CUMMING SCHOOL OF MEDICINE
GRADUATE COURSE OUTLINE

COURSE TITLE: Introduction to Biostatistical Methods			
Course	VETM/MDCH 605		
Pre/Co-Requisites	None		
Faculty	Cumming School of Medicine, Graduate Science Education		
Instructor Name(s)	Rob Deardon	**Email**	robert.deardon@ucalgary.ca
Office Location	TRW 1E31	**Office Hours**	Monday, 4 PM – 5 PM
Instructor Email Policy	Best means of contact		
Telephone No.	N/A		
TA Name	TBD	**Email**	TBD
Class Term, Days	Fall 2020, MWF		
Class Times	9 AM – 10:15 AM; Tutorial Wed 10:30 AM – 11:20 AM		
Class Location	Online via Zoom		

This course will take place **online** via Desire2Learn (D2L) and Zoom. To best succeed in the course, students are encouraged to participate in the asynchronous learning tasks using the D2L learning environment and synchronous Zoom sessions**.** When unable to participate live due to the time difference or unforeseen circumstances, inform the instructor in advance and propose and implement propose an alternative participation activity

COURSE INFORMATION/DESCRIPTION OF THE COURSE
Introductory course on how to design, and analyze data from, biomedical and veterinary studies. Emphasis is placed upon performing statistical analyses on the data, but also issues of formulating testable research questions, evaluating the appropriateness of different research designs, planning a well-designed experiment or clinical trial, and presenting the results in a scientific manner.
LEARNING RESOURCES/REQUIRED READING
Required Readings, Textbooks, and Learning Materials (available at the UCalgary Bookstore) No textbook is required for this course, but a number of excellent, non-technical textbooks suitable for this course exist. The notes are based on the textbook: **The Statistical Sleuth** by Ramsey and Schafer, Duxbury, Third Edition, 2012.

An alternative textbook of high suitability would be:
Introduction to the Practice of Statistics by Moore, McCabe and Craig, WH Freeman & Co, Seventh Edition, 2010.

Technology Requirements

Access to computer. Statistical Software, *R, will be used.*

This is a command-driven software package that runs all statistical tests and analyses you will need. The software will be used extensively during this course and is free. No experience of using this software is assumed and a major focus of assignments will be in using R.

COURSE OBJECTIVES/LEARNING OUTCOMES

At the end of this course, students will be able to:
1. Formulate testable research questions.
2. Evaluate the appropriateness of different research designs.
3. Plan a designed experimental or clinical study.
4. Analyze the results from observational, experimental or clinical studies (see modules below).

This course will be modular in approach with each module covering an overarching statistical / research problem. The topics covered will be introduced within these modules as required to solve the overarching problem the module defines, but the focus for the student throughout will be in solving the overarching problem itself.

Each module will begin with a few examples of the problems that the module addresses that will be revisited as the statistical methods and concepts are introduced. Concepts introduced in earlier modules will be revisited and emphasized throughout making connections to previously seen material.

Material will be explained in a non-mathematical way as much as possible, with a large degree of focus on concepts, implementation in R and interpretation of results.

The modules to be covered will be:

1. Two group comparisons, continuous response (t-test)

2. Multiple group comparisons, continuous response (ANOVA)

3. Single continuous explanatory, continuous response problems (Simple Linear Regression)

4. Multiple explanatory, continuous response problems (Multiple Linear Regression and ANCOVA)

5. Binary response (proportions, odds, logistic regression)

6. Contingency tables (chi-squared test)

Classroom activities and assignments will give you experience choosing a research design, critiquing research designs, preparing to visit and visiting a statistician, choosing the "right" statistical test, and using R to run statistical tests and analyses.

CUT POINTS FOR GRADES			
This course adheres to the grading system outlined in the University of Calgary, Faculty of Graduate Studies Calendar. Grades of A+ and A are not distinguished in the calculation of GPAs. Percentage/letter grade conversion used for this course is as follows			

Grade	Grade Point Value	Percentage Conversion	Graduate Description
A+	4.00	95-100	Outstanding
A	4.00	85-94	Excellent – superior performance showing comprehensive understanding of the subject matter
A-	3.70	80-84	Very Good Performance
B+	3.30	75-79	Good Performance
B	3.00	70-74	Satisfactory Performance
B-	2.70	65-69	Minimum Pass for Students in the Faculty of Graduate Studies
C+	2.30	55-64	All grades below 'B-" are indicative of failure at the graduate level and cannot be counted toward Faculty of Graduate Studies course requirements
C	2.00	50-54	

Assessment Components: The University policy on grading related matters is outlined in the 2019-2020 Calendar.

