UNIVERSITY OF CALGARY

DEPARTMENT OF BIOLOGICAL SCIENCES
COURSE OUTLINE

1. **Course: BIOLOGY 609 – Advanced Statistical Applications in Biology**

Lecture Sections: L01 MW 15:30-16:45 BI 182 Fall 2015

Instructor: **Dr. L.D. Harder** **BI 276A** **220-6489** **harder@ucalgary.ca**

Desire 2 Learn (D2L) course name https://d2l.ucalgary.ca/d2l/home/107065

Biological Sciences Department BI 186; (403) 220-3140; biosci@ucalgary.ca

2. **PREREQUISITES:** Familiarity with statistical inference, regression, and ANOVA-based experimental design (equivalent of Ecology 425) is required.
See section 3.5.C in the Faculty of Science section of the online Calendar
(http://www.ucalgary.ca/pubs/calendar/current/sc-3-5.html)

3. **GRADING**: The University policy on grading and related matters is described sections F.1 and F.2 of the online University Calendar. In determining the overall grade in the course the following weights will be used:

Assignments	80%
Final Take-home Examination	20%

Each piece of work (assignment, laboratory report, midterm test or final examination) submitted by the student will be assigned a percentage score. The student's average percentage score for the various components listed above will be combined with the indicated weights to produce an overall percentage for the course, which will be used to determine the course letter grade.

Tentative grade breakdown (thresholds may be lowered slightly, but will not be raised):

A+	≥ 95%
A	90%
A-	85%
B+	80%
B	76%
B-	72%
C+	67%
C	62%
C-	58%
D+	54%
D	50%
F	< 50%

Percentages will be rounded to the nearest 0.1 (e.g., 72.45 → 72.5%, 72.44 → 72.4%)

Note: All grades below "B-" are indicative of failure at the graduate level and cannot be counted toward Faculty of Graduate Studies course requirements.

4. **Missed Components of Term Work**. The regulations of the Faculty of Science pertaining to this matter are found in the Faculty of Science area of the Calendar in Section 3.6. It is the student's responsibility to familiarize himself/herself with these regulations. See also Section E.6 of the University Calendar

5. **EXAMINATION POLICY**: Students should also read the Calendar, Section G, on Examinations: **http://www.ucalgary.ca/pubs/calendar/current/g.html**."

6. **Course Materials:** No textbook.

7. **Examination Policy**: Wireless access devices, including cell phones, ***cannot*** be used during the examination. Calculators can be used with permission of the Instructor. See also Section G of the University Calendar.

8. **Writing across the curriculum statement:** "In this course, the quality of the student's writing in laboratory reports will be a factor in the evaluation of those reports. See also Section E.2 of the University Calendar.

10. OTHER IMPORTANT INFORMATION FOR STUDENTS:

(a) Academic Misconduct: (cheating, plagiarism, or any other form) is a very serious offence that will be dealt with rigorously in all cases. A single offence may lead to disciplinary probation or suspension or expulsion. The Faculty of Science follows a zero tolerance policy regarding dishonesty. Please read the sections of the University Calendar under Section K. Student Misconduct to inform yourself of definitions, processes and penalties

(b) Assembly Points: In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on assembly points.

(c) Student Accommodations: Students needing an Accommodation because of a Disability or medical condition should contact Student Accessibility Services in accordance with the Procedure for Accommodations for Students *with Disabilities available at http://www.ucalgary.ca/policies/files/policies/procedure-for-accommodations-for-students-with-disabilities_0.pdf*.

Students needing an Accommodation in relation to their coursework or to fulfil requirements for a graduate degree, based on a Protected Ground other than Disability, should communicate this need, preferably in writing, to the Associate Head of Biological Sciences, Dr. H. Addy by email addy@ucalgary.ca or phone 403 220-3140.

(d) Safewalk: Campus Security will escort individuals day or night (http://www.ucalgary.ca/security/safewalk/). Call 220-5333 for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.

(e) Freedom of Information and Privacy: This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPP). As one consequence, students should identify themselves on all written work by placing their name on the front page and their ID number on each subsequent page. For more information see also

(f) http://www.ucalgary.ca/secretariat/privacy.

(g) Student Union Information: VP Academic Phone: 403 220-3911 Email: suvpaca@ucalgary.ca
SU Faculty Rep. Phone: 403 220-3913 Email: science1@su.ucalgary.ca, science2@su.ucalgary.ca and science3@su.ucalgary.ca;
Student Ombuds Office: 403 220-6420 Email: ombuds@ucalgary.ca; http://ucalgary.ca/provost/students/ombuds

(h) Internet and Electronic Device Information: You can assume that in all classes that you attend, your cell phone should be turned off unless instructed otherwise. Also, communication with other individuals, via laptop computers, smart phones or other devices connectable to the Internet is not allowed in class time unless specifically permitted by the instructor. If you violate this policy you may be asked to leave the classroom. Repeated abuse may result in a charge of misconduct.

(i) At the University of Calgary, feedback provided by students through the Universal Student Ratings of Instruction (USRI) survey provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses (www.ucalgary.ca/usri). Your responses make a difference - please participate in USRI Surveys.

Department Approval: ORIGINAL SIGNED **Date**

Tentative Lecture Schedule

Lecture	Date	Topic
1	Sept 9	Course introduction and introduction to SAS
2	Sept 14	Introduction to SAS
3	Sept 16	Distributions – probability density & continuous distributions (uniform and normal)
4	Sept 21	Distributions – exponential distribution, discrete distributions (Bernoulli, binomial, Poisson)
5	Sept 23	Parameter estimation – least squares
6	Sept 28	Parameter estimation – maximum likelihood
7	Sept 30	Hypothesis testing – inference, *t* test, partial *F*-test
8	Oct 5	Hypothesis testing – likelihood-ratio, AIC
9	Oct 7	Linear models
10	Oct 14	Contrasts
11	Oct 19	Contrasts
12	Oct 21	Generalized linear models
13	Oct 26	Generalized linear models
14	Oct 28	Random-effects models
15	Nov 2	Mixed effects - randomized blocks
16	Nov 4	Mixed effects - repeated measures
17	Nov 9	Mixed effects - repeated measures
18	Nov 16	Nonlinear analysis
19	Nov 18	Randomization tests
20	Nov 23	Resampling techniques – jackknife, bootstrap, cross-validation
21	Nov 25	Multivariate techniques – principal components analysis
22	Nov 30	Multivariate techniques – MANOVA, discriminant functions
23	Dec 2	Displaying data
24	Dec 7	TBD