BSC 412 01E Fundamentals of Biostatistics

COURSE SYLLABUS: Fall 2026
STC 210 – MWF 9:00 - 9:50 am

INSTRUCTOR INFORMATION

Instructor: Bjorn Schmidt
Office Location: STC 212
Office Hours: MWF 11am - 12pm or by appointment
Office Phone: 903-886-5938
University Email Address: bjorn.schmidt@etamu.edu
Preferred Form of Communication**: email**
Communication Response Time: **24 hours (except holidays and weekends)**

COURSE INFORMATION

MATERIALS – TEXTBOOKS, READINGS, SUPPLEMENTAL READINGS

Textbook(s) Required:

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

Software Required:

1) machine capable of accessing d2l (learning management system) and running statistical analysis

The computers in our classroom STC 210 will always be available for assignments throughout the semester outside of scheduled class time in this room. If available, students may also find home computers useful for the class, but these are not required. There is dedicated in-class time for class assignments, so there may be limited need for outside of class computing, or you can use 210 room when empty if needed. To summarize, you are expected to complete data analysis worksheets with specific statistical software (below) inside or outside of class through use of the STC 210 computers or on your own computer.

The statistical program that we will use in the course is called 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. R is currently not functional for class purposes (coding requirements) on chromebooks or tablets. There are several options for R, and as an introductory course, we are mainly using base R functions to simplify and understand the coding (rather than R studio or other options). More information about R and computer requirements can be obtained at https://cran.r-project.org/

Optional Texts and/or Materials: none

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.

Prerequisite: MATH 1314 with minimum grade of C

STUDENT LEARNING OUTCOMES

1. Display proficiency at using the R software program to perform basic statistical analysis
2. Understand the theory behind statistical analysis including types of data, types of variables, sampling error, sampling bias, probability, estimation, and hypothesis testing
3. Compare and contrast the four microevolutionary forces that cause genetic change in populations, including their effects and their interactions
4. Interpret and present descriptive statistics of data
5. Perform different hypothesis tests on different types of data, including knowing and testing statistical assumptions for different tests such as examining deviations from normality
6. Be able to critically evaluate statistical results based on statistical theory
7. Be able to recognize and critically evaluate aspects of experimental design for statistical accuracy and precision

COURSE REQUIREMENTS

MINIMAL TECHNICAL SKILLS NEEDED

-ability to use software that can access d2l
-ability to use writing software (MS Word or able to export as a MS Word file (.doc or .docx))
-ability to edit and use codes in base R (command line) – instructions and tutorials provided in class

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. Tests will also consist of some analysis questions in R using the techniques learned from those sections. Tests will be administered on classroom computers to facilitate this, but all tests must be taken during the test day in class (no remote logins will be available). 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.

Important notes

*Use of AI, Chatbots, or other text generation software is **not allowed** in the course. All answers on the worksheet need to have the correct values that are calculated from the R software. Chatgpt or other generative text software does poorly in statistical analyses and often gives incorrect values (the values are kind of right, or have the right feeling for the expected test outcome, but are not the technical, exact values that are needed in proper, repeatable science) – answer values that are outside of typical number rounding issues will be marked as incorrect, leading to a low assignment score.*

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. Therefore, each student should answer worksheet questions independently. Students that don't learn how to do the analyses on the worksheets tend to do poorly on the exams and typically have lower grades for the course.

STUDENT RESPONSIBILITIES OR TIPS FOR SUCCESS IN THE COURSE

You are expected to keep up with all of the course materials provided each week, including lectures and assignments. The class builds on itself, with the easiest material at the beginning of class. Students that fall behind or don't treat seriously because of the start of the semester may have difficulty catching up in later sections. The best tips for success are to read the textbook chapters to mirror the lectures, and to give enough time for worksheets (don't procrastinate until the due date). Also make sure to know how to do all of the analyses in each section independently prior to the exam.

GRADING

Final grades in this course will be based on the following scale:

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

Total points corresponding to the final letter grades

A = 567 - 630 Points
B = 504 - 566 Points
C = 441 - 503 Points
D = 378 - 440 Points
F = <378 Points

Weights of the assessments in the course:

Tests (3) = 300 points - ~48%
Final Exam (Comprehensive) = 150 points - ~24%
Tutorials (11) = 33 points - ~5%
Worksheets (9) = 135 points - ~21%
Attendance/participation = 12 points - ~2%
TOTAL = 630 points - 100%

ASSESSMENTS

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 day will have one or two tutorials for how to use R for that week's material. Answers for the tutorial will need to be uploaded generally by midnight of those days in d2l unless the instructor specifies differently for that week. 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, 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 worksheets consisting of data analysis questions, with each worksheet being due generally around 1 week after posting. Worksheets, tutorials, 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) and 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..
Extra credit: 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.

