



THE OHIO STATE UNIVERSITY

COLLEGE OF ARTS AND SCIENCES

SYLLABUS: STAT 6111

FOUNDATIONS OF STATISTICAL THEORY I

AUTUMN 2026

Course overview

Instructor

Instructor: David J. Sivakoff
Email address: dsivakoff@stat.osu.edu
Class Website: Carmen Site
Lectures: MWF at 11:30am-12:25pm in CH 228
Office hours: Wednesdays 2-3pm and by appointment (please schedule appointments at least 24 hours in advance).
Office: 440A Cockins Hall

Course description

STAT 6111 is the first part in a series of two courses that review some mathematical concepts and introduce other mathematical foundations that are necessary for the coursework in the PhD programs in Statistics and Biostatistics. This course will focus on univariate and multivariate calculus, some linear algebra, strategies of proof, and some real analysis. To the extent possible, we will link the mathematical concepts to some statistical theory and methods.

Course learning outcomes

By the end of this course, students should successfully be able to:

- Demonstrate a thorough understanding of how to use both univariate and multivariate calculus tools needed to obtain results in Statistics and Biostatistics.
- Demonstrate understanding of Euclidian spaces and concepts related vector spaces for their use in statistical regression models.
- Apply multiple strategies of proof to obtain results in probability and statistical theory.
- Demonstrate understanding of convergence of sequences to obtain results in probability and statistical theory.

Course materials

Required

P.D. Lax and M.S. Terrell, *Multivariable Calculus with Applications*, Springer 2017. [Available online through the OSU library.](#)

W. F. Trench. *Introduction to Real Analysis*, 2003. Free hyperlink edition (2013) [available through the OSU library.](#)

D.W. Cunningham. *Real Analysis with Proof Strategies*. CRC Press 2021. [Available through the OSU library.](#)

Course delivery

Most lectures will be delivered live in person. Office hours will usually be in person, but appointments can be made to meet via Zoom. Lectures and office hours may occasionally be held via Zoom, but when this happens an Announcement will be posted on the course website.

Grading and faculty response

Homework, Quizzes and Exams

Assignment or category	Percentage
Attendance and class participation	10
Quizzes	40
Exams	50
Total	100

Grades will be recorded on the class website.

Homework: I will not collect homework for grading purposes. The textbooks listed above contain a collection of practice problems. Students are encouraged to attempt many of these problems in preparation for the in-class assessments. I will post suggested practice problems on Carmen. You are welcome to work with your classmates or ask me for help in understanding the material or homework problems. In the same way, you are welcome to use AI tools to help understand the material, check or revise your work, and ask for hints. Be aware that, like internet and human sources, AI tools can give responses that are inaccurate, incomplete, or inconsistent with course materials and expectations. In the end, you need to learn the material, and the best

way to practice is by solving problems, writing your own solutions and discussing them with me and your peers.

Attendance and participation: Students are expected to attend each class, engage with the material (take notes, solve problems) and participate in discussions (ask and answer questions, share opinions). I will take attendance regularly using TopHat (we will discuss during class how to do this if you've not done it before). If you arrive on time and prepared for at least 80% of the lectures, then you will receive 100% of the attendance points. Below 80% attendance, points will be deducted proportionally.

Quizzes: We will have regular (about every two weeks) in-class quizzes. These will typically take about 15 minutes. Each quiz will contain 1-2 problems on the topics covered in class most recently. The assessments are naturally cumulative. The tentative dates for these assessments are:

A1: September 4, 2026 (Friday)
 A2: September 18, 2026 (Friday)
 A3: September 30, 2026 (Wednesday)
 A4: October 14, 2026 (Wednesday)
 A5: October 30, 2026 (Friday)
 A6: November 9, 2026 (Monday)
 A7: November 20, 2026 (Friday)
 A8: December 4, 2026 (Friday)

The lowest quiz score will be dropped, so you are able to miss up to one quiz without it affecting your score.

Exams: There will be two exams, tentatively scheduled during class time on

E1: October 23, 2026 (Friday)
 E2: December 9, 2026 (Wednesday)

All assessments are to be taken without use of your notes or textbook and must be completed alone. Use of any other materials are forbidden, including any websites, software packages or AI tools. A calculator is allowed, but only one that does not have computational algebra capabilities.

I expect to use the following assignment of letter grades based on the assessment weightings in the table above.

