

Introduction to Statistical Analysis

MATH-211

CG Section 8WK 11/08/2019 to 04/16/2020 Modified 04/08/2022

Course Description

An introduction to statistical analysis for students with a background in calculus. Included in the topics covered are probability distributions, expectation, statistical inference, regression and correlation.

Requisites

For information regarding prerequisites for this course, please refer to the [Academic Course Catalog \(https://catalog.liberty.edu/\)](https://catalog.liberty.edu/).

Rationale

As members of a society increasingly devoted to the use and misuse of numbers, students must learn to correctly interpret statistical presentations in all areas and especially in their major fields. This course is designed to give the students a working knowledge of statistics with an emphasis on application rather than theory.

Course Learning Outcomes

Upon successful completion of this course, the student will be able to:

- A. **MLO 1:** Compute probabilities associated with multiple events.
- B. **MLO 2:** Compute the mean and variance of several common discrete and continuous probability distributions and use them in practical applications.
- C. **MLO 3:** Create confidence intervals for unknown parameters.
- D. **MLO 4:** Perform hypothesis tests.
- E. **MLO 5:** Determine the correlation between two variables and develop linear regression models which predict the value of one variable as a function of the other.

General Education Foundational Skill Learning Outcomes: Technological Solutions and Quantitative Reasoning (TSQR)

- A. **TSQR 1:** Analyze data and inform action through a structured method.
- B. **TSQR 2:** Predict the output based on an input in practical scenarios using technological solutions and/or quantitative reasoning.
- C. **TSQR 4:** Relate technology and quantitative reasoning to participation in God's redemptive work.

Course Resources

Click on the following link to view the required resource(s) for the term in which you are registered: [Liberty University Online Bookstore \(https://bncvirtual.com/liberty\)](https://bncvirtual.com/liberty)

Additional Materials for Learning

- A. Computer with basic audio/video output equipment
- B. Internet access (broadband recommended)
- C. Canvas [recommended browsers \(https://community.canvaslms.com/t5/Canvas-Basics-Guide/What-are-the-browser-and-computer-requirements-for-Canvas/ta-p/66\)](https://community.canvaslms.com/t5/Canvas-Basics-Guide/What-are-the-browser-and-computer-requirements-for-Canvas/ta-p/66)

☰ Course Assignments

Textbook readings and lecture presentations/notes

Course Requirements Checklist

After reading the Course Syllabus and [Student Expectations \(https://www.liberty.edu/institutional-effectiveness/student-expectations/\)](https://www.liberty.edu/institutional-effectiveness/student-expectations/), the student will complete the related checklist found in the Course Overview.

Discussion: Lies and Statistics?

The discussion introduces some of the ethical challenges that are specific to the practice of statistics and encourages students to approach these situations from a Christian perspective (FSLOs: TSQR 4).

Homework Assignments (8)

The student will complete a homework assignment each module/week in the WebAssign that is associated with the course textbook. Typically, assignments will cover 4 – 5 sections from the textbook, but this will vary depending on the length and difficulty of each section included in the assignment. Students will be required to earn a 70% on each assignment before moving on to the next homework assignment or test (CLOs: CLO 1, 2, 3, 4, 5; FSLOs: TSQR 1, 2).

Project: Password Security Assignment

This project applies combinatorics to an important real-life application and further explores topics introduced in the text. (CLOs: CLO 1, 3; FSLOs: TSQR 1, 2).

Project: Introduction to Cryptography Assignment

This project uses confidence intervals to analyze letter frequencies and applies this to decrypting a fairly simple type of coded message. It's an application of inferential statistics within the area of cyber-security, broadly-defined. (CLOs: CLO 1, 3; FSLOs: TSQR 1, 2).

Quiz: Exams (4)

Each test will cover the Learn material for two modules: the material assigned during the test module/week and the material from the previous module/week. Tests are not cumulative. Each test will be open-book/open-notes, contain 12-14 multiple-choice and short answer questions, and have a 3-hour time limit. These tests will be completed in the WebAssign that is associated with the course textbook (CLOs: CLO 1, 2, 3, 4, 5; FSLOs: TSQR 1, 2).

✓ Course Grading

Course Requirements Checklist	10
Homework Assignments (8 at 45 pts ea)	360
Project: Password Security Assignment	50
Project: Introduction to Cryptography Assignment	50
Discussion: Lies and Statistics?	40
Quiz: Exams (4 at 125 pts ea)	500

Policies

Mathematical Late Assignment Policy

Mathematical assignments that are submitted after the due date without prior approval from the instructor will receive the following deductions

1. Late *mathematical* assignments submitted within one week after the due date will receive a 10% deduction.
2. *Mathematical* assignments submitted more than one week late or after the final date of the course will not be accepted.
3. Discussion board assignments submitted within one week after the due date will receive a 10% deduction.
4. Discussion board submitted more than one week and less than 2 weeks late will receive a 20% deduction.
5. Discussion board submitted more than 2 weeks late will not be accepted.
6. Group projects, including group discussion board threads and/or replies, and assignments will not be accepted after the due date.