General Makeup Policy: The student is responsible for requesting an extension when they are unable to submit the regularly scheduled assessment and must schedule the extension within **1 day** after the due date of those items. Extensions will be given generally for university-policy approved reasons (documented sickness, sponsored event, unforeseen circumstances). If the assessment is not made-up or turned in will receive a zero for those items. Late assignments without requesting extensions will be subject to late penalties for the work, up to a 50% penalty depending on time between due date and submission.

Course Outline/Calendar

Week of	Topics (Book Chapters)	Assignments
08/17	Fri: Welcome/Syllabus; Statistics & Samples (Ch. 1)	
08/24	Mon: Statistics & Samples (Ch. 1); Graphs & Tables (Ch. 2) Wed: Graphs & Tables (Ch. 2) *Fri: **Computer Day** (intro to R)*	**Fri:** Tutorial 1 **WS1**: due 9/03 11:59 pm
08/31	Mon: Descriptive Statistics (Ch. 3) Wed: Descriptive Statistics (Ch. 3) *Fri: **Computer Day** (Ch3)*	**Fri:** Tutorial 2 **WS2**: due 9/10 11:59 pm
09/07	Mon: **no-class (holiday)** Wed: Estimation (Ch. 4) Fri: Estimation (Ch. 4); Probability (Ch. 5)	
09/14	Mon: Probability (Ch. 5) *Wed: **Computer Day** (Ch4-5)* Fri: Hypothesis Testing (Ch. 6)	**Wed:** Tutorial 3 **WS3**: due 9/21 11:59 pm (Mon)
09/21	Mon: Study session, Worksheet review **Wed: Test 1** (Chs. 1-6; worksheets 1-3) Fri: Proportions (Ch. 7)	**Wed: Test 1**
09/28	Mon: Proportions (Ch. 7); Frequency Data (Ch. 8) Wed: Frequency Data (Ch. 8) *Fri: **Computer Day** (Ch7-8)*	**Fri:** Tutorial 4a; Tutorial 4b **WS4**: due 10/07 11:59 pm

The *syllabus/schedule are subject to change.*

10/05	Mon: Contingency Data (Ch. 9) *Wed: **Computer Day** (Ch9)* Fri: **no-class (fall break)**	**Wed:** Tutorial 5 **WS5**: due 10/12 11:59 pm (Mon)
10/12	Mon: Study session, Worksheet Review; Questions **Wed: Test 2** (Chs. 7-9, worksheets 4-5) Fri: Normal Data (Ch. 10)	**Wed: Test 2**
10/19	Mon: One-Sample Data (Ch. 11) *Wed: **Computer Day** (Ch10-11)* Fri: Two-sample Data (Ch. 12 – analysis sections)	**Wed:** Tutorial 6 **WS6**: due 10/27 11:59 pm
10/26	Mon: Two-sample Data (Ch. 12 – analysis sections); Violations of Assumptions (Ch. 13) Wed: Violations of Assumptions (Ch. 13) *Fri: **Computer Day** (Ch12-13)*	**Fri:** Tutorial 7a, Tutorial 7b **WS7**: due 11/05 11:59 pm
11/02	Mon: Experimental Design (Ch. 14) Wed: Two-sample Data (Ch. 12 – theory sections) Fri: Study session, Worksheet review	
11/09	**Mon: Test 3** (Chs. 10-14, worksheets 6-7) Wed: ANOVA (Ch. 15) Fri: ANOVA (Ch. 15)	**Mon: Test 3**
11/16	*Mon: **Computer Day** (Ch15)* Wed: Correlation (Ch. 16) Fri: Correlation (Ch. 16); Regression (Ch. 17)	**Mon:** Tutorial 8 **WS8**: due 11/23 11:59 pm

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11/23	Mon: Regression (Ch. 17) Wed-Fri: **no class (Thanksgiving)**	
11/30	*Mon-Wed: **Computer Days** (Ch 16-17; review worksheet) Fri: Study session, Worksheet review	**Mon:** Tutorial 9 **WS9**: due 12/04 (Fri) 11:59 pm **WS10 (extra credit)**: due 12/06 (Sun) 11:59 pm
12/7	**Final Exam – Wed., Dec 9th** 8:00am – 10:00am STC 210	**Wed: Final**

TECHNOLOGY REQUIREMENTS

LEARNING MANAGEMENT SYSTEM (LMS)

All course sections offered by East Texas A&M University have a corresponding course shell in the myLeo Online (D2L Brightspace) LMS. Below are the technical requirements:

- LMS Requirements
- LMS Browser Support
- Zoom Video Conferencing Tool

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@etamu.edu.

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 or view other support options.

