TEXAS A&M UNIVERSITY
COMMERCE
College of Science and Engineering

BSC 412.01E: Quantitative Biology – Fall 2024

MWF 9:00 – 9:50 am; STC 210

Instructor Information:
Dr. Bjorn Schmidt
Office: STC 212
Email: bjorn.schmidt@tamuc.edu
Preferred contact: email
Office hours: MWF 11:00 am – 11:50 am, or by appointment through email

Textbook & materials (required):

The Analysis of Biological Data. 3rd edition. 2020. Whitlock, Michael C. & Schluter, Dolph. ISBN: 978-1-319-22623-7

9781319226237

Access to a computer and d2l (myleo online) is required; all course materials will be uploaded through d2l

It will be useful to have a computer that can be used outside of class to complete assignments, however the computers in classroom STC 210 will also be available for assignments. Some class time will be dedicated to doing and reviewing worksheets with statistical problems. You are expected to complete these worksheets inside or outside of class on your own laptop/computer or on the STC 210 computers.

The statistical program that we will use in the course is R. R is a free program that is user sourced and therefore can perform any statistical procedure. Specific instructions for downloading and setting up R will be presented in the course. More information about R and computer requirements can be obtained at https://cran.r-project.org/

Course Description
The objective of this course is to provide students with the knowledge and understanding of the methods of statistical analysis applicable to biological research. Emphasis will be placed on the

concepts and application of statistical thinking. Basic probability theory, parametric and nonparametric statistics including t-tests, chi-squared, analysis of variance, correlation, regression, and other quantitative methods will be introduced.

Course Requirements

Prerequisite: MATH 1314 with minimum grade of C

Minimal Technical Skills Needed:

- Proficiency in using the D2L Brightspace Learning Management System in myLEO Online
- Proficiency in using and access to Microsoft PowerPoint
- Able to perform basic computer code manipulation and editing in R (instructions provided during class)

Student Learning Outcomes

- Students will be able to use the R software program to perform basic statistical analysis
- Students will be able to explain the difference between practical significance and statistical significance
- Students will understand the theory behind statistical analysis including probability, estimation, and hypothesis testing
- Students will interpret and present descriptive statistics of data and perform different statistical analyses on different types of data

Instructional Methods

Instruction will consist of in-class lectures and discussions. Students are also expected to do at home readings corresponding to chapter content covered in the class lectures as shown in the course schedule. PowerPoints for lectures will be made available that day through d2l (myLeo Online). Students will also do hands on statistical analysis of worksheet problems using R. Some class time will be dedicated to reviewing completed worksheets done with R, where questions or problems students encounter will be addressed. Tests will also consist of some analysis type questions using the techniques learned for those sections in R. Completed worksheets will need to be turned in online by the listed due dates in the d2l system. Announcements will be presented during class time and will also be announced in d2l system. Gradebooks will be maintained in d2l.

*Use of AI, Chatbots, or other text generation software is **not allowed** in the course. Students can work collaboratively on the homework, but each student is responsible for knowing the information and how to use the R functions on the exams. Each student should answer worksheet questions independently.*

Course Evaluations

Tests: There will be three term exams on specific dates and a comprehensive final exam scheduled during finals week. Material for the final exam will be 33% new material that was covered after exam 3 and 66% older material that was covered on exams 1-3.

Tutorials: Each computer lab day will have a tutorial for how to use R for that week's material. Answers for the tutorial will need to be uploaded generally by midnight of that tutorial day in d2l unless the instructor specifies differently for that tutorial. It is important to attend class on computer days, so that hands on help can be given for the analysis if any problems arise. Tutorials are intended to give guided practice for using functions in R for each assignment, and so that any issues, questions, or concerns can be addressed before the worksheet assignment is done or those functions are used in exams.