A	> 79.99%	B	45 to 54.99%	C	10 to 24.99%
A-	65 to 79.99%	B-	35 to 44.99%	C-	0 to 9.99%
B+	55 to 64.99%	C+	25 to 34.99%		

Late assignments

Late assignments will generally not be accepted. If you cannot participate in the course for a prolonged period please contact me immediately to discuss options for completing work.

Faculty feedback and response time

I am providing the following list to give you an idea of my intended availability throughout the course. (Remember that you can call **614-688-HELP** at any time if you have a technical problem.)

Grading and feedback

For assignments, you can generally expect feedback within **7-10 days**.

E-mail

I will reply to e-mails within **24 hours on school days**.

Attendance, participation, and discussions

Student participation requirements

The following is a summary of everyone's expected participation:

- **Live, in-person lectures: THREE TIMES PER WEEK**
Students will be expected to participate and ask questions during live lectures.
- **Logging in: AT LEAST TWICE PER WEEK**
Students are required to log in to the course in Carmen each week, including weeks with holidays. (During most weeks you will probably log in many times.) If you have a situation that might cause you to miss an entire week of class, discuss it with me *as soon as possible*.
- **Office hours: OPTIONAL**
All office hours are optional. If you wish to discuss an assignment with me, please contact me if you need a time outside my scheduled office hours.

Discussion and communication guidelines

The following are my expectations for how we should communicate as a class. Above all, please remember to be respectful and thoughtful.

- **Writing style:** While there is no need to participate in class discussions as if you were writing a research paper, you should remember to write using proper grammar, spelling and punctuation. Informality (including an occasional emoticon) is acceptable for non-academic topics.
- **Tone and civility:** Let's maintain a supportive learning community where everyone feels safe and where people can disagree amicably. Remember that sarcasm doesn't always come across online.

- **Citing your sources:** When we have academic discussions, please cite your sources to back up what you say. (For the textbook or other course materials, list at least the title and page numbers. For online sources, include a link.)
- **Backing up your work:** Consider composing your academic posts in a word processor, where you can save your work, and then copying into the Carmen discussion.

Artificial Intelligence and Academic Integrity

There has been a significant increase in the popularity and availability of a variety of generative artificial intelligence (AI) tools, including ChatGPT, Sudowrite, and others. These tools will help shape the future of work, research and technology, but when used in the wrong way, they can stand in conflict with academic integrity at Ohio State.

All students have important obligations under the Code of Student Conduct to complete all academic and scholarly activities with fairness and honesty. Our professional students also have the responsibility to uphold the professional and ethical standards found in their respective academic honor codes. Specifically, students are not to use unauthorized assistance in the laboratory, on field work, in scholarship, or on a course assignment unless such assistance has been authorized specifically by the course instructor. In addition, students are not to submit their work without acknowledging any word-for-word use and/or paraphrasing of writing, ideas or other work that is not your own. These requirements apply to all students undergraduate, graduate, and professional.

To maintain a culture of integrity and respect, these generative AI tools should not be used in the completion of course assignments unless an instructor for a given course specifically authorizes their use. Some instructors may approve of using generative AI tools in the academic setting for specific goals. However, these tools should be used only with the explicit and clear permission of each individual instructor, and then only in the ways allowed by the instructor.

Disclaimer

This syllabus should be taken as a fairly reliable guide for the course content. However, you cannot claim any rights from it and in particular we reserve the right to change due dates or the methods of grading and/or assessment if necessary. Any changes will be communicated to you through official course announcements.

Tentative schedule of topics.

Week	Dates	Topics
1	8/26 – 8/28	Review of univariate integration techniques
2	8/31 – 9/4	Review of univariate integration, Real numbers, bounds
3	9/9 – 9/11	inf/sup, Completeness; Induction
4	9/14 – 9/18	Some topology, sequences
5	9/21 – 9/25	Limits of functions, continuity
6	9/28 – 10/2	Differentiability

Week	Dates	Topics
7	10/5 – 10/9	Mean value theorems, Taylor's theorem
8	10/12– 10/14	Vectors, Norms, Multivariate differentiability
9	10/19 – 10/23	Matrix derivatives. Some optimization.
10	10/26 – 10/30	Riemann integral
11	11/2 – 11/6	Families of integrable functions
12	11/9 – 11/13	Improper integrals
13	11/16 – 11/20	Multivariate Riemann integration
14	11/23	Iterated integrals
15	11/30 – 12/4	Change of variables
16	12/7 – 12/9	Integration over unbounded sets

Other course policies

Copyright disclaimer

The materials used in connection with this course may be subject to copyright protection and are only for the use of students officially enrolled in the course for the educational purposes associated with the course. Copyright law must be considered before copying, retaining, or disseminating materials outside of the course.

