STAT 406/EESC 502 Course Outline

Winter Term 1 2017

**Instructor:** J. Loeppky, Ph.D., P.Stat.

**Oﬃce:** ASC 348

**email:** [jason.loeppky@ubc.ca](mailto:jason.loeppky@ubc.ca)

**Lectures:** Monday, Wednesday, Friday (10:30 - 11:30 in ART 108)

**Oﬃce Hours:** Monday 14:00-16:00

**Calendar Description:** Foundation of the use of statistical concepts and methods in en- vironmental science and management. Scientific problem-solving using statistical methods. Integration of the formulation of objectives, study design, and quantitative methods appro- priate for the design. The role and use of statistical software packages.

**Textbook:** Lecture notes will be provided through the course of term. However lecture notes will be inherently incomplete and attending lectures will be essential.

**Software:** R Studio

Homepage: [https://www.rstudio.com](https://www.rstudio.com/)

Download page: <https://www.rstudio.com/products/rstudio/download/>

**Website:** Course Material can be found on Blackboard Connect: [elearning.ubc.ca/connect](http://elearning.ubc.ca/connect/)

# Evaluation:

|  |  |
| --- | --- |
| Final Exam | 30% |
| Assignments | 20% |
| Midterm | 20% |
| Project | 30% |

* You must pass the final in order to pass the course.
* No arrangements can be made to take the midterm at alternative times.

**Examinations:** Examinations will not test your ability to re-produce a formula or re- produce things that are done in class (including R code). Eaminations will be designed to make you think critically about appropriate modelling choices for data and interpret/critique the results of an analysis. Question in this regard may be a blend of multiple choice, true false, explain what is right or wrong with an analysis or written responses explaining results. Examinations will be open book so that you can double check code. However, if you are checking every piece of code you will run out of time.

**Assignments:** Assignments will be given out periodically to ensure that students are staying on top of the material. Assignments will not be weighted equally.

**Project:** Your final project can be an analysis of a problem relevant to biology or environ- mental science, a theoretical derivation of a method we have used in class or the development of a R Shiny App to illustrate a concept taught in class. Initial data and problem descrip- tion due at the end of September. Preliminary plan for data analysis is due at the start of November. Graduate student presentation will be in the last week of class.

**Term Tests:** There will be one in class midterm on October 20, 2017.

**Email:** I check email twice a day, once in the morning and once in the late afternoon. Emails will be answered in order of importance and when they were received. Always best to talk to me before or after class.

# Course Schedule:

Rough list of topics and basic ordering. Coverage of material will be time dependent.

* Review of Statistical principals
  + Hypothesis testing
  + Confidence intervals
  + Types of data
  + Use of R Studio
* Data collection and Working Examples
  + observational studies
  + designed experiments
  + randomization restrictions
  + lack of independence
  + nested error structures
* Regression model
  + Simple regression
  + prediction and error propagation
  + multiple regression
  + diagnostics
  + variable selection
* Modelling of messy data
  + randomization restrictions
  + lack of independence
  + fixed and random eﬀects
  + nested error structures
* Non-normal responses
  + logistic regression

**–** LD50/ED50

* + poisson errors
* Multivariate methods
  + principal components
  + clustering
* Dependent error
  + time dependent error sources
  + spatially dependent errors

# Information on UBC Okanagan policies and services

Academic Integrity – The academic enterprise is founded on honesty, civility, and integrity. As members of this enterprise, all students are expected to know, understand, and follow the codes of conduct regarding academic integrity. At the most basic level, this means submit- ting only original work done by you and acknowledging all sources of information or ideas and attributing them to others as required. This also means you should not cheat, copy, or mislead others about what is your work. Violations of academic integrity (i.e., misconduct) lead to the break down of the academic enterprise, and therefore serious consequences arise and harsh sanctions are imposed. **For example, incidences of plagiarism or cheat- ing usually result in a failing grade or mark of zero on the assignment or in the course.** Careful records are kept to monitor and prevent recidivism. A more detailed description of academic integrity, including the policies and procedures, may be found at [http://www.calendar.ubc.ca/okanagan/index.cfm?tree=3,54,111,959.](http://www.calendar.ubc.ca/okanagan/index.cfm?tree=3%2C54%2C111%2C959) If you have any ques- tions about how academic integrity applies to this course, consult with the instructor.

Disability Assistance – If you require disability-related accommodations to meet the course objectives, please contact the Diversity Advisor of Disability Resources located in the Univer- sity Centre, Room 227. For more information about Disability Resources or academic accom-

modations, please visit the website at: [http://www.ubc.ca/okanagan/students/drc/welcome.html.](http://www.ubc.ca/okanagan/students/drc/welcome.html)

Equity, Human Rights, Discrimination and Harassment – UBC Okanagan is a place where every student, staﬀ and faculty member should be able to study and work in an environment that is free from human rights based discrimination and harassment. If you require assistance related to an issue of equity, discrimination or harassment, please contact the Equity Oﬃce, your administrative head of unit, and/or your unit’s equity representative.

UBC Okanagan Equity Advisor: ph. 250-807-9291; email [equity.ubco@ubc.ca](mailto:equity.ubco@ubc.ca) Web: [www.ubc.ca/okanagan/equity](http://www.ubc.ca/okanagan/equity)

Unit Equity Representatives: <http://www.ubc.ca/okanagan/equity/programs/equityreps/unitcontacts.htm>