Worksheets: There will be nine required worksheets and one extra credit worksheet posted on specific days. Worksheets and associated files will be posted in the content tab of d2l. For each assignment, students will need to download the worksheet file (assignment instructions & questions), the Rscript file (code used in R). Students will work through datasets in R using statistical methods covered in the class and upload answers back to d2l before the listed deadlines in the schedule (upload answers to an untimed "quiz" file in d2l for that worksheet). Before each exam class time will be given to go over the worksheets to address questions, problems, and common mistakes encountered.

Extra Credit: 1) At the end of the semester, a short exit quiz will be made available to assess learning outcomes in the course. Completion of the optional exit test will award the student 20 points extra credit. 2) Worksheet 10 is an optional review/study guide worksheet, and is also an extra credit option at the end of the semester that is designed to help you study for the final.

Grading

A: 89.96-100%
B: 79.96-89.95%
C: 69.96-79.95%
D: 59.96-69.95%
F: <59.96%

Evaluation Points

3 Exams - 300 points (100 points each)
Final Comprehensive Exam - 150 points
9 worksheets - 180 points (20 points each)
10 tutorials - 50 points (5 points each)

Total points = 680

General Makeup Policy: The student is responsible for requesting a makeup when they are unable to submit the regularly scheduled assessment before the due date and must schedule the makeup by email within **2 days** after the class date. If the assessment is not made-up, the student will receive a zero for that item. Late assignments without pre-communicated make-up approval as detailed above will be graded with a late penalty applied based on how many days late the submission was made.

Syllabus Change Policy

The syllabus is a guide. Circumstances and events, such as student progress, may make it necessary for the instructor to modify the syllabus during the semester. Any changes made to the syllabus will be announced in advance.

Tentative Course Schedule (subject to change)

Week of	Topics (Book Chapters)	Assignment due dates
08/26	Topics: Welcome/Syllabus; Statistics & Samples (Ch. 1); Graphs & Tables (Ch. 2)	
09/02	Mon: **Labor Day; no class** *Wed: Computer Day; Tutorial/Worksheet 1 * Fri: Descriptive Statistics (Ch. 3)	**Wed:** Tutorial 1 **WS1**: due 9/10 11:59 pm
09/09	Mon: *Mon: Computer Day; Worksheet 2 (Ch 3)* Wed: Estimation (Ch. 4) Fri: Estimation (Ch. 4); Probability (Ch. 5)	**Mon:** Tutorial 2 **WS2**: due 9/16 11:59 pm

09/16	Mon: Probability (Ch. 5) *Wed: Computer Day; Worksheet 3 (Chs 4-5)* Fri: Hypothesis Testing (Ch. 6)	**Wed:** Tutorial 3 **WS3**: due 9/22 11:59 pm (Sun)
09/23	Mon: Study session, Worksheet Review **Wed: Test 1** (Chs. 1-6) Fri: Proportions (Ch. 7)	**Wed: Test 1**
09/30	Mon: Frequency Data (Ch. 8) Wed: Frequency Data (Ch. 8) *Fri: Computer Day; Worksheet 4 (Ch 7-8)*	**Fri:** Tutorial 4 **WS4**: due 10/10 11:59 pm
10/07	Mon: Contingency Data (Ch. 9) Wed: Contingency Data (Ch. 9) *Fri: Computer Day; Worksheet 5 (Ch 9)*	**Fri:** Tutorial 5 **WS6**: due 10/15 11:59 pm (Tue)
10/14	Mon: Normal Data (Ch. 10) ***not** on exam 2; **is** on exam 3* Wed: Study session, Worksheet Review; Questions **Fri: Test 2** (Chs. 7-9)	**Fri: Test 2**

