Fall 2022
GRADUATE COURSE OUTLINE

FOR3012 - Statistics Module

CLASSROOM LOCATION: ES 4001 and computer lab
CLASS HOURS: Wednesdays 1-4; Tutorials as necessary – Friday 10-1
INSTRUCTOR NAME: Patrick James
INSTRUCTOR EMAIL: patrick.james@utoronto.ca
OFFICE HOURS: Thursday 1-2
OFFICE LOCATION: ES 4017
TAs: Jessie Wen; jessieup.wen@mail.utoronto.ca

COURSE OBJECTIVES

The objective of this module is to provide students with experience in applying the most common statistical procedures. Lectures will introduce key ideas behind the various techniques; laboratories will immediately follow lecture and will focus on hands-on applications in R.

RELEVANCE OF COURSE GOALS AND LEARNING OUTCOMES TO CANADIAN FORESTRY ACCREDITATION BOARD (CFAB)

The course Goals, Content and Learning Outcomes are designed to fulfil some of the requirements prescribed for the following CFAB standards: **Standard 6** (Information acquisition and analysis)

EVALUATION (Assignments are to be undertaken <u>individually</u>):

Assignment	Grade (% of Module)	Due Date
1	10	**Sept. 28**
2	10	**Oct 5**
3	15	**Oct 12**
4	20	**Oct 19**
5	20	**Oct 26**
Final take-home	25	**Nov 2**

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SCHEDULE

Class	Date	Topics	Reading
1	Sept. 21	Why statistics? Introduction to R, scientific programming, and data management; Descriptive statistics Comparing two samples - *t*-tests, paired and unpaired; U-test	Motulsky Chs. 1 & 3; Kozak Ch 1; Dalgaard Ch. 1
2	Sept. 28	Comparing more than two samples ANOVA; Non-parametric methods.	Motulsky Chs. 30, 39, 41; Dalgaard Ch. 5, 7
3	Oct. 5	Statistical models; Linear, multiple, & logistic regression; Model diagnostics; data transformations	Motulsky Chs. 33, 34; Dalgaard Ch. 6; + TBD
4	Oct. 12	Contingency tests (χ^2); Model selection and AIC	Motulsky Ch. 35; Dalgaard Ch. 8; TBD
5	Oct. 19	Multivariate analysis – Ordination (PCA)	Motulsky Ch. 45 + TBD

READINGS

We will use readings from several sources to support the material presented in class and during lab sessions. Readings will be made directly available via *Quercus* or a link will be provided to the UofT library system where an online version of the text can be accessed.

Beyond the readings assigned for each week, students with little experience with statistics or using a programming language such as R, should also refer to the pertinent chapters in Kozak *et al.* (2008) and in Norman and Streiner (2008) for additional background and fundamentals.

Finally, there are many additional resources for the R-language and running analyses which can support your statistical adventure including analysis of data for the biodiversity field course and your Capstone. E.g.: Crawley MJ. 2013. The R Book. Hoboken, N.J: John Wiley & Sons Inc.

https://books-scholarsportal-info.myaccess.library.utoronto.ca/en/read?id=/ebooks/ebooks2/wiley/2013-04-08/1/9781118448908

References

Dalgaard P. 2008. *Introductory statistics with R*. 2nd Ed. New York : Springer. https://link-springer-com.myaccess.library.utoronto.ca/book/10.1007/978-0-387-79054-1

Kozak A, *et al*. 2008. *Introductory Probability and Statistics - Applications for Forestry and Natural Sciences*. Wallingford, UK; Cambridge, MA

Motulsky H. 2010. *Intuitive biostatistics: a nonmathematical guide to statistical thinking*. Oxford University Press, USA.

Norman GR, Streiner DL. 2008. *Biostatistics : the bare essentials*. Hamilton : B.C. Decker

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SOFTWARE

Prior to our first meeting, please download and install R (and RStudio) onto your own computer:

- Download R from https://cran.r-project.org/mirrors.html.

- Choose a "mirror" site near you, click on it, and install the R version for your operating system (Mac, PC, Linux).

- To download RStudio, go to https://rstudio.com/products/rstudio/download/ and install the free "RStudio Desktop". RStudio is a user-friendly, graphical interface that we will use to run R.

- Alternatively, you can also use Notepad++, a free platform for developing code. https://notepad-plus-plus.org/downloads/v8.4.4/

- Note that NP++ does not have the same integrated functionality as R-Studio, but is a useful development environment.

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GRADING

The graduate grading scale is listed as letter grades. The graduate grading scale is included below for your reference:

Graduate		
Letter Grade Scale	Grade Meaning	Numerical Scale of Marks
A+		90 – 100%
A	Excellent	85 – 89%
A-		80 – 84%
B+		77 – 79%
B	Good	73 – 76%
B-		70 – 72%
FZ*	Inadequate	0 – 69%

*FZ=Fail

Please refer to the University of Toronto Grading Practices Policy for additional information: http://www.governingcouncil.utoronto.ca/Assets/Governing+Council+Digital+Assets/Policies/PDF/grading.pdf.

