AMBROSE
UNIVERSITY COLLEGE

Winter 2011

BIO 310 QUANTITATIVE METHODS for the BIOLOGICAL SCIENCES
BIO 310L LAB
Instructor: Don Liteplo

Course Description

This course provides an introduction to descriptive and inferential statistical techniques used in biological research. The course content includes the study and application of procedures for analyzing data and for making inferences based on the analysis. Major topics include: tabulation and graphic representation of data, summary statistics, probability, normal curve applications and z-scores, confidence intervals, hypothesis tests (t-tests, ANOVA), and correlation/regression analysis.

The course has lecture and lab components. Lecture time is devoted mainly to explanation and illustration of statistical theory, techniques, and rationale. Lab time is devoted mainly to the demonstration of statistical software applications and to tutorial-style assistance by the instructor during hands-on practice and the completion of assignments by the students.

Course Term

Dates: Classes/Labs from January 12th to April 14th, 2011
Times: Lectures on Wednesdays and Fridays from 9:45 to 11:00 am
Lab Sessions on Mondays from 2:30 to 3:45 pm
Location: Lectures are in Room A2131
Lab Sessions are in Room A2131

Contacting the Instructor

Office: Room L2052 (Office Hours Posted on Office Door: other times are available by appointment.)
Office Telephone: (403) 410-2000 (Ext. 6907)
E-mail Address: dliteplo@ambrose.edu

As the course progresses, students of this course may be given a different (preferred) telephone number and/or e-mail address for *outside of class/lab* contact with the instructor. It is the student's responsibility to be sure that he/she has up-to-date contact information.

Additional Information

The primary objective of this course is to aid students in the interpretation and evaluation of research findings reported in scientific journals, newspapers, and other forms of media, by helping the students to develop a good understanding of the basic statistical concepts and procedures that are used to analyze biological research data.

In addition to the successful completion of prerequisite courses (see Calendar), students are required to be competent in the use of personal computers and must have a good working knowledge of basic mathematics (e.g., fractions, percentages, decimals, algebraic equations) in order to complete the course successfully. No statistical software experience is expected. To aid students whose math skills are a bit rusty, the text includes a basic math review (see Appendix A).

Expected Learning Outcomes

A combination of classroom instruction and laboratory practice is designed to provide students with the opportunity to improve critical thinking skills (through the application of statistical procedures and the interpretation of statistical results) and to enhance computer literacy skills (through hands-on use of statistical software – SPSS).

Course Organization

In general, material that is covered in lecture sessions will be followed-up with lab work which covers the same material – but, at the instructor's discretion, portions (or all) of some lab sessions may be used to finish coverage of materials that couldn't be completed in the lecture classroom and some lab sessions may be devoted to the writing of quizzes. The lab sessions are an integral part of the course – attendance at lab sessions is ***not*** to be regarded as optional.

Required Text (must be possessed by each student)

Essentials of Statistics for the Behavioural Sciences, Seventh Edition,
Gravetter, F. & Wallnau, L. (2011), Wadsworth.

Other Course Materials

The statistical theory and techniques taught in the required text are common to many fields of scientific enquiry, but students will notice that the text examples and data sets are particularly oriented to the behavioural sciences. Through the semester, the instructor will introduce some examples and data sets (handouts from outside sources) which are related more closely to the biological sciences.

Each student is required to have an Ambrose Computer Account and a USB Thumb-Drive (or other suitable media which can be used to **save** work being done in the lab sessions).

A hand-held electronic calculator with *statistical functions* is required. The calculator must be able to accept the input of raw statistical data and provide the student with at least the following output: Σ_x, Σ_x^2, mean, variance, and standard deviation. Students will find that using such a tool will considerably reduce time spent in calculations. This is especially valuable when handling complex assignments and writing quizzes/examinations. While a particular calculator (make and model) cannot be specified, it is recommended that any such calculator purchased have statistical capabilities similar to the TI BA II Plus. Students who do not already possess an appropriate calculator may wish to obtain information from the instructor during the first week of classes before deciding on the make and model to acquire. Note that the course instructor will endeavor to assist students with calculator applications, and can provide considerable assistance with the above-named calculator but, because of the wide variety of calculators in use, each student is ultimately responsible for knowing how to use the calculator that he/she brings to the course.

Arrangements may be made for copies of the *Study Guide* for Essentials of Statistics for the Behavioural Sciences, Seventh Edition, Gravetter, F. (2011), to be available at the Ambrose Library to be signed out for short periods of time. This booklet contains review materials and self-tests (with answers to the self-test questions). Students may find the practice questions in the text, together with course handout materials, to be sufficient.

Note, also, that there is a book companion website for your text at:
www.cengage.com/psychology/gravetter
This website provides additional self-study materials.

