COURSE SYLLABUS

COURSE TITLE: STAT-123: Introduction to Data Science

CLASS SECTION: 01

TERM: Winter 2024

COURSE CREDITS: 3

DELIVERY METHOD(S): Lecture

Camosun College campuses are located on the traditional territories of the Lək̓ʷəŋən and W̱SÁNEĆ peoples. We acknowledge their welcome and graciousness to the students who seek knowledge here.
Learn more about Camosun's Territorial Acknowledgement.

INSTRUCTOR DETAILS

NAME: Dr. Fan Wu

EMAIL: WuF@camosun.ca

OFFICE: E250

HOURS: Mondays, Tuesdays and Wednesday 09:30 am -10:50 am

As your course instructor, I endeavour to provide an inclusive learning environment. However, if you experience barriers to learning in this course, do not hesitate to discuss them with me. Camosun College is committed to identifying and removing institutional and social barriers that prevent access and impede success.

CALENDAR DESCRIPTION

Informed strategic decision making is based on data. Students will learn to apply a combination of statistical and programming foundations to summarize, visualize, analyze, and interpret real-world data to make data-driven decisions. The programming language R or alike will be used throughout the course to explore topics including visualizing data with graphs estimating throughout the course to explore topics including visualizing data with graphs, estimating parameters with confidence intervals, and modelling relationships with regression analyses.

PREREQUISITE(S):
One of:
C in one of: Pre-calculus 12, MATH 097, MATH 107, or MATH 115
CO-REQUISITE(S):
Not Applicable
EXCLUSION(S):
Not Applicable

Notes: An introductory statistics course such as Statistics 12, STAT 116, STAT 216, or STAT 218 is recommended

COURSE LEARNING OUTCOMES / OBJECTIVES

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

- Apply fundamental statistical concepts such as: sampling techniques, variability, sampling distributions, point estimation, and confidence intervals for parameters
- Visualize and describe data with summary statistics and graphs for both numerical and categorical data sets
- Assess Normality of data
- Describe relationships between two variables using correlation and regression
- Use basic functions of the R programming language. Specifically, students will be able to install R packages, create script files, access and analyze internal and external data files, work with dataframes and matrices, and perform simulations
- Sort, filter and manipulate data (data wrangling) through programming techniques including "if...else" statements, loops, and bootstrapping
- Draw evidence-based decision using statistical data analysis on real-world data

REQUIRED MATERIALS & RECOMMENDED PREPARATION / INFORMATION

(a) Texts

The Basic Practice of Statistics, 9th Ed, 2021, by D. S. Moore; W. I. Notz; M. l. Fligner
Achieve Access

Achieve Access: https://achieve.macmillanlearning.com/courses/bdcjxs

(b) Other

A Sharp EL-531 Scientific Calculator

COURSE SCHEDULE, TOPICS, AND ASSOCIATED PREPARATION / ACTIVITY / EVALUATION

The following schedule and course components are subject to change with reasonable advance notice, as deemed appropriate by the instructor.

WEEK and DATE RANGE	CHAPTER	COVERAGE IN TEXTBOOK	R-Tutorials	TESTS
Week 1	1 Sections: 1.1 to 1.6	- Categorical variables (pie charts and bar plots) - Quantitative variables (histograms, stem plots, time plots)	-Introduction to R	
Week 2	2 Sections: 2.1 to 2.5	- Mean, Median - Quartiles - Five-number summary	-Data types	
Week 3	2 Sections: 2.5 to 2.8	- Inter-quartile range - Boxplots and spotting outliers - Standard deviation - Choosing measures of center and variability	- Histogram, pie chart and bar plot - Five-number summary - Boxplot - Calculating standard deviation	