LATE WORK

All assignments are due in class at the specified time and date. Late submission will result in a 5% deduction (of each assignment's total grade) per day (excluding weekends).

In the case of illness or other special circumstance, notification should be given to the Instructors and the Registrar as soon as possible and before the deadline in question. A *Verification of Illness* **(Also known as a "doctor's note") is temporarily not required.** Students who are absent from academic participation for **any reason** (e.g., COVID, cold, flu and other illness or

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injury, family situation) and who require consideration for missed academic work should report their absence through the online absence declaration tool on ACORN. Additional information is available online: http://www.illnessverification.utoronto.ca/index.php

PREPAREDNESS AT UOFT

Students are advised to register for UTAlert, the University's alert system, at http://alert.utoronto.ca/. UTAlert sends important messages to registrants via text, email, and phone.

ACCESSIBILITY NEEDS

The University provides academic accommodations for students with disabilities in accordance with the terms of the Ontario Human Rights Code. This occurs through a collaborative process that acknowledges a collective obligation to develop an accessible learning environment that both meets the needs of students and preserves the essential academic requirements of the University's courses and programs.

If you are a student who identifies with one or more of the broad categories below, we encourage you to register with Accessibility Services: https://studentlife.utoronto.ca/department/accessibility-services/.

- Attention Deficit Hyperactivity Disorder (ADHD)
- Autism Spectrum Disorder
- Brain Injury and Concussion
- Chronic Health
- Deaf and Hard of Hearing
- Learning Disability
- Mental Health
- Mobility and Functional
- Low Vision / Legally Blind
- Temporary Injuries

For any questions or assistance, please see the staff in the Office of the Registrar and Student Services.

ACADEMIC INTEGRITY

Academic integrity is essential to the pursuit of learning and scholarship in a university, and to ensuring that a degree from the University of Toronto is a strong signal of each student's individual academic achievement. As a result, the University treats cases of cheating and plagiarism very seriously. The University of Toronto's Code of Behaviour on Academic Matters (www.governingcouncil.utoronto.ca/policies/behaveac.htm) outlines the behaviours that constitute academic dishonesty and the processes for addressing academic offences. The Code of Behavior on Academic Matters states: "It shall be an offence for a student knowingly […] to represent as one's own any idea or expression of an idea or work of another in any academic examination or term test or in connection with any other form of academic work, i.e., to commit plagiarism." The Code also states: "Wherever in the Code an offence is described as depending on 'knowing,' the offence shall likewise be deemed to have been committed if the person ought reasonably to have known."

Potential offences include, but are not limited to:
In papers and assignments:

1. Using someone else's ideas or words without appropriate acknowledgement.
2. Submitting your own work in more than one course without the permission of the instructor.
3. Making up sources or facts.

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    4. Obtaining or providing unauthorized assistance on any assignment.

On tests and exams:

    1. Using or possessing unauthorized aids.
    2. Looking at someone else's answers during an exam or test.
    3. Misrepresenting your identity.

In academic work:

    1. Falsifying institutional documents or grades.
    2. Falsifying or altering any documentation required by the University, including (but not limited to) doctor's notes.

All suspected cases of academic dishonesty will be investigated following procedures outlined in the Code of Behaviour on Academic Matters. If you have questions or concerns about what constitutes appropriate academic behaviour or appropriate research and citation methods, you are expected to seek out additional information on academic integrity from your instructor or from other institutional resources. For information about academic integrity at the University of Toronto, please see https://www.academicintegrity.utoronto.ca/.

Normally, students will be required to submit their course essays to Turnitin.com for a review of textual similarity and detection of possible plagiarism. In doing so, students will allow their essays to be included as source documents in the Turnitin.com reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University's use of the Turnitin.com service are described on the Turnitin.com website.

For accepted methods of standard documentation formats, including electronic citation of internet sources please see the U of T writing website at: http://www.writing.utoronto.ca/advice/using-sources/documentation.
Please also refer to "Reading and Using Sources: How Not to Plagiarize" on the University of Toronto writing site (http://www.writing.utoronto.ca/).

Student Work – Daniels Publishing Policy

On occasion, the John H. Daniels Faculty of Architecture, Landscape, and Design (the Faculty) will share, use, exhibit, display, broadcast, and distribute images of student work completed in this course in connection with the activities of the Faculty for promoting, publicizing, or explaining the activities of the school. Should you wish to 'opt out', please contact communications@daniels.utoronto.ca, otherwise, your participation in this course grants the Faculty permission to publish such images in PR/promotional materials such as marketing, advertising, fundraising, and any other Faculty-related publication. These images may appear in a wide variety of formats including but not limited to social media, website and print.

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