



COURSE OUTLINE

RRMT 202

Biometrics

45 HOURS

3 CREDITS

PREPARED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
Scott Gilbert, Instructor

APPROVED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
Margaret Dumkee, Dean

APPROVED BY ACADEMIC COUNCIL: (date)

RENEWED BY ACADEMIC COUNCIL: (date)



RRMT 202 Course Outline by Scott Gilbert is licensed under a [Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License](https://creativecommons.org/licenses/by-nc-sa/4.0/)

BIOMETRICS

---

**INSTRUCTOR:** Scott Gilbert, B.Sc., Ph.D.  
Tara Stehelin, B.Sc., M.Sc

**OFFICE HOURS:** SG: Wed 9:30 -10:30 am,  
Fri 11 am - noon  
TS: Fri 10:30am - 12:30pm

**OFFICE LOCATION:** A2515 (Gilbert)  
A2806 (Stehelin)

**CLASSROOM:** Lecture: A2206  
Lab: A2702

**EMAIL:** [sgilbert@yukoncollege.yk.ca](mailto:sgilbert@yukoncollege.yk.ca)  
[tstehelin@yukoncollege.yk.ca](mailto:tstehelin@yukoncollege.yk.ca)

**TIME:** Lecture: Mon. & Wed. 10:30 am - noon  
Lab: Friday, 1 - 3 pm

**TELEPHONE:** 668-8776, Scott Gilbert  
456-6957, Tara Stehelin

**Dates:** January 4 - April 21, 2017

---

**COURSE DESCRIPTION**

Biometrics is the study of biological variation and numerical (statistical) analysis. This course is designed as an introductory course for students preparing for a career in any area of field biology. Graduates will likely confront the problem of describing and interpreting information drawn from natural systems early in their careers. This course is designed to assist students in three ways. First we will survey some of the statistical techniques used to describe variation. Secondly, we introduce some of the ways statistics can be used to test hypotheses. Finally students will take steps towards developing their statistical "literacy" by reading sections from technical reports and learning how to interpret the statistics that are presented.

We will adopt a practical approach in this course and many of the key concepts will be introduced by using data drawn from real field situations. We will emphasize the use of computer programs to carry out calculations and the tutorials will include "hands-on" exercises and activities using actual field data.

**PREREQUISITES**

Enrolment in Renewable Resource Management Program or permission of the instructor; working knowledge of spreadsheet software (e.g. Excel) is highly recommended.

**EQUIVALENCY or TRANSFERABILITY**

Please see the BC Transfer Guide for transferability options <http://bctransferguide.ca/>

## LEARNING OUTCOMES:

Students that successfully complete this course will:

- Understand how statistics can be used to describe the range of variation in biological systems.
- Be able to analyze a set of raw data and describe it using graphs, such as frequency distributions as well as descriptive statistics.
- Be able to use spreadsheets to carry out simple statistical analyses including correlation and linear regression.
- Be able to use inferential statistics to compare means of two populations.
- Know how to write a formal scientific report that includes appropriate reporting of descriptive and inferential statistics (e.g. t -test).

## DELIVERY METHODS

This is a lecture based course that incorporates “hands on”, practical exercises in weekly, two-hour tutorials as well as occasional group problem solving activities during class. Students will work with existing data sets they collected in previous courses to carry out statistical analysis.

## COURSE FORMAT

Lectures: Three hours per week (2 classes of 1.5 hours)

Tutorial: Two hours per week. There will be weekly problem sets to work through for each tutorial and students will be expected to use computer spreadsheets for many analyses. There will be one data collecting exercise in February; during our field trip, on snowshoes, we will collect snow depths so we can compare two contrasting areas along McIntyre Creek.

## COURSE REQUIREMENTS

### ASSESSMENTS

#### Attendance

Attendance at all lectures is expected. Each tutorial will focus on a different skill set and students will be required to submit answers to the weekly problem sets introduced during the tutorial. There is a strong correlation between regular attendance and academic performance in this course.

#### Assignments and Tests

Students will have ample opportunity to chart their progress in this course. Rather than a single mid-term examination there will be three tests in class at the end of key sections. Students will also receive a grade for each weekly tutorial exercise.

#### Evaluation

Quiz	3 @	10%	30%
Tutorial Activities			40%
Final Exam			30%
Total			100%

## **REQUIRED TEXTBOOKS**

Fowler, J. and L. Cohen, Practical Statistics for Field Biology. 1998. 2nd Ed.

## **ACADEMIC AND STUDENT CONDUCT**

Information on academic standing and student rights and responsibilities can be found in the current Academic Regulations that are posted on the Student Services/Admissions & Regulations web page.

## **PLAGIARISM**

Plagiarism is a serious academic offence. Plagiarism occurs when students present the words of someone else as their own. Plagiarism can be the deliberate use of a whole piece of another person's writing, but more frequently it occurs when students fail to acknowledge and document sources from which they have taken material. Whenever the words, research or ideas of others are directly quoted or paraphrased, they must be documented according to an accepted manuscript style (e.g., APA, CSE, MLA, etc.). Resubmitting a paper which has previously received credit is also considered plagiarism. Students who plagiarize material for assignments will receive a mark of zero (F) on the assignment and may fail the course. Plagiarism may also result in dismissal from a program of study or the College.