Assessment Methods	Description	Weight %	Due Date and Time
Assignment 1	Based on Module 1	20%	Wed 30 Sept, 5pm
Assignment 2	Based on Modules 2 & 3	20%	Wed 21 Oct, 5pm
Assignment 3	Based on Module 4	20%	Mon 16 Nov, 5pm
Assignment 4	Based on Module 5	20%	Mon 7 Dec, 5pm
Final Project	Based on all Modules	20%	Wed 16 Dec, 5pm

ASSESSMENT AND EVALUATION INFORMATION

ATTENDANCE AND PARTICIPATION EXPECTATIONS

Mandatory.

GUIDELINES FOR SUBMITTING ASSIGNMENTS

To be submitted at the beginning of class on due date.

FINAL EXAMINATIONS

None.

EXPECTATIONS FOR WRITING

Writing is expected to be clear and understandable.

LATE ASSIGNMENTS

A scaled deduction will be made for late assignments, resulting in a loss of 1% per hour.

Is a passing grade on a particular component essential to pass the course as a whole?
No.

Course Schedule Date	Topic & Reading	Instructor	Assignments/Due Dates
Week 1: Sept 9 - 14	Observational & Experimental Studies; Causality and Confounding	RD	
Week 2: Sept 16 - 21	Sampling and Sampling Distributions; Confidence Intervals	RD	
Week 3: Sept 23 - 28	T-tests	RD	
Week 4: Sept 30 – Oct 5	Analysis of Variance (ANOVA)	RD	A1 due Wednesday 5pm

Week 5: Oct 7 - 12	Simple Linear Regression I		
Week 6: Oct 14 - 19	Simple Linear Regression II	RD	
Week 7: Oct 21 - 26	Multiple Linear Regression I	RD	A2 due Wednesday 5pm
Week 8: Oct 28 – Nov 2	Multiple Linear Regression II	RD	
Week 9: Nov 4 - 16	Analysis of Covariance (ANCOVA)	RD	No classes (Nov 9 – 13)
Week 10: Nov 18 - 23	Proportions & Odds Logistic Regression I	RD	A3 due Monday 5pm
Week 11: Nov 25 - 30	Logistic Regression II	RD	
Week 12: Dec 2 – 9	Contingency Tables Chi-squared tests	RD	A4 due Monday 5pm

Communication

Brightspace (By D2L) is located on the University of Calgary server and will be used extensively for communication with Students. A link to the zoom class will be provided on D2L. It is the student's responsibility to ensure that they receive all posted communications and documents and that they receive e-mails send by instructors of fellow students through D2L. Only your @ucalgary.ca e-mail address maybe linked to D2L. Please ensure that you are regularly checking your @ucalgary.ca account

Technology requirements

In order to successfully engage in learning experiences at the University of Calgary, students taking online, remote and blended courses are required to have reliable access to the following technology:

- A computer with a supported operating system, as well as the latest security and malware updates;
- A current and updated web browser;
- Webcam (built-in or external);
- Microphone and speaker (built-in or external), or headset with microphone;
- Current antivirus and/or firewall software enabled;
- Broadband internet connection

Most current laptops will have a built-in webcam, speaker and microphone.

Please see the following for a detailed explanation of the minimal required technology for online learning https://elearn.ucalgary.ca/technology-requirements-for-students/

A laptop, desktop, tablet or mobile device is required for D2L access. If you need help accessing or using D2L, please visit the Desire2Learn resource page for students: http://elearn.ucalgary.ca/d2l-student/.

Guidelines for Zoom Sessions

Zoom is a video conferencing program that will allow us to meet at specific times for a 'live' video conference, so that we can have the opportunity to meet each other virtually and discuss relevant course topics as a learning community.

To help ensure Zoom sessions are private, do not share the Zoom link or password with others, or on any social media platforms. Zoom links and passwords are only intended for students registered in the course. Zoom recordings and materials presented in Zoom, including any teaching materials, must not be shared, distributed or published without the instructor's permission.