STUDENT RESPONSIBILITIES FOR THE COURSE

CWID AND PASSWORD

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@etamu.edu.

TECHNOLOGY-RELATED ISSUES

Personal computer and internet connection problems do not excuse the requirement to complete all coursework in a timely and satisfactory manner. Each student needs a backup method to handle these inevitable problems. These methods might include having a backup PC at home or work, temporarily using a computer at a friend's home, at the local library, at office service companies, at Starbucks, or at an ETAMU campus open computer lab.

TECHNOLOGY REQUIREMENTS AND SUPPORT

MINIMAL TECHNICAL SKILLS NEEDED

Students will need a reliable computer and internet access for this course. Students must be able to use myLeo email, myLeo Online (D2L Brightspace), and Microsoft Office effectively.

LEARNING MANAGEMENT SYSTEM (LMS) – D2L Brightspace

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

- View the Learning Management System Requirements Webpage.
- Learn more on the LMS Browser Support Webpage.

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 on the Brightspace Support Webpage.

COMMUNICATION AND SUPPORT

INTERACTION WITH INSTRUCTOR STATEMENT

If you have any questions or are having difficulties with the course material, please contact your instructor. Correspondence will always be through university email (your "myLeo" mail), and announcements will be posted in myLeo online (D2L Brightspace). You will not RECEIVE email through Brightspace, so be sure to check your ETAMU email for communication. Students are encouraged to check their university email daily.

INCLUDE THE FOLLOWING IN EMAILS WITH INSTRUCTOR:

- Course name and subject in the subject line
- Salutation (Good afternoon, Dr. Jackson)
- Proper email etiquette (no "text" emails – use proper grammar and punctuation)
- Student name and CWID after the body of the email (possibly add to student signature on email)

COURSE AND UNIVERSITY PROCEDURES/POLICIES

SYLLABUS CHANGE POLICY

The syllabus is a guide. Circumstances and events, such as student progress, may necessitate the instructor's modification of the syllabus during the semester. Any changes made to the syllabus will be announced in advance.

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 online in the Student Guidebook.

Students should also consult the Rules of Netiquette Webpage for more information regarding how to interact with students in an online forum.

ETAMU ATTENDANCE

For more information about the attendance policy, please view the Attendance Webpage and the Class Attendance Policy.

ACADEMIC INTEGRITY

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

Undergraduate Academic Dishonesty University Procedure 13.99.99.R0.03

Undergraduate Student Academic Dishonesty Form

Graduate Student Academic Dishonesty University Procedure 13.99.99.R0.10

Graduate Student Academic Dishonesty Form

USE OF ARTIFICIAL INTELLIGENCE

East Texas A&M University acknowledges that there are legitimate uses of Artificial Intelligence, ChatBots, or other software that have 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

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 reasonable accommodations for their disabilities. If you have a disability requiring an accommodation, please contact:

Office of Student Disability Resources and Services
East Texas A&M University
Velma K. Waters Library Rm 162
Phone (903) 886-5150 or (903) 886-5835
Fax (903) 468-8148
Email: studentdisabilityservices@etamu.edu
Website: Office of Student Disability Services

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NONDISCRIMINATION NOTICE

East Texas A&M University 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 East Texas A&M University 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 ETAMU 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.

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

EAST TEXAS A&M SUPPORTS STUDENTS' MENTAL HEALTH – COUNSELING SERVICES

The Counseling Center at East Texas A&M University, located in the Halladay Building, Room 203, offers counseling services, educational programming, and connections 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 the Counseling Center website.

MENTAL HEALTH AND WELL-BEING

The university aims to provide students with essential knowledge and tools to understand and support mental health. As part of our commitment to your well-being, we offer access to Telus Health, a service available 24/7/365 via chat, phone, or webinar. Scan the QR code or download the app and explore the resources available to you for guidance and support whenever you need it.

ACCREDITING INFORMATION AND MISSION STATEMENT:

East Texas A&M is accredited by the Southern Association of Colleges and Schools Commission on Colleges (SACSCOC) to award baccalaureate, master's and doctoral degrees. Academic programs in the Department of Biological and Environmental Science operate under this institutional accreditation.

College of Science and Engineering Mission Statement:

We transform lives by providing an accessible education in an environment where faculty and staff care and are dedicated to the success of all our students throughout their academic career. We empower our students, faculty and staff to become the best version of themselves by supporting their continuous development and growth. Fueled by our resilience, tenacity, and talents, we strengthen the rural and urban communities we serve. Innovation is the heartbeat of East Texas A&M University, with career preparedness as a cornerstone of our educational mission. We are committed to ensuring our graduates are well-prepared for the challenges and opportunities that lie ahead. Through robust career exploration, internships, industry partnerships, and skill development initiatives, we bridge the gap between academia and the workplace.