

School of Liberal Arts



MATH105
Introductory Statistics
Winter 2022

3 Credits

Course Outline

INSTRUCTOR	Andy Roebuck (PhD)	OFFICE HOURS	Via Zoom: Tuesdays 1:00-3:00 pm or by appointment
OFFICE	n/a	CLASSROOM	Zoom ID: 830 544 5427
E-MAIL	aroebuck@yukonu.ca	CLASS TIME	Tuesday 6:00 – 7:50 pm
TELEPHONE	n/a	CRN	20206
Liberal Arts office: Ayamdigut Campus A2501, liberalarts@yukonu.ca, 867-668-8770			

COURSE DESCRIPTION

This is a first course in Statistics. The objective of the course is for students to gain a good intuitive understanding of statistical principles and methods. At the end of the course, students should be able to use elementary statistical techniques and to critically assess statistical work done by others. Topics include descriptive statistics (histograms, mean, median, mode, standard deviation, normal approximations, and measurement errors), correlation and regression, probability, chance, variability, sampling, and hypothesis testing (including one-sample, two-sample, ANOVA, and chi-squared). The course is not intended to be a mathematical treatment of statistics, but a good knowledge of high school algebra is critical.

COURSE REQUIREMENTS

Prerequisite(s): MATH 11, MATH 12, or MATH 130 is strongly recommended

EQUIVALENCY OR TRANSFERABILITY

AU MATH215 (3) CAMO STAT 116 (4) KPU MATH 1115 (3) OC STAT 121 (3)

SFU STAT101 (3) -Q TRU STAT1200 (3) TRU-OL STAT1201 (3) TWU MATH102 (3)

UBC STAT203 (3)* UBCO STAT121 (3) UFV MATH 1XX (3) UNBC STAT240 (3)**

UVIC STAT 100 lev (1.5) VIU MATH161 (3)

*Not for credit in the faculty of science.

**refer to transfer notes.

For more information about transferability contact the School of Liberal Arts office

Students are reminded that it is always the receiving institution that determines whether a course is acceptable as an applicable, equivalent course or if it may be transferred to their program for credit. Find further information at: <https://www.yukonu.ca/admissions/transfer-credit>

LEARNING OUTCOMES

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

- Apply the techniques of descriptive statistics in order to organize and analyse data (using histogram, mean, median, mode, and standard deviation).
- Demonstrate an understanding of probability (simple, addition, multiplication, conditional) and counting rules (combinations and permutations).
- Apply hypothesis tests to means, proportions, and variances.
- Demonstrate an understanding of ANOVA and nonparametric statistics.
- Apply the techniques of inferential statistics (correlation and regression).
- Present the findings of a research project that employs the statistical techniques learned throughout the course to a real-world, local dataset.

COURSE FORMAT

Delivery format

This course is being taught online using a variety of materials, activities, and technical solutions. You will need to visit the course Moodle site and participate in online activities and discussions as assigned and scheduled.

There are no in-person meetings scheduled for this course. Students will be expected to attend a weekly Zoom session every Tuesday from 6:00-7:50 pm. The Zoom meetings will be held in Room: 830 544 5427.

The class will proceed on a timetable (see below) with set assignments and due dates. **This is not a self-paced course.**

EVALUATION

Attendance and Participation – 5%

Regular attendance and completion of course work is expected. Attendance and participation will be worth 5% of the total course grade.

The weekly Zoom Session is scheduled for Tuesday's from 6:00-7:50 pm. During the Zoom sessions, students will be expected to respond to a few short multiple-choice questions. Questions are asked and answered in Zoom. These questions are not marked for correctness, rather they are a tool for self-assessment. Completion of 80% or more of these questions over the course will be considered "perfect

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attendance". Should a student respond to fewer than 80% of questions, the attendance mark will be prorated to match their responses.

Example 1: A student responds to 90% of questions throughout the course. 90% is greater than 80% therefore they receive full marks for attendance (5%).

Example 2: A student responds to 60% of the required 80% of questions. This is equal to 75% of "perfect attendance" ($60 / 80 = 75\%$). Therefore, the student receives a mark of 75% for attendance (3.75%).

