| CAPILANO UNIVERSITY COURSE OUTLINE | |
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| Term: **Fall 2018** | Course No. **STAT 205** |
| Course: **INTRODUCTION TO PROBABILITY and STATISTICS** | Credits: **3.0**<br>Section: |
| **INSTRUCTOR: TBA**<br>Office:<br>Tel:<br>email:<br>website: | |

**COURSE FORMAT:**    Three hours of class time, 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.

**PREREQUISITES:**    MATH 126 with a minimum "C-" grade.

Note: This is an approved Quantitative/Analytical course for baccalaureate degrees.
STAT 205 is equivalent to MATH 205. Duplicate credit will not be granted for this course and MATH 205.

**COURSE OBJECTIVES:**

*General:*    To introduce students to probability models and basic statistical methods for analyzing data with an emphasis on engineering and scientific applications.

*Student Learning Outcomes:*    Upon successful completion of this course, it is expected that students will be able to:

- organize and present a data set with respect to its centre and spread for a pre-determined purpose;
- compute simple conditional probability and use Bayes' Theorem to analyze posterior probability;
- distinguish discrete random variables from continuous random variables in different probability distributions;
- identify parameters in probability distributions according models like binomial, hypergeometric, negative binomial, and Poisson;
- apply probability density functions in problems for models like the normal, gamma, and exponential;
- compute expected value and variance for probability distributions;
- compute covariance and correlation for discrete joint probability distributions;
- apply the Central Limit Theorem;

- compute confidence intervals for means and proportions in single samples;
- perform a test of hypotheses based on both a single sample and two samples;
- perform analysis of variance on multiple treatments of a population;
- analyze the simple linear regression model through confidence interval building of parameters, hypothesis testing of the slope parameter, or model utility test;
- ghmanage multiple data sets in the graphing calculator to compute relevant statistic;
- state and apply theorems, definitions, and formulas used in the course;
- use technology appropriately as a tool in problem solving; and
- use correct mathematical and statistical notation and terminology to present solutions and results.


## REQUIRED COURSE MATERIALS:

*Textbook:*        Devore, Jay L.  Probability and Statistics for Engineering and the Sciences.  Custom Edition for Math 205 at Capilano University.  8th ed.  Brooks/Cole Publishing, 2011.

*Calculator:*      Students must have a non-symbolic graphing calculator.  The Mathematics and Statistics Department recommends a T.I.-83+ or T.I.-84+ calculator with non-symbolic capabilities.  Graphing calculator instruction (in the classroom or in workshops) will only be given using one of these calculators.  Any student who intends to use any other calculator must have it approved by his/her instructor at the start of the semester.  For more detailed information on graphing calculators go to: http://www.capilanou.ca/math/Graphing-Calculator-Policies/

*Class Notes:*     Some instructors will have class notes available for purchase in the Bookstore.


## RECOMMENDED COURSE SUPPLEMENT:

*Student Solutions
Manual:*           Solutions manual for the odd numbered questions in the textbook (available for purchase from the Bookstore).

*Exam Booklet:*    Practice exams and solutions from previous terms (available for purchase from Bookstore).
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**COURSE CONTENT:**

| Topics | Text Reference | Weeks (approx.) |
|---|---|---|
| An overview of probability and statistics. Graphical and numerical summarization of data. | 1.1-1.4 | 1.0 |
| Basic laws and properties of probability. Counting techniques. Conditional probability and independence. | 2.1-2.5 | 1.5 |
| Discrete random variables and probability distributions. Expected value. Binomial, Hypergeometric, Negative Binomial and Poisson distributions. | 3.1-3.6 | 1.5 |
| Continuous random variables and probability distributions. Expected value. Normal, Gamma, Exponential and Weibull distributions. | 4.1-4.4 | 1.0 |
| Joint probability distributions. Covariance and correlation. Sums and averages. The Central Limit Theorem. | 5.2-5.5 | 1.5 |
| Single sample confidence intervals for means and proportions. | 6.1, 7.1-7.3 | 2.0 |
| Test of hypotheses based on a single sample | 8.1, 8.2, 8.4 | 1.0 |
| Inferences based on two samples | 9.1, 9.2 | 1.0 |
| Analysis of variance | 10.2 | 0.5 |
| The simple linear regression model | 12.1, 12.2 | 1.0 |
| Tests | | 1.0 |
| Final Exams | | 2.0 |

