



BSC 412.01E: Quantitative Biology – Spring 2023

TR 11:00 – 12:15 am; STC 210

Instructor Information:

Dr. Bjorn Schmidt

Office: STC 212

Email: bjorn.schmidt@tamuc.edu

Preferred contact: email (answered within 48 hours)

Office Hours: TR 1:00 pm – 3:00 pm, or by appointment

Textbook & materials (required):

The Analysis of Biological Data. 3rd edition. 2020. Whitlock, Michael C. & Schluter, Dolph.

ISBN: 978-1-319-2263-7

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.

Worksheets: There will be 11 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) and the answer sheet file (for recording and uploading answers). Students will work through datasets in R using statistical methods covered in the class and upload the answer sheet with their answers back to d2l before the listed deadlines in the schedule (upload into the assignments tab). Generally, after the due date, class time will be given to go over the worksheets to address answers and any problems encountered.

Tutorials: Each computer lab day will have a short tutorial assignment that students will upload answers for the walkthrough section of the worksheet, making sure that they learn how to use the program R for that week's lesson plan. These will need to be completed in that class session before you leave for that day (due by the end of the day). This is 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 full assignment is done or those functions are used in exams.

Extra Credit: 1) At the end of the semester, a short exit quiz will be made available to assess learning outcomes in the course. 2) Worksheet 12 is an optional review/study guide worksheet, and is also an extra credit option at the end of the semester.

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)

9 tutorial quizzes - 90 points (10 points each; on class days for worksheets 1-9)

Total points = 720

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)

In general, tutorials are due the same day as assigned, worksheets are generally due one week after being assigned, with some exceptions due to scheduling. Specific due dates will be announced in class and in d2l. Test dates will be announced in class and d2l at least one week before the exam (tentative dates below for computer days and exams, but subject to change based on course progress and in cases of inclement weather/university closings)

week 1 (01/08) - Introduction, Ch. 1: Statistics and Samples

week 2 (01/15) - Ch. 2: Graphs and Tables, **Thur** - Computer day, tutorial/worksheet 1

week 3 (01/22) - Ch. 3: Descriptive Statistics, **Thur** - Computer day, tutorial/worksheet 2 (Ch. 3)

week 4 (01/29) - Ch. 4: Estimation, Ch. 5: Probability

week 5 (02/05) - **Tue** - Computer day, tutorial/worksheet 3 (Ch. 4-5), Ch 6: hypothesis testing

week 6 (02/12) - **Tue** - **Exam One (Chs. 1-6)**, **Thur** - Ch. 7: Proportions

week 7 (02/19) - Ch. 8: Frequency data, **Thur** - Computer day, tutorial/worksheet 4 (Ch. 7-8)

week 8 (02/26) - Ch. 9: Contingency data **Thur** - Computer day, tutorial/worksheet 5 (Ch. 9)

week 9 (03/04) - Ch. 10: Normal data, **Thur** - **Exam Two (Chs. 7-9)**

week 10 (03/11) - ***spring break, no class***

week 11 (03/18) - Ch. 11 - One-Sample Data, Ch. 12 - Two-Sample data

week 12 (03/25) - **Tue** - Computer day, tutorial/worksheet 6 (Ch. 10-11), Ch. 13 - Violations of Assumptions

week 13 (04/01) - **Tue** - Computer day, tutorial/worksheet 7 (Ch. 13), Ch. 14 - Experimental design

week 14 (04/08) - **Tue** - **Exam Three (Chs. 10-14)**, Ch. 15 - ANOVA

week 15 (04/15) - **Tue** - Computer day, tutorial/worksheet 8 (Ch. 15), Ch. 16 - Linear Correlations

week 16 (04/22) - Ch. 17 - Linear regression, **Thur** - Computer day, tutorial/worksheet 9 (Chs. 16-17)

week 17 (04/29) - **Tue**: review, open computer day to complete last assignments/extra credit; **Thur**: ***no class, study for exams***

Finals (05/06) - **Final Exam: Tuesday, May 7th - 10:30 am -12:30 pm, STC 210**

Technology Requirements:

LMS

All course sections offered by Texas A&M University-Commerce have a corresponding course shell in the *myLEO* 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/studentGuidebook.aspx).
<http://www.tamuc.edu/Admissions/oneStopShop/undergraduateAdmissions/studentGuidebook.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)
<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/)

<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.