

Further information on what constitutes academic dishonesty is detailed in UVU Policy 541: *Student Code of Conduct*.

Equity and Title IX

Utah Valley University does not discriminate on the basis of race, color, religion, national origin, sex, sexual orientation, gender identity, gender expression, age (40 and over), disability, veteran status, pregnancy, childbirth, or pregnancy-related conditions, citizenship, genetic information, or other basis protected by applicable law, including Title IX and 34 C.F.R. Part 106, in employment, treatment, admission, access to educational programs and activities, or other University benefits or services. Inquiries about nondiscrimination at UVU may be directed to the U.S. Department of Education's Office for Civil Rights or UVU's Title IX Coordinator at 801-863-7999 – TitleIX@uvu.edu – 800 W University Pkwy, Orem, 84058, Suite BA 203.

Religious Accommodation

UVU values and acknowledges the array of worldviews, faiths, and religions represented in our student body, and as such provides supportive accommodations for students. Religious belief or conscience broadly includes religious, non-religious, theistic, or non-theistic moral or ethical beliefs as well as participation in religious holidays, observances, or activities. Accommodations may include scheduling or due-date modifications or make-up assignments for missed class work.

To seek a religious accommodation, a student must provide written notice to the instructor and the Director of Accessibility Services at accessibilityservices@uvu.edu. If the accommodation relates to a scheduling conflict, the notice should include the date, time, and brief description of the difficulty posed by the conflict. Such requests should be made as soon as the student is aware of the prospective scheduling conflict.

While religious expression is welcome throughout campus, UVU also has a specially dedicated space for meditation, prayer, reflection, or other forms of religious expression.