The use of video conferencing programs relies on participants to act ethically, honestly and with integrity; and in accordance with the principles of fairness, good faith, and respect (as the Code of Conduct). When entering Zoom or other video conferencing sessions, you play a role in helping create an effective, safe and respectful learning environment. Please be mindful of how your behaviour in these sessions may affect others. Participants are required to use names officially associated with their UCID (legal or preferred names listed in the Student Centre) when engaging in these activities. Instructors/moderators can remove those whose names do not appear on class rosters. Non-compliance may be investigated under relevant University of Calgary conduct policies. If participants have difficulties complying with this requirement, they should email the instructor of the class explaining why, so the instructor may consider whether to grant an exception, and on what terms. For more information on how to get the most out of your zoom sessions visit: https://elearn.ucalgary.ca/guidelines-for-zoom/.

If you are unable to attend a Zoom session, please contact your instructor to arrange an alternative activity (where available). Please be prepared, as best as you are able, to join class in a quiet space that will allow you to be fully present and engaged in Zoom sessions. Students will be advised by their instructor when they are expected to turn on their webcam (such as for group work, presentations, etc).

The instructor may record online Zoom class sessions for the purposes of supporting student learning in this class – such as making the recording available for review of the session or for students who miss a session. Students will be advised before the instructor initiates a recording of a Zoom session. These recordings will be used to support student learning only.

Conduct During Lectures

The classroom should be respected as a safe place to share ideas without judgement - a community in which we can all learn from one another. Students are expected to frame their comments and questions to lecturers in respectful and appropriate language, always maintaining sensitivity towards the topic. Students, employees, and academic staff are also expected to demonstrate behaviour in class that promotes and maintains a positive and productive learning environment.

As members of the University community, students, employees and academic staff are expected to demonstrate conduct that is consistent with the University of Calgary Calendar, the Code of Conduct and Non-Academic Misconduct policy and procedures, which can be found at https://www.ucalgary.ca/policies/forms/title.

INTERNET AND ELECTRONIC COMMUNICATION DEVICE INFORMATION

Cell phones must be turned off in class unless otherwise arranged with the instructor.

The use of laptop and mobile devices is acceptable when used in a manner appropriate to the course and classroom activities. Students are to refrain from accessing websites that may be distracting for fellow learners (e.g. personal emails, Facebook, YouTube). Students are responsible for being aware of the University's Internet and email use policy, which can be found at https://www.ucalgary.ca/policies/files/policies/electronic-communicationspolicy.pdf.

MEDIA AND RECORDING IN LEARNING ENVIRONMENTS

Media recording for lesson capture
The instructor may use media recordings to capture the delivery of a lecture. These recordings are intended to be used for lecture capture only and will not be used for any other purpose. Although the recording device will be fixed on the Instructor, in the event that incidental student participation is recorded, the instructor will ensure that any identifiable content (video or audio) is masked, or will seek consent to include the identifiable student content to making the content available on University approved platforms.

Media recording for assessment of student learning
The instructor may use media recordings as part of the assessment of students. This may include but is not limited to classroom discussions, presentations, clinical practice, or skills testing that occur during the course. These recordings will be used for student assessment purposes only and will not be shared or used for any other purpose.

Media recording for self-assessment of teaching practices
The instructor may use media recordings as a tool for self-assessment of their teaching practices. Although the recording device will be fixed on the instructor, it is possible that student participation in the course may be inadvertently captured. These recordings will be used for instructor self-assessment only and will not be used for any other purpose.

Student Recording of Lectures
Audio or video recording of lectures is prohibited except where explicit permission has been received from the instructor.

UNIVERSITY OF CALGARY POLICIES AND SUPPORTS

ACADEMIC ACCOMMODATIONS
Students seeking an accommodation based on disability or medical concerns should contact Student Accessibility Services; SAS will process the request and issue letters of accommodation to instructors. For additional information on support services and accommodations for students with disabilities, visit www.ucalgary.ca/access/. Students who require an accommodation in relation to their coursework based on a protected ground other than disability should communicate this need in writing to their Instructor. The full policy on Student Accommodations is available at http://www.ucalgary.ca/policies/files/policies/student-accommodation-policy.pdf

IMPORTANT INFORMATION
Any research in which students are invited to participate will be explained in class and approved by the appropriate University Research Ethics Board

INSTRUCTOR INTELLECTUAL PROPERTY
Course materials created by professor(s) (including course outlines, presentations and posted notes, labs, case studies, assignments and exams) remain the intellectual property of the professor(s). These materials may NOT be reproduced, redistributed or copied without the explicit consent of the professor. The posting of course materials to third party websites such as note-sharing sites without permission is prohibited. Sharing of extracts of these course materials with other students enrolled in the course at the same time may be allowed under fair dealing

