University of Victoria
School of Exercise Science, Physical and Health Education

EPHE 487/591

BIOMEDICAL STATISTICS

Calendar Description
Units: 1.5   **Hours: 3**

The course will cover classic inferential statistics, select multivariate methods, the "New Statistics", and Bayesian methods of analysis. Students will also gain exposure to multiple statistical platforms including R, JASP, and SPSS.

Course Instructor

> Olave E. Krigolson, PhD   Email: krigolson@gmail.com
> Phone: 250 721 7843
> Office: 187
> Office Hours: By appointment

Class Times and Location

> Mondays and Thursdays
> 10:00am to 11:20am
> Clearihue D134

Website   www.krigolsonteaching.com

Learning Outcomes

At the end of this course, you will be able to:
1. Use the R programming environment to conduct sophisticated statistical analyses.
2. Understand and use the classic descriptive statistics to summarize data: mean, median, mode, variance, standard deviance, maxima, minima, range, confidence intervals.
3. Describe the central limit theory.
4. Discuss sampling theory and sampling distributions.
5. Understand and use correlation and regression.
6. Understand and use multiple regression.
7. Understand the logic of null hypothesis testing and its faults.
8. Understand and use t-tests and various ANOVA models.
9. Understand and discuss the concept of the general linear model.
10. Be familiar with the "New Statistics" as an alternative to classic null hypothesis testing.
11. Be familiar with simple Bayesian models as an alternative to classic null hypothesis testing.

Course Text and other Resources

It is **_strongly_** recommended that you purchase your own copy of "Discovering Statistics Using R" by Andy Field. Other R resources are available for free online however this book is the best and the easiest to read.
Additional readings and assignments will be posted online at www.krigolsonteaching.com

Assessment

Assignments	60%
Final	40%
Total	100%

Assessment Breakdown

Assignments   60% of course grade
                                    Number: 24
                                    Due: Final due date for all assignments is December 8th.
Each class will have an assignment. The assignment must be completed before the next class. Assignments are graded on a pass or fail basis. All 24 assignments must be passed to receive a grade of 60%. 5% will be deducted from 60% for every incomplete / failed assignments. Students will be able to redo failed assignments.

Final Exam   40% of course grade
                                    15 short answer questions
                                    University Exam Period
A final exam consisting of 15 short answer questions will be held during the university exam period. The first 10 questions will be closed book and based on knowledge acquired throughout the course. The remaining 5 questions will be open book and require the student to do statistical analysis similar to the assignments and draw conclusions from these analyses. Students will be allowed to bring in a laptop computer and any resources they need to write the second half of the final exam. Internet access will not be allowed.

Missing / Late Work

Any assignments submitted after December 8th will not be accepted and result in a point deduction. If you are unable to write the final exam at the assigned time there will be a rewrite opportunity during the exam period of the following semester.

Final Grade and Exam Redo

If you do not think your final exam grade reflects your ability in statistics, you can rewrite the final in a subsequent semester(s) to improve your standing. Note, you must achieve a grade of at least 50% on the original final exam to be able to rewrite the final exam at a future point in time.

Course Outline

The course instructor reserves the right to change this course outline at his discretion. This course outline is not a binding contract.

Course Delivery

This course will consist on in person lectures, synchronous online lectures, and asynchronous online lectures. Some classes will solely consist of completing the assigned material and assignment. Note, there are more classes than course dates. The remaining work is to be completed on your own time.

Attendance

Your attendance is expected and mandatory.

Additional Information

Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodations, please feel free to approach me and/or the Resource Centre for Students with a Disability (RCSD) as soon as possible. The RCSD staff are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations http://rcsd.uvic.ca/, the sooner you let us know your needs the quicker we can assist you in achieving your learning goals in this course.

Academic Integrity

Academic integrity is intellectual honesty and responsibility for academic work that you submit individual or group work. It involves commitment to the values of honesty, trust, and responsibility. It is expected that students will respect these ethical values in all activities related to learning, teaching, research, and service. Therefore, plagiarism and other acts against academic integrity are serious academic offences.
The responsibility of the institution
Instructors and academic units have the responsibility to ensure that standards of academic honesty are met. By doing so, the institution recognizes students for their hard work and assures them that other students do not have an unfair advantage through cheating on essays, exams, and projects.
The responsibility of the student
Plagiarism sometimes occurs due to a misunderstanding regarding the rules of academic integrity, but it is the responsibility of the student to know them. If you are unsure about the standards for citations or for referencing your sources, ask your instructor. Depending on the severity of the case, penalties include a warning, a failing grade, a record on the student's transcript, or a suspension.It is your responsibility to understand the University's policy on academic integrity.

Course Overview

1. Introduction
2. Analyzing Data
3. Measures of Central Tendency
4. Measures of Variability
5. Visualizing Data
6. Outlier Analysis
7. Correlation
8. The Logic of NHST
9. Statistical Assumptions
10. T-Tests
11. ANOVA
12. Post-hoc Tests
13. Contrasts
14. Factorial ANOVA
15. Repeated Measures ANOVA
16. Mixed Designs
17. Non-Parametric Tests
18. Regression and Multiple Regression
19. Categorical Data
20. The Problems with NHST
21. The "New" Statistics
22. The Logic of Bayesian Statistics
23. Bayesian Statistics I: T-Tests
24. Bayesian Statistics II: ANOVA