Special circumstances (e.g. death in the family, personal health issues) will be reviewed by the instructor on a case-by-case basis.

For other assignments, please refer to the standard Late Assignment Policy, below.

Late Assignment Policy

Course Assignments, including discussions, exams, and other graded assignments, should be submitted on time.

If the student is unable to complete an assignment on time, then he or she must contact the instructor immediately by email.

Assignments that are submitted after the due date without prior approval from the instructor will receive the following deductions:

1. Late assignments submitted within one week after the due date will receive up to a 10% deduction.
2. Assignments submitted more than one week and less than 2 weeks late will receive up to a 20% deduction.
3. Assignments submitted two weeks late or after the final date of the course will not be accepted outside of special circumstances (e.g. death in the family, significant personal health issues), which will be reviewed on a case-by-case basis by the instructor.
4. Group projects, including group discussion threads and/or replies, and assignments will not be accepted after the due date outside of special circumstances (e.g. death in the family, significant personal health issues), which will be reviewed on a case-by-case basis by the instructor.

Disability Assistance

Students with a disability and those with medical conditions associated with pregnancy may contact Liberty University's Online Office of Disability Accommodation Support (ODAS) at LUOODAS@liberty.edu for accommodations. Such accommodations require appropriate documentation of your condition. For more information about ODAS and the accommodations process, including how to request an accommodation, please visit <https://www.liberty.edu/online/online-disability-accommodation-support/> (<https://www.liberty.edu/online/online-disability-accommodation-support/>). Requests for accommodations not related to disabilities or pregnancy must be directed to the Registrar's Office, which generally handles medical needs support.

If you have a complaint related to disability discrimination or an accommodation that was not provided, you may contact ODAS or the Office of Equity and Compliance by phone at (434) 592-4999 or by email at equityandcompliance@liberty.edu. Click to see a full copy of Liberty's [Discrimination, Harassment, and Sexual Misconduct Policy](https://www.liberty.edu/media/1226/Liberty_University_Discrimination_Harassment_and_Sexual_Misconduct_Policy.pdf) (https://www.liberty.edu/media/1226/Liberty_University_Discrimination_Harassment_and_Sexual_Misconduct_Policy.pdf) or the [Student Disability Grievance Policy and Procedures](http://www.liberty.edu/media/8021/Disability_Grievance_Procedures.pdf) (http://www.liberty.edu/media/8021/Disability_Grievance_Procedures.pdf).

Course Attendance

In an effort to comply with U.S. Department of Education policies, attendance is measured by physical class attendance or any submission of a required assignment within the enrollment dates of the course (such as examinations, written papers or projects,

any discussion posts, etc.) or initiating any communication with one's professor regarding an academic subject. More information regarding the [attendance policy \(https://nam04.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwiki.os.liberty.edu%2Fdisplay%2FIE%2FOnline%2BAttendance%2BAnd%2BNon-Attendance&data=02%7C01%7Caccollins2%40liberty.edu%7Cd91431fa6ac547056b5408d833029e1a%7Cbf8218eb3024465a9934a39c97251b2%7C0%7C0%7C637315433613719138&sdata=%2BNBTsPOoXuHAPLfISQRugK7cRSuV6UyC7qD3agf3l2k%3D&reserved=0\)](https://nam04.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwiki.os.liberty.edu%2Fdisplay%2FIE%2FOnline%2BAttendance%2BAnd%2BNon-Attendance&data=02%7C01%7Caccollins2%40liberty.edu%7Cd91431fa6ac547056b5408d833029e1a%7Cbf8218eb3024465a9934a39c97251b2%7C0%7C0%7C637315433613719138&sdata=%2BNBTsPOoXuHAPLfISQRugK7cRSuV6UyC7qD3agf3l2k%3D&reserved=0) can be found in the [Academic Course Catalogs \(https://nam04.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.liberty.edu%2Findex.cfm%3FPID%3D791&data=02%7C01%7Caccollins2%40liberty.edu%7Cd91431fa6ac547056b5408d833029e1a%7Cbf8218eb3024465a9934a39c97251b2%7C0%7C0%7C637315433613729132&sdata=DjjhMiRBFnF%2B2ZJUC8eBd1OdNb26S9ADukODYsilXIA%3D&reserved=0\)](https://nam04.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.liberty.edu%2Findex.cfm%3FPID%3D791&data=02%7C01%7Caccollins2%40liberty.edu%7Cd91431fa6ac547056b5408d833029e1a%7Cbf8218eb3024465a9934a39c97251b2%7C0%7C0%7C637315433613729132&sdata=DjjhMiRBFnF%2B2ZJUC8eBd1OdNb26S9ADukODYsilXIA%3D&reserved=0). Regular attendance in online courses is expected throughout the length of the term. Students who do not attend within the first week of a sub-term by submitting a required academic assignment (such as the Course Requirements Checklist, an examination, written paper or project, discussion post, or other academic activity) will be dropped from the course. Students who wish to re-engage in the course are encouraged to contact Academic Advising to discuss their enrollment options. Students who begin an online course, but at some point in the semester cease attending, and do not provide official notification to withdraw, will be assigned a grade of "FN" ([Failure for Non-Attendance \(https://nam04.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwiki.os.liberty.edu%2Fdisplay%2FIE%2FUnofficial%2BWithdrawals&data=02%7C01%7Caccollins2%40liberty.edu%7Cd91431fa6ac547056b5408d833029e1a%7Cbf8218eb3024465a9934a39c97251b2%7C0%7C0%7C637315433613729132&sdata=MoMvZdPfa69InuhVHMHAVgu59ZP0Fw45xJTU9PIBrU%3D&reserved=0\)](https://nam04.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwiki.os.liberty.edu%2Fdisplay%2FIE%2FUnofficial%2BWithdrawals&data=02%7C01%7Caccollins2%40liberty.edu%7Cd91431fa6ac547056b5408d833029e1a%7Cbf8218eb3024465a9934a39c97251b2%7C0%7C0%7C637315433613729132&sdata=MoMvZdPfa69InuhVHMHAVgu59ZP0Fw45xJTU9PIBrU%3D&reserved=0)). Students wishing to withdraw from courses after the official start date should familiarize themselves with the [withdrawal policy](#).