COPYRIGHT LEGISLATION
All students are required to read the University of Calgary policy on Acceptable Use of Material Protected by Copyright (www.ucalgary.ca/policies/files/policies/acceptable-use-of-material-protected-by-copyright.pdf) and requirements of the copyright act (https://laws-lois.justice.gc.ca/eng/acts/C-42/index.html) to ensure they are aware of the consequences of unauthorised sharing of course materials (including instructor notes, electronic versions of textbooks etc.). Students who use material protected by copyright in violation of this policy may be disciplined under the Non-Academic Misconduct Policy

ACADEMIC INTEGRITY
The Cumming School of Medicine expects intellectual honesty from its students. Course participants should be aware of University policies relating to Principles of Conduct, Plagiarism and Academic Integrity. These are found in the printed Faculty of Graduate Studies Calendar, or online under Academic Regulations in the Faculty of Graduate Studies Calendar, available at **Faculty of Graduate Studies Academic Regulations**

ACADEMIC MISCONDUCT
For information on academic misconduct and its consequences, please see the University of Calgary Calendar at http://www.ucalgary.ca/pubs/calendar/current/k.html

EMERGENCY EVACUATION AND ASSEMBLY POINTS

Assembly points for emergencies have been identified across campus. The primary assembly points for South Campus (Health Science Centre (HSC); Health & Research Innovation Centre (HRIC); Heritage Medical Research Building (HMRB) and Teaching, Research and Wellness (TRW)) are:
- HSC and HMRB: HRIC Atrium (alternate assembly point is Parking Lot 6)
- HRIC: HMRB Atrium (alternate assembly point is Parking Lot 6)
- TRW: McCaig Tower (alternate assembly point is HMRB – Atrium)

APPEALS
If there is a concern with the course, academic matter or a grade, first communicate with the instructor. If these concerns cannot be resolved, students can proceed with an academic appeal, as per Section N of the Faculty of Graduate Studies Calendar. Students must follow the official process and should contact the Student Ombuds Office (http://www.ucalgary.ca/provost/students/ombuds) for assistance with this and with any other academic concerns, including academic and non-academic misconduct

THE FREEDOM OF INFORMATION AND PROTECTION OF PRIVACY (FOIP) ACT
This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIP) and students should identify themselves on written assignments (exams and term work.) by their name and ID number on the front page and ID on each subsequent page. Assignments given by you to your course instructor will remain confidential unless otherwise stated before submission. The assignment cannot be returned to anyone else without your expressed permission to the instructor. Grades will be made available on an individual basis and students will not have access to other students' grades without expressed consent. Similarly, any information about yourself that you share with your course instructor will not be given to anyone else without your permission

WELLNESS AND MENTAL HEALTH RESOURCES
The University of Calgary recognizes the pivotal role that student mental health plays in physical health, social connectedness and academic success, and aspires to create a caring and supportive campus community where individuals can freely talk about mental health and receive supports when needed. We encourage you to explore the excellent mental health resources available throughout the university community, such as counselling, self-help resources, peer support or skills-building available through the SU Wellness Centre (Room 370, MacEwan Student Centre), https://www.ucalgary.ca/wellnesscentre/services/mental-health-services and the Campus Mental Health Strategy website https://www.ucalgary.ca/mentalhealth/"

SUPPORTS FOR STUDENT LEARNING, SUCCESS, AND SAFETY

Student Ombudsman: The Student Ombuds' Office supports and provides a safe, neutral space for students. For more information, please visit www.ucalgary.ca/ombuds/ or email ombuds@ucalgary.ca

Student Union: The SU Vice-President Academic can be reached at (403) 220-3911 or suvpaca@ucalgary.ca; Information about the SU, including elected Faculty Representatives can be found here: https://www.su.ucalgary.ca

Graduate Student's Association: The GSA Vice-President Academic can be reached at (403) 220- 5997 or gsa.vpa@ucalgary.ca; Information about the GSA can be found here: https://gsa.ucalgary.ca

SAFEWALK

Campus security will escort individuals, day or night, anywhere on campus (including McMahon Stadium, Health Sciences Centre, Student Family Housing, the Alberta Children's Hospital and the University LRT station). Call 403-220-5333 or visit http://www.ucalgary.ca/security/safewalk. Use any campus phone, emergency phone or the yellow phone located at most parking lot pay booths. Please ensure your personal safety by taking advantage of this service.