

MATH 411B MATHEMATICAL STATISTICS I
WINTER 2021 (Jan 5-Mar 12)

Instructor: Sahadeb Upretree, PhD
E-mail: upretees@cwu.edu
Class Time: MWF 12 - 12:50 PM

Office Hours: MT 10-11:00 am, WR 3 – 4:00 pm or appointment
Classroom: Online Web

TEXTBOOK: Hogg R. V, Tanis E. A., and Zimmerman D. L. (2015): *Probability and Statistical Inference*, 9th Ed. Pearson.

PRE-REQUISITES: MATH 411 A

COURSE CONTENT: This course provides basic knowledge of the fundamental probability tools for quantitatively assessing risk. By applying these tools students can find mean, variance, distribution, and other properties of order statistics as well as the properties of point estimation.

Chapter 1: Distributions of functions of random variables

Functions of one random variable, transformations of two random variables, several random variables, the moment-generating function technique, random functions associated with normal distributions.

Learning Outcomes

The students will be able to:

- Define probability generating functions and moment generating functions and use them to calculate probabilities and moments.
- Apply transformations
- Explain and apply joint moment generating functions
- Calculate joint moments, such as the covariance and the correlation coefficient
- Determine the distribution of a transformation of jointly distributed random variables
- Calculate probabilities and moments for linear combinations of independent random Variables
- State and apply the Central Limit Theorem

Chapter 2: Point Estimation

Descriptive statistics, exploratory data analysis, order statistics, maximum likelihood estimation, a simple regression problem, asymptotic distributions of maximum likelihood estimators, sufficient statistics, Bayesian estimation, more Bayesian concepts.

Learning Outcomes

The students will be able to:

- Display the five-point summary in a box and whisker diagram.
- Determine the distribution of order statistics from a set of independent random variables
- Create the quantile-quantile (q-q) plot.
- Apply the maximum likelihood estimation method to estimate parameters.
- Apply the method of moments to estimate parameters
- Apply asymptotic distribution of maximum likelihood estimators.
- Use factorization theorem.

TIME INVESTMENT REQUIREMENT:

The information listed below illustrates the total investment of time by an average student to achieve the learning goals of the course. (30 hours/credit x 3 = 90 hours)

The amount of time that an average student should expect to spend on this class is as follows:

- 30 hours - Time spent in the classroom, online instruction, taking exams and doing worksheets, etc.
- 60 hours - Time for preparation and study for in-class worksheets, homework, monthly and final exams, discussion during office hours.

COURSE POLICIES

COVID-19 STATEMENT:

“Due to COVID-19, and under the directive and mandate of public health officials and the president of Central Washington University, students must adopt face-covering protocol before entering any classroom or building at CWU until further notice. Students must also follow the social distancing placement marks in buildings and classrooms. If you do not have a face-covering Central Washington University can provide one for you. If you have not yet received your CWU-supplied facial covering, please go the SURC Information Desk. Please do so prior to the start of your first class.”

MENTAL HEALTH STATEMENT:

“Stress and other life circumstances that may be out of your control can make learning and focusing difficult. If you find stress or other mental health concerns make academics difficult, Central has resources to support you. I encourage you to reach out as soon as you notice you’re struggling.”

RESOURCES FOR STUDENTS:

CWU Counseling Center: <https://www.cwu.edu/medical-counseling/counseling-clinic>

Mental Health Crisis Support outside normal business hours: 1-800 – 273 - 8255, Text HOME to 741741 or call 911.

Wellness Center: <https://www.cwu.edu/wellness/> 509-963 -3213

Student Rights and Responsibilities: <https://www.cwu.edu/student-rights/office-student-rights-responsibilities>

CENTRAL WASHINGTON UNIVERSITY COVID-19 REPORTING FORM: available on <http://cwu.edu/student-success/covid-form>

POLICY ON ACADEMIC DISHONESTY:

Students are on their honor to follow the student conduct code as outlined in the Washington Administrative Code. Violations of this section will result in a failing grade in the course in addition to further possible university sanctions. (See <http://apps.leg.wa.gov/WAC/default.aspx?cite=106-125>)

POLICY ON DIVERSITY:

University-level education is about broadening horizons and looking at academic issues from a variety of perspectives. With this in mind, the participants in this class are encouraged to bring their own life experiences and viewpoints to bear on classroom discussions and assignments. Along with the freedom to express one's views comes the responsibility to respect the views of others. No student will be discriminated against based on race, ethnicity, age, creed, religion, gender, sexual orientation, marital status, or political ideology.

DISABILITY SERVICES:

Central Washington University is committed to creating a learning environment that meets the needs of its diverse student body. If you anticipate or experience any obstacles to learning, contact Disability Services to discuss a range of available options. Student Disability Services is located in Hogue 126. Call (509) 963-2214 or email ds@cwu.edu for more information. (see <https://www.cwu.edu/disability-services/>)

SUBMITTING ELECTRONIC FILES:

All electronic files must be submitted in .doc, .docx or .pdf format. If you don't have Microsoft Office, you can download it for free, using your CWU email and password from the MS Office website. Here is the guide on (<https://cwu.teamdynamix.com/TDClient/2015/Portal/KB/ArticleDet?ID=9080>), how to download MS Office. Mac users make sure to save documents with visible extension (.docx or .rtf).

RELIGIOUS HOLIDAY ABSENCES: In compliance with RCW 28B.137.010, CWU makes every effort to deal reasonably and fairly with students who, because of religious obligations, have conflicts with scheduled exams, assignments, or required attendance. Students must present written notice to their instructor within the first two weeks of the class listing the specific dates on which accommodations are required. Contact the Dean of Student Success at (509) 963-1515 for further information or questions.