

Course code number	CM-402	Course Title	Statistics using R
No. of Credit Units	3	Semester	Second
Prerequisite	None	Course Coordinator	Dr. May Aye Khine

Course Description

This course introduces some of the key ideas and concepts of statistics and the core concepts of probability theory, enabling you to analyze and visualize data using R, demonstrate a conceptual understanding of statistical inference, perform statistical inference and modeling.

Reference Books

- Introduction to the Practice of Statistics, 9th edition by David S. Moore, George P. McCabe, Bruce A. Craig
- Statistics: Learning from Data by Roxy Peck
- Statistics: The Art and Science of Learning from Data by Alan Agresti and Christine Franklin
- Using R for Introductory Statistics, 2nd Edition by John Verzani
- R Cookbook by Paul Teetor

Course Outcomes

Students completing the course will be able to:

- Understand random variables, basic probability rules, Bayes' rule and probability distributions.
- Understand the law of large numbers and the central limit theorem
- Understand the fundamentals of statistics
- Learn how to work with different types of data
- How to plot different types of data
- Understand the measures of central tendency, asymmetry, and variability
- Estimate confidence intervals
- Perform hypothesis testing
- Understand the mechanics of regression analysis
- Understand the concepts needed for data science even with R

Assessment Plan for the Course

Class Participation	-	10%
Quizzes	-	10%
Lab.+Assignment	-	20 %
Test	-	10%
Final Exam	-	50%

Class Attendance and Participation Policy:

- **Attendance**

Class attendance is mandatory. Students are expected to attend each class, to complete any required preparatory work (including assigned reading) and to participate actively in lectures, discussions and exercises.

- **Quizzes, assignments, tests and Exam**

Your performance in this class will be evaluated using your scores for attendance, quizzes, homework assignments, two tests and one final examination. There are no planned extra credit projects or assignments to improve your grade.

We will take a short quiz for every lecture. There will be homework assignments, roughly one per week. Test will start after two or three chapters finished and the coordinator will announce the date for the test.

Any assignment or quiz or test is simply missed, regardless of the reason why (e.g. illness, work, traffic, car trouble, computer problems, death, etc.), and **earns a grade of zero**. You are strongly encouraged to complete all assignments and attend all quizzes so that you can check that you understand the material and can throw out bad grades, or grades for which you had to miss an assignment or quiz for a valid reason.

Late submissions will not be accepted for any graded activity for any reason.

Students may not do additional work nor resubmit any graded activity to raise a final grade.

For this course, the following additional requirements are specified:

All work submitted for a grade must have been prepared by the individual student. Students are expressly prohibited from sharing any work that has been or will be submitted for a grade, in progress or completed, for this course in any manner with a person other than the instructor and teaching assistant(s) assigned to this course).

Specifically, students may not do the following, including but not limited to:

- Discuss questions, example problems, or example work with another person that leads to a similar solution to work submitted for a grade.
- Give to, show, or receive from another person (intentionally, or accidentally because the work was not protected) a partial, completed, or graded solution.
- Ask another person about the completion or correctness of an assignment.
- Post questions or a partial, completed, or graded solution electronically (e.g. a Web site).
- All work must be newly created by the individual student for this course. Any usage of work developed for another course, or for this course in a prior semester, is strictly prohibited without prior approval from the instructor.
- Posting or sharing course content (e.g. instructor provided lecture notes, assignment directions, assignment questions, or anything not created solely by the student), using any non-electronic or electronic medium (e.g. web site, FTP site, any location where it is accessible to someone other than the individual student, instructor and/or teaching assistant(s)) constitutes copyright infringement and is strictly prohibited without prior approval from the instructor.

Tentative Lesson

No	Topics	Week	Remark
1	R for Statistics	Week 1+2	
2	Introduction to Data Data Describing Data Distributions Displaying Distributions with Graphs Measures of central tendency, asymmetry, and variability Density Curves and Normal Distributions	Week 3	
3	Data Relationships Examining relationships Scatterplots, Transforming Data Correlation Data Analysis for Two-Way Tables	Week 4	

4	Introduction to Probability Disjoint Events Independence Probability rules The mean of a random variable Statistical estimation and the law of large numbers Conditional probability Probability Trees Bayesian Inference	Week 5+6	
5	Sampling Distributions The Sampling Distribution of a Sample Mean - The mean and standard deviation of \bar{x} - The central limit theorem Sampling Distributions for Counts and Proportions - Normal Distribution - Binomial distributions	Week 7	
6	Introduction to Inference Estimating with Confidence Tests of Significance Use and Abuse of Tests	Week 8+9	
7	Inference for Distributions Inference for the Mean of a Population Comparing Two Means	Week 10+11	
8	Inference for Proportions Inference for a Single Proportion Comparing Two Proportions	Week 12+13	
9	Analysis of Two-Way Tables Inference for Two-Way Tables	Week 14+15	
10	Inference for Regression Simple Linear Regression More about Simple Linear Regression Inference for Multiple Regression (Intro.)	Week 16+17	
11	Review for the exam	Week 18	