Grading Scale

A	B	C	D	F
900-1010	800-899	700-799	600-699	0-599

For courses with a Pass/NP final grade, please refer to the Course Grading section of this syllabus for the assignment requirements and/or point value required to earn a Passing final grade.

Add/Drop Policy

The full policy statement and procedures are published in the [Policy Directory \(https://wiki.os.liberty.edu/display/IE/Dropping+and+Adding+Online+Classes\)](https://wiki.os.liberty.edu/display/IE/Dropping+and+Adding+Online+Classes).

Honor Code

Liberty University comprises a network of students, Alumni, faculty, staff and supporters that together form a Christian community based upon the truth of the Bible. This truth defines our foundational principles, from our Doctrinal Statement to the Code of Honor. These principles irrevocably align Liberty University's operational procedures with the long tradition of university culture, which remains distinctively Christian, designed to preserve and advance truth. Our desire is to create a safe, comfortable environment within our community of learning, and we extend our academic and spiritual resources to all of our students with the goal of fostering academic maturity, spiritual growth and character development.

Communities are predicated on shared values and goals. The Code of Honor, an expression of the values from which our Doctrinal Statement was born, defines the fundamental principles by which our community exists. At the core of this code lie two essential concepts: a belief in the significance of all individuals, and a reliance on the existence of objective truth.

While we acknowledge that some may disagree with various elements of the Code of Honor, we maintain the expectation that our students will commit to respect and uphold the Code while enrolled at Liberty University.

Adherence to the principles and concepts established within facilitates the success of our students and strengthens the Liberty community.

The Code of Honor can be viewed in its entirety at <http://www.liberty.edu/index.cfm?PID=19155> (<http://www.liberty.edu/index.cfm?PID=19155>).

Schedule

When	Topic	Notes
Course Overview	Student Acknowledgements	Course Requirements Checklist
	Technology Integration Set-Up	Cengage Registration
Module 1: Week 1	Learn	Read: 1 item Watch: 4 items
	Apply	HW: Graphs & Descriptive Statistics Assignment
Module 2: Week 2	Learn	Read: 1 item Watch: 3 items
	Apply	HW: Probability & Counting Assignment Quiz: Descriptive Statistics & Probability Exam
Module 3: Week 3	Learn	Read: 1 item Watch: 3 items
	Apply	HW: Discrete Random Variable Assignment Project: Password Security Assignment
Module 4: Week 4	Learn	Read: 1 item Watch: 3 items
	Apply	HW: Continuous Random Variable Assignment Quiz: Random Variables Exam
Module 5: Week 5	Learn	Read: 1 item Watch: 3 items
	Apply	HW: Joint Distributions & Central Limit Thm Discussion: Lies and Statistics?
Module 6: Week 6	Learn	Read: 1 item Watch: 3 items
	Apply	HW: Estimating Parameters Assignment Quiz: Joint Distributions and Confidence Intervals Exam
Module 7: Week 7	Learn	Read: 1 item Watch: 3 items
	Apply	HW: Hypothesis Testing Assignment Project: Introduction to Cryptography Assignment
Module 8: Week 8	Learn	Read: 1 item Watch: 3 items
	Apply	HW: Regression & Correlation Assignment Quiz: Hypothesis Testing and Regression Exam