The text includes instructions/examples of SPSS applications, and the course instructor will provide some handout readings and examples (in hardcopy, or as pdf files which can be accessed via MOODLE) as the course progresses. The SPSS software has been installed by Ambrose IT staff on campus computers which are usually accessible to students in the Commons area or in the Lab. Students should not need to possess their own copies of the software (which could be installed on their own PCs), but it may be possible that copies of a student version (either 17.0 or 18.0) could be ordered through the campus bookstore for purchase by students.

Attendance

The general expectation is that students will attend all classes and lab sessions in which they are registered. A combination of low academic performance and notable absences from classes or lab sessions may be brought to the attention of the program head. Additionally, a portion of the final grade for this course includes a percentage for *participation*, and absences from lecture and/or lab sessions can negatively impact marks for participation.

Course Schedule

A *Detailed Course Schedule* will be handed out in the first week of the semester. This schedule will set out the topics, dates, and times for the lectures and lab sessions, and will also show the dates and times for assignments, quizzes, and the mid-term examination. The dates and times are subject to change at the instructor's discretion as the course progresses; changes, if any, will be few and will be communicated in advance. The following is a Broad Course Schedule.

TOPIC	TEXT REFERENCE
Introduction to Statistics	Chapter 1
Frequency Distributions	Chapter 2
Central Tendency	Chapter 3
Variability	Chapter 4
Standardized Distributions	Chapter 5
Probability	Chapter 6
Distribution of Sample Means	Chapter 7
Introduction to Hypothesis Testing	Chapter 8
Introduction to the t Statistic	Chapter 9
The t-Test for Two Independent Samples	Chapter 10
The t-Test for Two Dependent Samples	Chapter 11
Confidence Intervals	Chapter 12
Analysis of Variance (ANOVA)	Chapter 13
Correlation and Regression	Chapter 15

We will not be covering all of the content of all of the above chapters – the pages that are required reading will be contained in a Readings List that will be handed out as the course progresses. There will be **no** (or very little) coverage of the material in chapters 14 and 16. Note also that some information that is not included in the text will be covered in the lecture/lab sessions and can be included in assignments, quizzes, and examinations.

Course Requirements and Grading

Student performance will be evaluated in a combination of classroom participation and graded assignments, quizzes, mid-term examination, and final examination. Mark allocation is as follows:

Participation	5%
Three Assignments	18% (6% each)
Three Quizzes	24% (8% each)
Mid-Term Exam	18%
Final Exam	35%
	100%

Lab practice exercises are not graded, but students are required to complete them in order to be eligible to write the mid-term and final examinations. The completed exercises (in the student's own handwriting, and with pertinent computer output) are to be shown to the instructor at the end of the relevant lab session *for entry in a "completion" record*.

Students need not receive a passing grade on all components of term work and examinations in order to pass the course. However, failure to submit an assignment or write a quiz/examination, without the prior approval of the instructor, may result in an F grade for the course.

Students are required to read in the above-listed chapters of the textbook, and in other reference materials which may be specifically-assigned for reading, in order to be prepared for the classroom lectures, discussion, and problem-solving. A detailed readings list will be handed out early in the semester.

Marks for classroom/lab participation are based on the instructor's impression (cumulative through the semester) of the student's efforts to review and comprehend text material, the student's classroom and lab session attitude, quality of responses to questions asked by the instructor, and quantity/quality of contributions to classroom/lab discussion. As well, absences from class and/or lab sessions can negatively impact marks for *participation*.

Assignments/Quizzes

The assignments will be take-home exercises. One of the quizzes may be a take-home exercise. Deadlines for completion and submission of these will be clearly indicated in advance.

Any take-home assignment/quiz submitted by a student after the due date will be penalized by 50%, but if submitted after answer keys have been posted, or after any graded materials have been returned to any students, a grade of 0% will be awarded.

All assignment and quiz papers must include the student's name (printed clearly).

Note that in order for a student to be eligible to write the mid-term and final examinations, he/she must have completed/submitted all work due by the date of the examination – this includes all lab exercises, all take-home papers, and all quizzes. The mark for an in-class quiz which is *missed with a legitimate reason* (typically illness, evidenced by a Doctor's note) will normally be spread across (transferred to) the other quizzes and assignments.

Mid-Term Examination

The mid-term examination will be 1 1/4 hours (75 minutes) in length. It will be written during regular class (or lab) time *per the Detailed Course Schedule* and can cover all materials included in the course up to the date of the exam.

A grade of 0% will be awarded for a mid-term examination missed *without a legitimate reason*. If the mid-term examination is missed *with a legitimate reason*, a make-up mid-term examination will be arranged within one week. If the instructor determines that this arrangement is not practical, the final grade will be reallocated as follows:

Participation	6%
Three Assignments	24% (8% each)
Three Quizzes	30% (10% each)
Final Exam	40%
	100%

Final Examination

The final examination will be comprehensive (i.e., can cover any materials included in the course during the semester, but emphasis will be on the material covered in the last half of the course). The final examination will have a maximum writing time of three hours (180 minutes). The exact time and date for writing will be posted by the Registrar. The final examination will be written during the final examination period – April 18th to 26th, 2011 – following the last day of classes. It is the student's responsibility to ensure that he/she does not have any conflicting commitments during the final examination period.

