UNIVERSITY OF THE FRASER VALLEY

**ORIGINAL COURSE IMPLEMENTATION DATE:** September 1994
**REVISED COURSE IMPLEMENTATION DATE:** September 2021
**COURSE TO BE REVIEWED** (six years after UEC approval)**:** January 2027
Course outline form version: 05/18/2018

# OFFICIAL UNDERGRADUATE COURSE OUTLINE FORM

**Note: The University reserves the right to amend course outlines as needed without notice.**

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| **Course Code and Number:** STAT 270 | **Number of Credits:** 4 Course credit policy (105) |

**Course Full Title:** Introduction to Probability and Statistics
**Course Short Title:** Intro to Probability and Stats
*(Transcripts only display 30 characters. Departments may recommend a short title if one is needed. If left blank, one will be assigned.)*

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| **Faculty:** Faculty of Science | **Department (or program if no department):** Mathematics & Statistics |

**Calendar Description:**

An introduction to the theory and practice of statistics for engineering and science students who have experience with calculus. Topics include descriptive statistics, probability, random variables and their probability distributions, sampling distributions, confidence intervals and hypothesis tests for means and proportions, Pearson's Chi-squared tests, correlation, and linear regression.

Note: This course is offered as STAT 270 and MATH 270. Students may only take one of these for credit.

Note: As a general rule, students with Mathematics 11 are prepared to take STAT 104, those with Mathematics 12 are prepared to take STAT 106, and those with a full year of calculus are prepared to take STAT/MATH 270. Before registering, students should check the requirements of their program. The Mathematics major program requires STAT/MATH 270, while the Mathematics minor program requires STAT 106 or STAT/MATH 270.

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| **Prerequisites (or NONE):** | One of the following: MATH 112, MATH 118, or a B or better in MATH 141. |
| **Corequisites (if applicable, or NONE):** | |
| **Pre/corequisites (if applicable, or NONE):** | |

**Antirequisite Courses** *(Cannot be taken for additional credit.)*
Former course code/number:
Cross-listed with: **MATH 270**
Dual-listed with:
Equivalent course(s):
*(If offered in the previous five years, antirequisite course(s) will be included in the calendar description as a note that students with credit for the antirequisite course(s) cannot take this course for further credit.)*

**Typical Structure of Instructional Hours**

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| Lecture/seminar hours | 40 |
| Tutorials/workshops | |
| Supervised laboratory hours | 20 |
| Experiential (field experience, practicum, internship, etc.) | |
| Supervised online activities | |
| Other contact hours: | |
| **Total hours** | **60** |

Labs to be scheduled independent of lecture hours: ☒ No ☐ Yes

**Special Topics** *(Double-click on boxes to select.)*
This course is offered with different topics:
☒ No ☐ Yes *(If yes, topic will be recorded when offered.)*

**Independent Study**
If offered as an Independent Study course, this course may be repeated for further credit: *(If yes, topic will be recorded.)*
☒ No ☐ Yes, repeat(s) ☐ Yes, no limit

**Transfer Credit**
Transfer credit already exists: *(See **bctransferguide.ca**.)*
☐ No ☒ Yes
Submit outline for (re)articulation:
☒ No ☐ Yes *(If yes, fill in transfer credit form.)*

**Grading System**
☒ Letter Grades ☐ Credit/No Credit

**Maximum enrolment (for information only):** 36

**Expected Frequency of Course Offerings:**
Annually *(Every semester, Fall only, annually, etc.)*

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|---|---|---|
| **Department / Program Head or Director: Ian Affleck** | **Date approved:** | June 15, 2020 |
| **Faculty Council approval** | **Date approved:** | September 11, 2020 |
| **Dean/Associate VP:** Lucy Lee | **Date approved:** | September 11, 2020 |
| **Campus-Wide Consultation (CWC)** | **Date of posting:** | n/a |
| **Undergraduate Education Committee (UEC) approval** | **Date of meeting:** | January 29, 2021 |