10/21	Mon: One-Sample Data (Ch. 11) *Wed: Computer Day; Worksheet 6 (Chs 10-11)* Fri: Two-sample Data (Ch. 12)	**Wed:** Tutorial 6 **WS6**: due 10/29 11:59 pm
10/28	Mon: Violations of Assumptions (Ch. 13) *Wed: Computer Lab Day; Worksheet 7 (Chs 12-13)* Fri: Two-sample Data (Ch. 12)	**Wed:** Tutorial 7 **WS7**: due 11/05 11:59 pm
11/04	Mon: Experimental Design (Ch. 14) Wed: Experimental Design (Ch. 14) Fri: Study session, Worksheet Review; Questions	
11/11	**Mon: Test 3** (Chs. 10-14) Wed: ANOVA (Ch. 15) Fri: ANOVA (Ch. 15)	**Mon: Test 3**
11/18	*Mon: Computer Lab Day; Worksheet 8 (Ch. 15)* Wed: Correlation (Ch. 16) Fri: Correlation (Ch. 16), Regression (Ch. 17)	**Mon:** Tutorial 8 **WS8**: due 11/30 11:59 pm
11/25	Mon: Regression (Ch. 17) Wed: overflow day if needed Thu-Fri: **Thanksgiving break; no class**	

12/02	*Mon-Wed: Computer Day; Worksheet 9 (Ch. 16-17); Worksheet 10 (Extra Credit; Review; no tutorial for this worksheet)* Fri: Study session, Worksheet Review; Questions	**Mon:** Tutorial 10 **WS10**: due 12/05 11:59 pm **WS11 (extra credit)**: due 12/8 11:59 pm (Sun)
12/09	**Final Exam – Wed., Dec 13th** 8:00am – 10:00am STC 210	**Wed: Final**

Technology Requirements:

LMS

All course sections offered by Texas A&M University-Commerce have a corresponding course shell in the *my*LEO Online Learning Management System (LMS). Below are technical requirements:

LMS Requirements:
https://community.brightspace.com/s/article/Brightspace-Platform-Requirements

LMS Browser Support:
https://documentation.brightspace.com/EN/brightspace/requirements/all/browser_support.htm

Access and Navigation
You will need your campus-wide ID (CWID) and password to log into the course. If you do not know your CWID or have forgotten your password, contact the Center for IT Excellence (CITE) at 903.468.6000 or helpdesk@tamuc.edu

R information and support
The statistical program that we will use in the course is called R. R is an open-sourced free program that in general can perform any statistical procedure. Statistical packages used in R are continually developed and updated by users. Specific instructions for downloading and setting

up R will be presented in the course. More information about R, computer requirements, and user manuals can be obtained at https://cran.r-project.org/

Communication and Support
If you have any questions or are having difficulties with the course material, please contact your Instructor.

Technical Support

If you are having technical difficulty with any part of *Brightspace*, please contact Brightspace Technical Support at 1-877-325-7778. Other support options can be found here:

https://community.brightspace.com/support/s/contactsupport

Interaction with Instructor Statement

Response time to any questions sent by email regarding the course will be answered within 72 hours. However, students are encouraged to interact with the instructor directly during the class time and office hours, if necessary. Exceptions such as widespread internet outage apply.

Counseling Services Statement

The Counseling Center at A&M-Commerce, located in the Halladay Building, Room 203, offers counseling services, educational programming, and connection to community resources for students. Students have 24/7 access to the Counseling Center's crisis assessment services by calling 903-886-5145. For more information regarding Counseling Center events and confidential services, please visit www.tamuc.edu/counsel

Course and University Procedures/Policies:

Course Specific Procedures/Policies:
You are expected to check your TAMUC email and d2l every day to check for any announcements. Additional information about all course assessment components is provided under "Course Evaluations". Please do not attend class if feeling ill, if an illness occurs during a course assessment, please see the "General Makeup Policy" section above for guidance.