**EVALUATION PROFILE:**

Final grades for the course will be computed based on the following schedule:

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| Midterms | *50% |
| Final Exam | *35% |
| Assignments | *5% |
| Personal Evaluation | 10% |
| TOTAL | 100% |

\*    If the percentage achieved on the Final Exam is higher than the percentage achieved on the Term Work component (midterms and assignments), then the Final Exam weight will be increased to 55% and the Term Work will be decreased to 35%.

Term work will consist of tests, quizzes and/or assignments. While the weighting of individual tests, etc. is at the discretion of the instructor, no single test will exceed 25% of the final total. The weight of tests, quizzes and assignments will be announced in class in advance.

**PERSONAL EVALUATION:**

In the absence of exceptional circumstances, which are evaluated at the instructor's discretion, the personal evaluation component of the final grade will be pro-rated to the rest of the grade.  For example, a 10% personal evaluation component would be determined by dividing the remaining mark out of 90 by 9.  The most common circumstance justifying an increased personal evaluation mark is a student's improved performance in the final examination relative to the term work, which the instructor feels justifies an elevated letter grade.

**SUPPLEMENTAL 4TH HOUR ACTIVITY:**

Each section has, in addition to the 3 hours of scheduled classroom time per week, a supplemental activity.  This activity might be a scheduled tutorial or lab, an on-line activity, a group meeting, or some other activity as indicated by the instructor. Students are expected to participate in this additional activity. If this is not possible, students should consult their instructor to determine how this missed activity can be completed.  It is in the student's best interest to ensure that any missed course activity is completed.

**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% |             |

Students should refer to the University Calendar for the effect of the above grades on grade point average.

**TESTS:**          Dates for tests will be announced beforehand in class.

**HOMEWORK:**          It is expected that students spend at least 8 hours per week doing course work outside of class time.

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

**OPERATIONAL DETAILS:**

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

***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.

***Missed Exams:***   Normally, a score of zero will be given for a missed exam, test, quiz, lab, etc.  In some exceptional situations, the student will be permitted to write a make-up test, defer the lab to a later date or to replace the score by other marks.

The situations in which a score of zero may be avoided are those for which 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) about the missed 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 is provided.  Proper proof of illness or injury requires a medical certificate from a doctor, who may also be consulted.

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 offered to the student who meets the four conditions are decided by the instructor.  They will not necessarily meet the convenience of the student. .

***Final Exam Period:***   Students should note that the final exam period is from **date to date** *(including Saturday, date),* and that they can expect to write exams at any time during this period.  Individual exam times will not normally be rescheduled because of holidays, work, or other commitments.  While efforts are made to spread exams throughout the exam period, an individual's particular course combination may result in exams being scheduled close together, or spread widely through the entire exam period.

***Cheating/Plagiarism:***   Students caught cheating on a test or assignment can receive a grade of "F" for the course.  Plagiarism (including the copying of any part of assignments, laboratory reports and essays) is a serious offence and is a form of cheating.  Any

incidents of cheating or plagiarism will be dealt with under the provisions of the <u>University Policy on Cheating and Plagiarism</u>.

***Incomplete Grades:*** Incomplete grades ("I") are given only when special arrangements have been agreed upon with the instructor prior to the end of the semester.  Since "I" grades are granted only in exceptional circumstances (usually health problems), their occurrence is rare.

***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 the Math Department Style Guide at: http://www.capilanou.ca/math/Math-Department-Style-Guide/

***Mathematics Learning Centre:*** Instructional help and Mathematics learning aids, such as audio visual materials, computer software and reference texts are available to students in the Birch Building (BR289).

***Emergency Procedures:*** Please read the emergency procedures posted on the wall of the classroom.