If you will be unable to regularly attend/engage with Zoom sessions for any reason (e.g. bandwidth/computer issues, work/family commitments, illness), please contact the instructor directly (arobuck@yukonu.ca) to have the attendance mark shifted to the final exam. This option will be available to ALL students up until the date of the final exam. **NOTE: Exams will be held during the Zoom time and ALL students will be expected to participate in these assessments. Please make a note of these dates and times now!**

Module Assignments – 35%

In this class you will be expected to submit a short assignment at the end of each Module (8 in total). Weekly Zoom sessions are designed to cover the most important material in each section and textbook readings will supplement the material covered during lectures. Module assignments will reinforce core concepts in this course and help you prepare for the exams. The module assignments should take ~60 minutes to complete provided you have done the readings and practice questions.

Assignments will include some multiple-choice questions (similar to what you will see on the midterms), fill in the blank, matching, and VERY short answer questions (1-3 lines). Short answer questions are not be an assessment of your writing skill and point form is fine as long as I can understand it. Short answer questions may require calculations. All information needed for the assignments can be found in the lecture notes, textbook, and/or assigned readings/extra materials. Assignments will be available AT LEAST ONE WEEK before they are due, and they will generally be due on Sundays @ 11:59 pm.

Some very important points for assignments:

- Life happens, everyone gets **1 free extension**, you DO NOT need to e-mail me, just submit it before the next assignment is due and there will be no penalty.

- Any additional late assignments will be assessed a flat penalty of **20%**.

- Lastly, **if you complete all 8 assignments, late or otherwise, before the final exam, I will drop the mark of your lowest assignment.** The point of these assignments is to encourage you to read and engage with the material, not to punish you when life/school gets stressful and busy.

Research Project – 15%

Students will undertake a short research project where they will apply the statistical techniques learned in the course to a real-life situation involving data analysis. The project will involve data collection, analysis, and a short report (a template will be provided). More information on the project will be presented in the first few weeks of class.

Exams

Midterm Exam – 15%

During this course there will be one midterm exam worth 15% of your final grade. The midterm exam is OPEN BOOK and will be completed through the course Moodle page. Students are expected to complete exams independently. The midterm exam will be held on Tuesday Mar 1 from 6:00-7:30 pm and will cover Modules 1-4. The midterm will consist of approximately 50 multiple choice questions and students will have 1.5 hours to complete the assessment. Note: although exams are open book, students should not rely on this to answer the questions as there will not be enough time to look up every answer. The exams will be similar in format to the module assignments.

Final Exam – 30%

There will be a final exam tentatively scheduled for April 19th from 6:00-9:00 pm. This exam will be identical in format to the midterm exam. The final exam will be comprehensive, with ~1/3 of questions coming from Modules 1-4 and 2/3 of questions from Modules 5-9. Additional information regarding the final exam will be released later.

Attendance and Participation	5 %
Module Assignments	35 %
Research Project	15 %
Midterm Exam	15 %
Final Exam	30 %
Total	100%

TEXTBOOKS & LEARNING MATERIALS

For Introductory Statistics we will be using the open textbook: OpenStax Psychology 2e. You can download the textbook and find additional information here:

<https://openstax.org/details/books/introductory-statistics>. An open textbook is a textbook licensed under an open copyright license. It is available online and can be **freely** used by students, teachers, and members of the public. Additional information about how to access your textbook can be found on the course site.

Calculator: You will require a scientific calculator for this course. It need not be a graphing calculator, but it should have a stats function and be capable of square roots, powers, exponents, and factorials.

A stable internet connection will be required during lectures, assignments, and exams.

Other Resources include:

The Academic Support Centre

<https://www.yukonu.ca/student-life/learning-matters/academic-support-centre>

Use it for: You can set up meetings for Math and Stats help (and other courses!)

Khan Academy: Probability and Statistics

<https://www.khanacademy.org/math/probability>

Use it for: Short YouTube videos explaining each concept.

Math is Fun: Probability and Statistics

<http://www.mathsisfun.com/data/#stats>

Use it for: Clear step-by-step explanations of each concept.

Additional materials, practice questions, and assignments will be posted to the course site. We will review these materials on the first day of classes.

COURSE WITHDRAWAL INFORMATION

Students may officially withdraw from a course or program without academic penalty up until two-thirds of the course contact hours have been completed. Specific withdrawal dates vary, and students should become familiar with the withdrawal dates of their program. See withdrawal information at www.yukonu.ca/admissions/money-matters

Refer to the YukonU website for important dates: www.yukonu.ca/admissions/important-dates

Refunds may be available. See the Refund policy and procedures at www.yukonu.ca/admissions/money-matters

ACADEMIC INTEGRITY

Students are expected to contribute toward a positive and supportive environment and are required to conduct themselves in a responsible manner. Academic misconduct includes all forms of academic dishonesty such as cheating, plagiarism, fabrication, fraud, deceit, using the work of others without their permission, aiding other students in committing academic offences, misrepresenting academic assignments prepared by others as one's own, or any other forms of academic dishonesty including falsification of any information on any Yukon University document.

