

COURSE OUTLINE		
<b>TERM: Fall 2022</b>	<b>COURSE NO: STAT 310</b>	
<b>INSTRUCTOR:</b>	<b>COURSE TITLE: Predictive Modeling and Analysis of Experimental Data</b>	
<b>OFFICE: LOCAL:</b> <b>E-MAIL: @capilanou.ca</b>	<b>SECTION NO(S):</b>	<b>CREDITS: 3.0</b>
<b>OFFICE HOURS:</b>		
<b>COURSE WEBSITE:</b>		

Capilano University acknowledges with respect the Lil'wat, Musqueam, Squamish, Sechelt, and Tsleil-Waututh people on whose territories our campuses are located.

### COURSE FORMAT

Three hours of class time (including minimum of 1.5 hours in a computer lab), plus an additional hour of supplemental activity delivered through on-line or other activities for a 15-week semester, which includes two weeks for final exams.

### COURSE PREREQUISITES

45 credits 100-level or higher coursework including one of STAT 101, STAT 205, LBST 201, BADM 210, PSYC 213, TOUR 350 or KINE 302

### CALENDAR DESCRIPTION

This course introduces students to models, design and analysis of small to medium-sized experimental data using software. Students will design single-factor and factorial experiments as well as analyze the effect of each factor and the interaction among factors. Statistical methods such as t-tests and ANOVAs will be used to analyze data. Simple and multiple linear regression models will be used to make predictions and analyze relationships between variables. Students will gain hands-on experience applying these techniques to data from disciplines such as social sciences, life sciences, physical sciences, economics, education, and engineering.

### COURSE NOTE

STAT 310 is an approved Science and Technology course for Cap Core requirements.

STAT 310 is an approved Science course.

STAT 310 is an approved Quantitative/Analytical course for baccalaureate degrees.

### REQUIRED TEXTS AND/OR RESOURCES

**Textbook:** Instructor's Course Pack

**Reference Texts:** *Paul D. Berger et al., Experimental Design, with applications in Management, Engineering, and the Sciences, Springer, 2nd Edition, 2018.*

## COURSE STUDENT LEARNING OUTCOMES

**On successful completion of this course, students will be able to do the following:**

- Explore and manage small to medium-sized statistical data using software.
- Produce useful statistical graphs and tables to visualize and summarize small to medium size data using software.
- Describe how to design, conduct and analyze experiments.
- Implement factorial and fractional factorial designs.
- Describe how factorial design allows cost reduction and increases efficiency of experimentation.
- Explain various designs and their respective differences, advantages, and disadvantages.
- Perform Analysis of Variance (ANOVA) tests and detailed analysis of experimental data.
- Investigate the effect of each factor as well as the interaction effect among factors.
- Summarize and visualize experimental data using software.
- Make predictions and analyze relationships through models such as simple and multiple linear regression.
- Check possible violations of the assumptions of the models and interpret the effectiveness of the fitted models.
- Build an appropriate model including significant predictors.
- Conduct regression analysis and hypothesis testing for decision-making using software.
- Produce a statistical project involving background literature review, check for compliance with ethics rules, data collection and analysis of a real-world problem, and presentation of the results.

**Students who complete this Science and Technology course will be able to do the following:**

- Apply numerical and computational strategies to solve problems.
- Evaluate scientific information (e.g., distinguish primary and secondary sources, assess credibility and validity of information).
- Demonstrate how a problem, concept, or process can be modelled numerically, graphically, or algorithmically.
- Participate in scientific inquiry and communicate the elements of the process, including making careful and systematic observations, developing and testing a hypothesis, analyzing evidence, and interpreting results.

## COURSE CONTENT

Topics	Weeks (approx.)
Explore and manage small to medium-sized statistical data using software. Produce statistical graphs and tables to visualize and summarize small to medium-sized data using software.	1.0
Explain various designs such as factorial and fractional factorial designs and describe their respective differences, advantages, and disadvantages. Review ethical considerations.	1.0
Summarize experimental data using descriptive statistics, tables and graphs. Conduct hypothesis testing for decision-making using software. Perform t-test for two samples.	2.0
Perform Analysis of Variance (ANOVA) tests and detailed analysis of experimental data. Investigate the effect of each factor as well as the interaction effect among factors.	3.0

Topics	Weeks (approx.)
Make predictions and analyze relationships through models such as simple and multiple linear regression. Check possible violation of the assumptions of the model and interpret the effectiveness of the fitted model.	4.0
Project Proposal and Presentation	1.0
Testing	1.0
Final Exam Period	2.0

## EVALUATION PROFILE

Lab assignments	10%-40%
Homework	5%-10%
Project(s)	10%-40%
Midterms, tests, quizzes	5%-40%
Final Exam	25%
<b>TOTAL</b>	<b>100%</b>

Note: No individual grading component will be worth more than 25%.

## GRADING PROFILE

Letter grades will be assigned according to the following guidelines:

A+ 90 - 100%	B+ 77 - 79%	C+ 67 - 69%	D 50 - 59%
A 85 - 89%	B 73 - 76%	C 63 - 66%	F 0 - 49%
A- 80 - 84%	B- 70 - 72%	C- 60 - 62%	

## LATE ASSIGNMENTS

Assignments are due at the beginning of class, unless otherwise announced. Late assignments may receive a grade of zero.

## INCOMPLETE GRADES

Grades of Incomplete "I" are assigned only in exceptional circumstances when a student requests extra time to complete their coursework. Such agreements are made only at the request of the student, who is responsible to determine from the instructor the outstanding requirements of the course.