Graded final examinations will be available for supervised review at the request of the student.

Available Letters for Course Grades

% Grade	Letter Grade	Description
95% to 100%	A+	
90% to 94%	A	Excellent
85% to 89%	A-	
80% to 84%	B+	
76% to 79%	B	Good
72% to 75%	B-	
68% to 71%	C+	
64% to 67%	C	Satisfactory
60% to 63%	C-	
55% to 59%	D+	
50% to 54%	D	Minimal Pass
0% to 49%	F	Failure

Important Notes

The last day to:
- enter a course without permission
- withdraw from a course
- change to audit

and receive tuition refund, is Friday, January 21st, (Winter, 2011 Semester).

The last day to:
- withdraw from a course or change to audit

without academic penalty is Friday, March 18th, (Winter, 2011 Semester).

Course withdrawal forms are available from the Registrar. Students who do not follow the proper withdrawal procedures will be recorded as having failed the course.

Students are reminded that examinations will be actively invigilated. Students may only bring to an examination room items stipulated by the instructor to be required for the completion of the examination. All non-essential items (including, but not limited to, hats, coats, gloves, knapsacks, purses, and electronic devices other than approved calculators) must be left in an area of the examination room designated by the instructor. All cell phones and other unauthorized electrical devices MUST be turned off during examinations. Failure to comply may result in a failing grade for the examination.

Please note that final grades will be available on your student portal. Printed grade sheets are no longer mailed out.

It is the responsibility of all students to become familiar with and adhere to academic policies as stated in the Student Handbook and Academic Calendar. Personal information, that is information about an individual that may be used to identify that individual, may be collected as a requirement as part of taking this class. Any information collected will only be used and disclosed for the purpose for which the collection was intended. For further information contact the Privacy Compliance Officer at privacy@ambrose.edu.

Although extensions to coursework in the semester are at the discretion of the instructor, students may not turn in coursework for evaluation after the last day of the scheduled final examination period unless they have received permission for a "Course Extension" from the Registrar's Office. Requests for course extensions or alternative examination time must be submitted to the Registrar's Office by the appropriate deadline (as listed in the Academic Calendar http://www.ambrose.edu/publications/academiccalendar). Course extensions are only granted for serious issues that arise "due to circumstances beyond the student's control."

We are committed to fostering personal integrity and will not overlook breaches of integrity such as plagiarism and cheating. Academic dishonesty is taken seriously at Ambrose University College as it undermines our academic standards and affects the integrity of each member of our learning community. Any attempt to obtain credit for academic work through fraudulent, deceptive, or dishonest means is academic dishonesty. Plagiarism involves presenting someone else's ideas, words, or work as one's own. Plagiarism is fraud and theft, but plagiarism can also occur by accident when a student fails or forgets to give credit to another person's ideas or words. Plagiarism and cheating can result in a failing grade for an assignment, for the course, or immediate dismissal from Ambrose University College. Students are expected to be familiar with the policy statements in the current academic calendar and the student handbook that deal with plagiarism, cheating, and the penalties and procedures for dealing with these matters. All cases of academic dishonesty are reported to the Academic Dean and become part of the student's permanent record.

Course changes, including adding or dropping a course, may be made during the Registration Revision period, as outlined in the Calendar of Events. All course changes must be recorded on a Registration form, available from the Office of the Registrar. Due to circumstances such as class size, prerequisites or academic policy, the submission of a Registration form does not guarantee that a course will be added or removed from a student's registration. Students may change the designation of any class from credit to audit

up to the date specified in the Calendar of Events, although students are not entitled to a tuition adjustment or refund after the Registration Revision period.

Withdrawal from courses after the Registration Revision period will not be eligible for tuition refund. Students intending to withdraw from some or all of their courses must submit a completed Registration form to the Registrar's office. The dates by which students may voluntarily withdraw from a course without penalty are listed in the Calendar of Events. A grade of 'W' will be recorded on the student's transcript for any withdrawals from courses made after the end of the Registration Revision period and before the Withdrawal Deadline (also listed in the Calendar of Events). 'W' grades are not included in grade point average calculations. A limit on the number of courses from which a student is permitted to withdraw may be imposed. Students wishing to withdraw from a course, but who fail to do so by the applicable date, will receive the grade earned in accordance with the course syllabus. A student obliged to withdraw from a course after the Withdrawal Deadline because of health or other reasons may apply to the Registrar for special consideration.

An appeal for change of grade on any course work must be made to the course instructor within one week of receiving notification of the grade. An appeal for change of final grade must be submitted to the Office of the Registrar in writing within 30 days of receiving notification of the final grade, providing the basis for appeal. A review fee of $50.00 must accompany the appeal to review final grades. If the appeal is sustained, the fee will be refunded. Note that the review could justify an increase, no change, or a decrease in the final grade.

Students are advised to retain this syllabus for their records.

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