WEEK and DATE RANGE	CHAPTER	COVERAGE IN TEXTBOOK	R-Tutorials	TESTS
Week 4	3 Sections: 3.3 to 3.6	- The normal distribution - The 68-95-99.7 rule - Finding Normal Proportions	-Vectors - Generating normal data and plotting the corresponding histogram - Calculating normal proportions	
Week 5	4 Sections: 4.1 to 4.6	- Explanatory and response variables - Displaying relationships: scatterplots - Measuring linear correlation (Person's correlation coefficient)	- Scatterplot -calculate correlation	
Week 6	5 Sections: 5.1, 5.7, 5.2, 5.3, 5.4, 5.8	- Regression lines - Least-squares regression line - Examples of software regression output - Caution about correlation and regression - Association does not imply causation	- Least-squares regression fit - Interpretation of result table	Midterm 1
Week 7		Reading Break		
Week 8	6 Sections: 6.1, 6.2, 6.3	- Two-way contingency tables - Relative risk, odds ratio - Simpson's Paradox	-Matrix 1	
Week 9	8 Sections: 8.1 to 8.7	- Population versus sample - Bad samples - Simple random sample - Stratified random sample - Why can we trust random samples? - Cautions about sample surveys	-Matrix 2	
Week 10	9 Sections: 9.1 to 9.7	- Observational studies versus random experiments	-Programming basics -If else -For loop	
Week 11	13 Sections: 13.1 to 13.5	- Rules of probability - Addition - Independence and the multiplication rule - Conditional probability - Venn diagrams	-write function 1	
Week 12	15 Sections: 15.3 to 15.6	- Sampling distributions - Mean sampling distribution - Central limit theorem - Statistical significance	-write function 2	
Week 13	16 Sections: 16.1 to 16.4	- Quantifying estimation uncertainty - Confidence intervals (CIs) for a population mean - Bootstrap confidence intervals	-Building Confidence Interval	Midterm 2

WEEK and DATE RANGE	CHAPTER	COVERAGE IN TEXTBOOK	R-Tutorials	TESTS
Week 14	32 Sections: 32.3 and 32.4	-Bootstrap	-Bootstrap R	
Week 15		- Finish content from previous week and/or review for final exam		

Students registered with the Centre for Accessible Learning (CAL) who complete quizzes, tests, and exams with academic accommodations have booking procedures and deadlines with CAL where advanced noticed is required. Deadlines scan be reviewed on the CAL exams page. http://camosun.ca/services/accessible-learning/exams.html

EVALUATION OF LEARNING

DESCRIPTION		WEIGHTING
Assignments –Online Submission		20%
Labs Assignments		25%
Midterms		30%
Final Examination		25%
	TOTAL	100%

All tests must be written during the scheduled times. In the event that you missed a test due to a family emergency or illness, the weight of the test will be put on other exams of the same category or the final exam provided the instructor is notified before the test and all assignments are completed satisfactorily. NO late assignments or labs will be accepted.

If you have a concern about a grade you have received for an evaluation, please come and see me as soon as possible. Refer to the Grade Review and Appeals policy for more information. http://camosun.ca/about/policies/education-academic/e-1-programming-andinstruction/e-1.14.pdf

COURSE GUIDELINES & EXPECTATIONS

R Labs
This course includes computer lab sessions designed to familiarize students with the use of a Statistical programing language to perform data analysis and the procedure of reporting data analysis results.

Homework: "I hear and I forget. I see and I remember. I do and I understand." In order to get a full understanding of the course materials, it is necessary to complete all the homework on time. It is essential to review the notes and do homework after every class and to keep up consistently. This course is cumulative, cramming does not work.

Midterms and Reviews
There will be two midterms. Before each of the 2 midterms, there will be a review session and a set of review problems to practice.

Desire2Learn (D2L)
This class has the assistance of D2L, an online course management system. Please visit this open site for D2L tutorials even if you have used D2L before: https://elearningtutorialscamosun.opened.ca/. All course related materials and announcements will be available in D2L. It is your responsibility to subscribe to the notifications on D2L and check the site regularly.

SCHOOL OR DEPARTMENTAL INFORMATION

Enrolment at Camosun assumes that the student will become a responsible member of the College community. As such, each student will display a positive work ethic, assist in the preservation of College property, and assume responsibility for their education by researching academic requirements and policies; demonstrating courtesy and respect toward others; and respecting expectations concerning attendance, assignments, deadlines, and appointments.

STUDENT RESPONSIBILITY

Enrolment at Camosun assumes that the student will become a responsible member of the College community. As such, each student will display a positive work ethic, assist in the preservation of College property, and assume responsibility for their education by researching academic requirements and policies; demonstrating courtesy and respect toward others; and respecting expectations concerning attendance, assignments, deadlines, and appointments.

SUPPORTS AND SERVICES FOR STUDENTS

Camosun College offers a number of services to help you succeed in and out of the classroom. For a detailed overview of the supports and services visit http://camosun.ca/students/.