University Specific Procedures:

Student Conduct

All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment. The Code of Student Conduct is described in detail in the Student Guidebook. http://www.tamuc.edu/Admissions/oneStopShop/undergraduateAdmissions/studentGuideboo k.aspx

Students should also consult the Rules of Netiquette for more information regarding how to interact with students in an online forum: Netiquette http://www.albion.com/netiquette/corerules.html

TAMUC Attendance

For more information about the attendance policy please visit the Attendance webpage and Procedure 13.99.99.R0.01.
http://www.tamuc.edu/admissions/registrar/generalInformation/attendance.aspx

http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/academic/13.99.99.R0.01.pdf

Academic Integrity

Students at Texas A&M University-Commerce are expected to maintain high standards of integrity and honesty in all of their scholastic work. For more details and the definition of academic dishonesty see the following procedures:

Undergraduate Academic Dishonesty 13.99.99.R0.03

http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/undergraduates/13.99.99.R0.03UndergraduateAcademicDishonesty.pdf

Graduate Student Academic Dishonesty 13.99.99.R0.10

http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/graduate/13.99.99.R0.10GraduateStudentAcademicDishonesty.pdf

AI Statement

Texas A&M University-Commerce acknowledges that there are legitimate uses of Artificial Intelligence, ChatBots, or other software that has the capacity to generate text, or suggest replacements for text beyond individual words, as determined by the instructor of the course.

Any use of such software must be documented. Any undocumented use of such software constitutes an instance of academic dishonesty (plagiarism).

Individual instructors may disallow entirely the use of such software for individual assignments or for the entire course. Students should be aware of such requirements and follow their instructors' guidelines. If no instructions are provided the student should assume that the use of such software is disallowed.

In any case, students are fully responsible for the content of any assignment they submit, regardless of whether they used an AI, in any way. This specifically includes cases in which the AI plagiarized another text or misrepresented sources.

13.99.99.R0.03 Undergraduate Academic Dishonesty
https://inside.tamuc.edu/aboutus/policiesproceduresstandardsstatements/rulesprocedures/13students/undergraduates/13.99.99.R0.03UndergraduateAcademicDishonesty.pdf

13.99.99.R0.10 Graduate Student Academic Dishonesty
https://inside.tamuc.edu/aboutus/policiesproceduresstandardsstatements/rulesprocedures/13students/graduate/13.99.99.R0.10.pdf

Students with Disabilities – ADA Statement

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you have a disability requiring an accommodation, please contact:

Office of Student Disability Resources and Services
Texas A&M University-Commerce
Gee Library- Room 162
Phone (903) 886-5150 or (903) 886-5835
Fax (903) 468-8148
Email: studentdisabilityservices@tamuc.edu
Website: Office of Student Disability Resources and Services
http://www.tamuc.edu/campusLife/campusServices/studentDisabilityResourcesAndServices/

Nondiscrimination Notice

Texas A&M University-Commerce will comply in the classroom, and in online courses, with all federal and state laws prohibiting discrimination and related retaliation on the basis of race, color, religion, sex, national origin, disability, age, genetic information or veteran status. Further, an environment free from discrimination on the basis of sexual orientation, gender identity, or gender expression will be maintained.

Campus Concealed Carry Statement

Texas Senate Bill - 11 (Government Code 411.2031, et al.) authorizes the carrying of a concealed handgun in Texas A&M University-Commerce buildings only by persons who have been issued and are in possession of a Texas License to Carry a Handgun. Qualified law enforcement officers or those who are otherwise authorized to carry a concealed handgun in the State of Texas are also permitted to do so. Pursuant to Penal Code (PC) 46.035 and A&MCommerce Rule 34.06.02.R1, license holders may not carry a concealed handgun in restricted locations.

For a list of locations, please refer to the Carrying Concealed Handguns On Campus document and/or consult your event organizer.

Web url:
http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/34SafetyOfEmployeesAndStudents/34.06.02.R1.pdf

Pursuant to PC 46.035, the open carrying of handguns is prohibited on all A&M-Commerce campuses. Report violations to the University Police Department at 903-886-5868 or 9-1-1.
at 903-886-5868 or 9-1-1.