Please refer to Academic Regulations & Procedures (updated bi-annually) for further details about academic standing, and student rights and responsibilities: www.yukonu.ca/policies/academic-regulations

ACADEMIC ACCOMMODATION

Reasonable accommodations are available for students requiring an academic accommodation to fully participate in this class. These accommodations are available for students with a documented disability, chronic condition or any other grounds specified in section 8.0 of the Yukon University Academic Regulations (available on the Yukon University website at www.yukonu.ca/policies/academic-regulations)

It is the student's responsibility to seek these accommodations by contacting the Learning Assistance Centre (LAC): LearningAssistanceCentre@yukonu.ca.

TOPIC OUTLINE

Course: Jan 5 – April 22	MATH 105 – Introductory Statistics
Jan 9 – Jan 15	Topic: <i>Introduction and Syllabus</i> To Do: Course Outline; Download textbook; Check out Moodle; Start Reading Chapter 1. Zoom: Jan 11, 6:00 – 7:50 pm.
Module 1: Jan 16 – Jan 22	Topic: <i>Introduction to Statistics, Sampling, and Data</i> To Do: Finish Chapter 1; Start Chapter 2; Complete Assignment #1. Zoom: Jan 18, 6:00 – 7:50 pm. Assignment #1 Due Jan 23 @ 11:59 pm
Module 2: Jan 16 – Jan 29	Topic: <i>Descriptive Statistics</i> To Do: Finish Chapter 2; Complete Assignment #2. Zoom: Jan 25, 6:00 – 7:50 pm. Assignment #2 Due Jan 30 @ 11:59 pm
Module 3: Jan 30 – Feb 12	Topic: <i>Probability Topics</i> To Do: Chapter 3; Complete Assignment #3. Zoom: Feb 1, Feb 8, 6:00 – 7:50 pm. Assignment #3 Due Feb 13 @ 11:59 pm
Module 4: Feb 13 – Feb 19	Topic: <i>The Normal Distribution; Hypotheses; Research Project Info</i> To Do: Chapter 6; Complete Assignment #4. Zoom: Feb 15, 6:00 – 7:50 pm. Assignment #4 Due Feb 27 @ 11:59 pm
Feb 20 – Feb 26 (Reading Week)	Reading Week... do whatever you want. Live your best life.
Midterm Exam: Mar 1 6:00-7:30 pm	Topic: <i>Midterm Exam</i> Midterm Exam (Modules 1-4): During Zoom Time (6:00-7:30 pm)
Module 5: Mar 6 – Mar 12	Topic: <i>Confidence Intervals</i> To Do: Chapter 8; Complete Assignment #5. Zoom: Mar 8, 6:00 – 7:50 pm. Assignment #5 Due March 20 @ 11:59 pm

Module 6: Mar 13 – Mar 26	<p>Topic: <i>Hypothesis Testing</i> To Do: Chapters 9-10; Complete Assignment #6.</p> <p>Zoom: Mar 15, Mar 22 Mar 6:00 – 7:50 pm. Assignment #6 Due Mar 27 @ 11:59 pm</p>
Module 7: Mar 27 – April 2	<p>Topic: <i>The Chi-Square Distribution</i> To Do: Chapter 11; Complete Assignment #7.</p> <p>Zoom: Mar 29, 6:00 – 7:50 pm. Assignment #7 Due Apr 3 @ 11:59 pm</p>
Module 8: Apr 3 – Apr 9	<p>Topic: <i>Linear Regression</i> To Do: Chapter 12; Complete Assignment #8.</p> <p>Zoom: Apr 5, 6:00 – 7:50 pm. Assignment #8 Due Apr 10 @ 11:59 pm</p>
Module 9: Apr 10 – Apr 16	<p>Topic: <i>F-Distribution and One-Way ANOVA</i> To Do: Chapter 13; Complete Research Project.</p> <p>Zoom: Apr 12, 6:00 – 7:50 pm. Research Project Due Thursday April 14</p>
Final Exam: April 19, 6:00-9:00 pm	<p>Final Exam April 19, 6:00 – 9:00 pm 1/3 questions from Modules 1-4, 2/3 questions from Modules 5-9</p>