Support Service	Website
Academic Advising	http://camosun.ca/advising
Accessible Learning	http://camosun.ca/accessible-learning
Counselling	http://camosun.ca/counselling
Career Services	http://camosun.ca/coop

Support Service	Website
Financial Aid and Awards	http://camosun.ca/financialaid
Help Centres (Math/English/Science)	http://camosun.ca/help-centres
Indigenous Student Support	http://camosun.ca/indigenous
International Student Support	http://camosun.ca/international/
Learning Skills	http://camosun.ca/learningskills
Library	http://camosun.ca/services/library/
Office of Student Support	http://camosun.ca/oss
Ombudsperson	http://camosun.ca/ombuds
Registration	http://camosun.ca/registration
Technology Support	http://camosun.ca/its
Writing Centre	http://camosun.ca/writing-centre

If you have a mental health concern, please contact Counselling to arrange an appointment as soon as possible. Counselling sessions are available at both campuses during business hours. If you need urgent support after-hours, please contact the Vancouver Island Crisis Line at 1-888-494-3888 or call 911.

COLLEGE-WIDE POLICIES, PROCEDURES, REQUIREMENTS, AND STANDARDS

Academic Accommodations for Students with Disabilities

The College is committed to providing appropriate and reasonable academic accommodations to students with disabilities (i.e. physical, depression, learning, etc). If you have a disability, the Centre for Accessible Learning (CAL) can help you document your needs, and where disability-related barriers to access in your courses exist, create an accommodation plan. By making a plan through CAL, you can ensure you have the appropriate academic accommodations you need without disclosing your diagnosis or condition to course instructors. Please visit the CAL website for contacts and to learn how to get started: http://camosun.ca/services/accessible-learning/

Academic Integrity

Please visit http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.13.pdf for policy regarding academic expectations and details for addressing and resolving matters of academic misconduct.

Academic Progress

Please visit http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.1.pdf for further details on how Camosun College monitors students' academic progress and what steps can be taken if a student is at risk of not meeting the College's academic progress standards.

Course Withdrawals Policy

Please visit http://camosun.ca/about/policies/education-academic/e-2-student-services-and-support/e-2.2.pdf for further details about course withdrawals. For deadline for fees, course drop dates, and tuition refund, please visit http://camosun.ca/learn/fees/#deadlines.

Grading Policy

Please visit http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.5.pdf for further details about grading.

Grade Review and Appeals

Please visit http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.14.pdf for policy relating to requests for review and appeal of grades.

Mandatory Attendance for First Class Meeting of Each Course

Camosun College requires mandatory attendance for the first class meeting of each course. If you do not attend, and do not provide your instructor with a reasonable reason in advance, you will be removed from the course and the space offered to the next waitlisted student. For more information, please see the "Attendance" section under "Registration Policies and Procedures" (http://camosun.ca/learn/calendar/current/procedures.html) and the Grading Policy at http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.5.pdf.

Medical / Compassionate Withdrawals

Students who are incapacitated and unable to complete or succeed in their studies by virtue of serious and demonstrated exceptional circumstances may be eligible for a medical/compassionate withdrawal. Please visit http://camosun.ca/about/policies/education-academic/e-2-student-services-and-support/e-2.8.pdf to learn more about the process involved in a medical/compassionate withdrawal.

Sexual Violence and Misconduct

Camosun is committed to creating a campus culture of safety, respect, and consent. Camosun's Office of Student Support is responsible for offering support to students impacted by sexual violence. Regardless of when or where the sexual violence or misconduct occurred, students can access support at Camosun. The Office of Student Support will make sure students have a safe and private place to talk and will help them understand what supports are available and their options for next steps. The Office of Student Support respects a student's right to choose what is right for them. For more information see Camosun's Sexualized Violence and Misconduct Policy: http://camosun.ca/about/policies/education-academic/e-2-student-services-and-support/e-2.9.pdf and camosun.ca/sexual-violence. To contact the Office of Student Support: oss@camosun.ca or by phone: 250-370-3046 or 250-3703841

Student Misconduct (Non-Academic)

Camosun College is committed to building the academic competency of all students, seeks to empower students to become agents of their own learning, and promotes academic belonging for everyone. Camosun also expects that all students to conduct themselves in a manner that contributes to a positive, supportive, and safe learning environment. Please review Camosun College's Student Misconduct Policy at http://camosun.ca/about/policies/education-academic/e-2-student-services-and-support/e-2.5.pdf to understand the College's expectations of academic integrity and student behavioural conduct.

Changes to this Syllabus: Every effort has been made to ensure that information in this syllabus is accurate at the time of publication. The College reserves the right to change courses if it becomes necessary so that course content remains relevant. In such cases, the instructor will give the students clear and timely notice of the changes.