## MISSED EXAMS/QUIZZES/LABS

A score of zero will be assigned unless the student meets all of the following conditions:

1. Circumstances clearly beyond the control of the student caused the exam, test, quiz, lab, etc. to be missed. Such circumstances include serious illness or injury, or death of close family member. They do not include forgetting about the test, lack of preparation for the test, work-related or social obligations.
2. The student has notified the instructor (or the School of STEM office staff, if the instructor is not available) that they will miss the exam, test, quiz, lab, etc. Such notification must occur in advance, if possible, or at the latest, on the day of the exam, test, quiz, lab, etc.

3. Proof of the circumstances may be required.
4. The student has been fully participating in the course up until the circumstances that prevented the writing of the exam, test, quiz, lab, etc. Fully participating means attending almost all of the classes and turning in almost all assignments in the course.

The options for making up any missed grades offered to the student who meets the four conditions are decided by the instructor. They will not necessarily meet the convenience of the student.

Make-up exams, quizzes and/or tests are given at the discretion of the instructor. They are generally given only in medical emergencies or severe personal crises. Some missed labs or other activities may not be able to be accommodated. Please consult with your instructor.

### **ATTENDANCE**

Regular attendance is essential. If classes are missed, it is the student's responsibility to become aware of all information given out in the classes or tutorials, including times of examinations and assignment deadlines.

### **ENGLISH USAGE**

Students are expected to use correct standard English in their written and oral assignments, exams, presentations and discussions. Failure to do so may result in reduced grades in any part of the Evaluation Profile. Please refer to the guidelines provided in the Capilano Guide to Writing Assignments (available from the University Bookstore).

### **MATHEMATICAL LANGUAGE**

Use of proper Mathematical terminology and notation is an important component of Mathematics. Marks may be deducted for improper usage. For full details, please refer to your instructor.

### **MATHEMATICS LEARNING CENTRE (MLC)**

Instructional help and reference texts are available to students in the Learning Commons located in the Library in LB126.

### **ON-LINE COMMUNICATION**

Outside of the classroom, instructors will (if necessary) communicate with students using either their official Capilano University email or eLearn; please check both regularly. Official communication between Capilano University and students is delivered to students' Capilano University email addresses only.

### **UNIVERSITY OPERATIONAL DETAILS:**

#### **Tools for Success**

Many services are available to support student success for Capilano University students. A central navigation point for all services can be found at: <https://www.capilanou.ca/student-life/>

**Capilano University Security: download the [CapU Mobile Safety App](#)**

#### **Policy Statement (S2009-06)**

Capilano University has policies on Academic Appeals (including appeal of final grade), Student Conduct, Cheating and Plagiarism, Academic Probation and other educational issues. These and other policies are available on the University website.

**Academic Integrity (S2017-05)**

Any instance of academic dishonesty or breach of the standards of academic integrity is serious and students will be held accountable for their actions, whether acting alone or in a group. See policy S2017-05 for more information: <https://www.capilanou.ca/about-capu/governance/policies/>

Violations of academic integrity, including dishonesty in assignments, examinations, or other academic performances, are prohibited and will be handled in accordance with the Student Academic Integrity Procedures.

**Academic dishonesty** is any act that breaches one or more of the principles of academic integrity. Acts of academic dishonesty may include but are not limited to the following types:

**Cheating:** Using or providing unauthorized aids, assistance or materials while preparing or completing assessments, or when completing practical work (in clinical, practicum, or lab settings), including but not limited to the following:

- Copying or attempting to copy the work of another during an assessment;
- Communicating work to another student during an examination;
- Using unauthorized aids, notes, or electronic devices or means during an examination;
- Unauthorized possession of an assessment or answer key; and/or,
- Submitting of a substantially similar assessment by two or more students, except in the case where such submission is specifically authorized by the instructor.

**Fraud:** Creation or use of falsified documents.

**Misuse or misrepresentation of sources:** Presenting source material in such a way as to distort its original purpose or implication(s); misattributing words, ideas, etc. to someone other than the original source; misrepresenting or manipulating research findings or data; and/or suppressing aspects of findings or data in order to present conclusions in a light other than the research, taken as a whole, would support.

**Plagiarism:** Presenting or submitting, as one's own work, the research, words, ideas, artistic imagery, arguments, calculations, illustrations, or diagrams of another person or persons without explicit or accurate citation or credit.

**Self-Plagiarism:** Submitting one's own work for credit in more than one course without the permission of the instructors, or re-submitting work, in whole or in part, for which credit has already been granted.

**Prohibited Conduct:** The following are examples of other conduct specifically prohibited:

- Taking unauthorized possession of the work of another student (for example, intercepting and removing such work from a photocopier or printer, or collecting the graded work of another student from a stack of papers);
- Falsifying one's own and/or other students' attendance in a course;
- Impersonating or allowing the impersonation of an individual;
- Modifying a graded assessment then submitting it for re-grading; or,
- Assisting or attempting to assist another person to commit any breach of academic integrity.

**Sexual Violence and Misconduct**

All Members of the University Community have the right to work, teach and study in an environment that is free from all forms of sexual violence and misconduct. Policy B401 defines sexual assault as follows:

Sexual assault is any form of sexual contact that occurs without ongoing and freely given consent, including the threat of sexual contact without consent. Sexual assault can be committed by a stranger, someone known to the survivor or an intimate partner.

Safety and security at the University are a priority and any form of sexual violence and misconduct will not be tolerated or condoned. The University expects all Students and Members of the University Community to abide by all laws and University policies, including B.401 Sexual Violence and Misconduct Policy and B.401.1 Sexual Violence and Misconduct Procedure (found on Policy page <https://www.capilanou.ca/about-capu/governance/policies/>)

**Emergency Procedures**

Students are expected to familiarise themselves with the emergency policies where appropriate and the emergency procedures posted on the wall of the classroom.