**Learning Outcomes:**

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

1. Construct frequency tables and use numerical and graphical methods to explore qualitative and quantitative data.
2. Obtain measures of location, dispersion, and relative standing, and interpret.
3. Derive, manipulate and apply fundamental formulae and use in probability.
4. Calculate and use measures of location and spread for a variety of discrete and continuous random variables.
5. Define, binomial, hypergeometric, negative-binomial, Poisson, uniform, normal and exponential distributions, obtain their probabilities, and assess situations where their use is appropriate.
6. Identify probability models for two random variables and calculate covariance, correlation and conditional means.
7. Identify a simple random sample and use the Central Limit Theorem.
8. Construct and interpret confidence intervals for means and proportions.
9. Conduct hypotheses tests for means and proportions and interpret p-value.
10. Compare two means by constructing confidence intervals and performing test of hypotheses.
11. Use ANOVA method to test equality of several means.
12. Build simple linear regression models, use them for estimation, and perform relevant inferential procedures.
13. Use statistical software to find an initial multiple linear regression model using quantitative explanatory variables, and use the fitted model to produce estimates of the response.
14. Apply Pearson's Chi-squared tests to draw inferences in appropriate categorical sampling situations.

**Prior Learning Assessment and Recognition (PLAR)**

☒ Yes ☐ No, PLAR cannot be awarded for this course because

**Typical Instructional Methods** *(Guest lecturers, presentations, online instruction, field trips, etc.; may vary at department's discretion.)*

Lectures, mixed with sessions in the computer lab. Note that statistical packages such as Minitab are used in the computer lab.

**NOTE: The following sections may vary by instructor. Please see course syllabus available from the instructor.**

**Typical Text(s) and Resource Materials** *(If more space is required, download Supplemental Texts and Resource Materials form.)*

| | Author | Title (article, book, journal, etc.) | Current ed. | Publisher | Year |
|---|---|---|---|---|---|
| **1.** | Devore, J | Probability and Statistics for Engineering and the Sciences | ☒ | Brooks/Cole | 2009 |
| **2.** | DeGroot and Schervish | Probability and Statistics | ☒ | Pearson/Prentice Hall | 2005 |
| **3.** | Swartz, T | Introduction to Probability and Statistics | ☒ | Pearson | 2010 |
| **4.** | Douglas C. Montgomery | Applied Statistics and Probability for engineers | ☒ | John Wiley and Sons | 2002 |

**Required Additional Supplies and Materials** *(Software, hardware, tools, specialized clothing, etc.)*

A graphing calculator is required

**Typical Evaluation Methods and Weighting**

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| Final exam: | 40% | Assignments: | 10% | Field experience: | % | Portfolio: | % |
| Midterm exam: | 30% | Project: | % | Practicum: | % | Other: | % |
| Quizzes/tests: | 20% | Lab work: | % | Shop work: | % | Total: | 100% |

**Details (if necessary):** Students must achieve at least 40% on the final exam in order to receive credit for this course.

**Typical Course Content and Topics**

- Descriptive statistics for samples and finite populations: frequency tables, histograms and other graphical representations, mean median, variance, standard deviation, and percentiles. Means and standard deviations of functions of variables.
- Probability: events, axioms, counting rules, conditional probability, independence, Bayes Theorem.
- Discrete distributions: probability mass functions, mean, variance, binomial, hypergeometric, Negative-binomial and Poisson random variables. Continuous distributions: probability density functions, mean, variance, uniform, normal and exponential random variables. Joint probability distributions, covariance and correlation in terms of expectation, conditional mean, mean and variance of a linear combination of variables.
- Statistics and their distributions: The Central Limit Theorem.
- Confidence intervals and tests of hypotheses. These techniques applied to one and two populations.
- Comparison of the means of several populations the one-way ANOVA table.
- Chi-squared test for independence
- The simple linear regression model, least squares estimation of the parameters, estimation and interpretation of the coefficients, confidence intervals and test of hypotheses for coefficients. Coefficient of correlation, coefficient of determination. Introduction to multiple linear regression using statistical software.