## **YUKON FIRST NATIONS CORE COMPETENCY**

Yukon College recognizes that a greater understanding and awareness of Yukon First Nations history, culture and journey towards self-determination will help to build positive relationships among all Yukon citizens. As a result, to graduate from ANY Yukon College program, you will be required to achieve core competency in knowledge of Yukon First Nations. For details, please see [www.yukoncollege.yk.ca/yfnccr](http://www.yukoncollege.yk.ca/yfnccr).

## **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 College Academic Regulations (available on the Yukon College website). It is the student's responsibility to seek these accommodations. If a student requires an academic accommodation, he/she should contact the Learning Assistance Centre (LAC) at (867) 668-8785 or [lassist@yukoncollege.yk.ca](mailto:lassist@yukoncollege.yk.ca).

# TOPIC OUTLINE / SYLLABUS

## Lecture Schedule

Monday		Lecture Topic	Wednesday		Lecture Topic
		<b>Notes:</b> Readings refer to Fowler et al. (1998). BSG = Scott Gilbert TS= Tara Stehelin Jan 3, 2017	4-Jan	BSG	Chap. 1 & 2: statistics, observations, scales of measurement (nominal, ordinal, interval & ratio), coefficient of variation, descriptive & inferential statistics, discrete & continuous variables, precision, accuracy
9-Jan	BSG	Chap. 5 & 6: populations versus samples, measures of central tendency: mean, median, mode, measures of dispersion: range, standard deviation, variance, sum of squares, degrees of freedom	11-Jan	BSG	Chap. 3 & 4: frequency distribution, frequency table, outliers, bar graph, histogram, implied class limits, class interval, class mark. Intro to probability, types of probability dist'ns: Poisson, binomial, negative binomial
16-Jan	BSG	Normal Dist'n - Chap. 9: types of distributions, z-scores, standardizing a normal curve, z-table, one and two-tailed regions, level of significance	18-Jan	BSG	Confidence limits - Chap. 11: sampling distribution, standard error, Central Limit theorem, confidence limits, t-table
23-Jan	BSG	Confidence limits (con'd)	25-Jan	BSG	Plotting confidence limits on graphs, predicting a sample sizes for a given margin of error
30-Jan	BSG	Types of sampling: simple random sampling, systematic and stratified sampling, random number table, strata and subpopulations	1-Feb	BSG	<b>Quiz I -</b>
6-Feb	TS	Failing to meet assumptions- transforming data (Chapter 10)	8-Feb	TS	Intro to hypothesis testing - Chap. 12: inferential statistics, main steps in hypothesis-testing, null hypothesis, alternate hypothesis, level of significance, test statistic, one and two-tailed tests, t-tables
13-Feb	TS	Comparing two means: t-test, F-test to check assumption that variances are similar	15-Feb	TS	F-test and t-test for independent samples
20-Feb		Reading Week Feb 20-24	22-Feb		Reading Week Feb 20-24
27-Feb	TS	paired t-test, paired vs independent data,	1-Mar	BSG	<b>Quiz II</b>
6-Mar	BSG	Chi-square tests - Chap. 13, Type I and Type II errors	8-Mar	BSG	Chi-squared (continued)
13-Mar	BSG	What is ANOVA? How to compare multiple means? Partitioning a sum of squares. Understanding an ANOVA table	15-Mar	BSG	ANOVA (continued)
20-Mar	TS	Intro to bivariate data, scatter plots, linear and curvilinear plots, correlation.	22-Mar	TS	Pearson correlation coefficient, Spearman rank correlation
27-Mar	TS	Regression - Chap. 15: dependent and independent variables, line of best fit, regression line, regression coefficients, simple linear regression assumptions	29-Mar	TS	<b>Quiz 3</b>
3-Apr	TS	TBD	5-Apr	TS	Finale - review

## Tutorial Schedule

Friday		Tutorial Topic
6-Jan	BSG	Tutorial #1: Computer Lab: using Excel to prepare descriptive statistics
13-Jan	BSG	Tutorial #2: Plotting freq dist'ns and using Histogram feature in Excel
20-Jan	BSG	Tutorial #3: Working with normal curves
27-Jan	BSG	Tutorial #4: How good are our estimates, and practice with sample size
3-Feb	BSG	Tutorial #5: Snow depth data collection -
10-Feb	TS	Tutorial #6: Comparing means
17-Feb	TS	Tutorial #7: Comparing two samples
24-Feb		<i>Heritage Day holiday</i>
3-Mar	BSG	Tutorial #8: Intro to Chi-squared tests
10-Mar	BSG	Tutorial #9: Comparing several samples, ANOVA
17-Mar		Tentative snowmachine safety course for RRM students - no class
24-Mar	TS	Tutorial #10: Correlation
31-Mar	TS	Tutorial #11: Regression
7-Apr	TS	Tutorial #12: TBD