Please **do not disseminate any course materials, including any lecture videos, assignments, and solutions** outside of the course.

Academic integrity policy

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term “academic misconduct” includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee ([Faculty Rule 3335-5-48.7 \(B\)](#)). For additional information, see the [Code of Student Conduct](#).

Grievances and Solving Problems

According to University Policies, if you have a problem with this class, you should seek to resolve the grievance concerning a grade or academic practice by speaking first with the instructor or professor. Then, if necessary, take your case to the department chairperson, college dean or associate dean, and to the provost, in that order. Specific procedures are outlined in Faculty Rule 3335-8-23. Grievances against graduate, research, and teaching assistants should be submitted first to the supervising instructor, then to the chairperson of the assistant's department.

Creating an Environment Free from Harassment, Discrimination, and Sexual Misconduct

The Ohio State University is committed to building and maintaining a welcoming community. All Buckeyes have the right to be free from harassment, discrimination, and sexual misconduct. Ohio State does not discriminate on the basis of age, ancestry, color, disability, ethnicity, gender, gender identity or expression, genetic information, HIV/AIDS status, military status, national origin, pregnancy (childbirth, false pregnancy, termination of pregnancy, or recovery therefrom), race, religion, sex, sexual orientation, or protected veteran status, or any other bases under the law, in its activities, academic programs, admission, and employment. Members of the university community also have the right to be free from all forms of sexual misconduct: sexual harassment, sexual assault, relationship violence, stalking, and sexual exploitation.

To report harassment, discrimination, sexual misconduct, or retaliation and/or seek confidential and non-confidential resources and supportive measures, contact the Civil Rights Compliance Office (CRCO):

Online reporting form: <http://civilrights.osu.edu/>

Call 614-247-5838 or TTY 614-688-8605

civilrights@osu.edu

The university is committed to stopping sexual misconduct, preventing its recurrence, eliminating any hostile environment, and remedying its discriminatory effects. All university employees have reporting responsibilities to the Civil Rights Compliance Office to ensure the university can take appropriate action:

- All university employees, except those exempted by legal privilege of confidentiality or expressly identified as a confidential reporter, have an obligation to report incidents of sexual assault immediately.
- The following employees have an obligation to report all other forms of sexual misconduct as soon as practicable but at most within five workdays of becoming aware of such information: 1. Any human resource professional (HRP); 2. Anyone who supervises faculty, staff, students, or volunteers; 3. Chair/director; and 4. Faculty member.

Mental health

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting ccs.osu.edu or calling [614-292-5766](tel:6142925766). CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower. You can reach an on call

counselor when CCS is closed at [614-292-5766](tel:614-292-5766) and 24 hour emergency help is also available 24/7 by dialing 988 to reach the Suicide and Crisis Lifeline.

Disability services

The university strives to maintain a healthy and accessible environment to support student learning in and out of the classroom. If you anticipate or experience academic barriers based on your disability (including mental health, chronic, or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion.

If you are ill and need to miss class, including if you are staying home and away from others while experiencing symptoms of a viral infection or fever, please let me know immediately. In cases where illness interacts with an underlying medical condition, please consult with Student Life Disability Services to request reasonable accommodations. You can connect with them at slds@osu.edu; 614-292-3307; or slds.osu.edu.

Religious accommodation

Ohio State has had a longstanding practice of making reasonable academic accommodations for students' religious beliefs and practices in accordance with applicable law. In 2023, Ohio State updated its practice to align with new state legislation. Under this new provision, students must be in early communication with their instructors regarding any known accommodation requests for religious beliefs and practices, providing notice of specific dates for which they request alternative accommodations within 14 days after the first instructional day of the course. Instructors in turn shall not question the sincerity of a student's religious or spiritual belief system in reviewing such requests and shall keep requests for accommodations confidential.

With sufficient notice, instructors will provide students with reasonable alternative accommodations with regard to examinations and other academic requirements with respect to students' sincerely held religious beliefs and practices by allowing up to three absences each semester for the student to attend or participate in religious activities. Examples of religious accommodations can include, but are not limited to, rescheduling an exam, altering the time of a

student's presentation, allowing make-up assignments to substitute for missed class work, or flexibility in due dates or research responsibilities. If concerns arise about a requested accommodation, instructors are to consult their tenure initiating unit head for assistance.

A student's request for time off shall be provided if the student's sincerely held religious belief or practice severely affects the student's ability to take an exam or meet an academic requirement and the student has notified their instructor, in writing during the first 14 days after the course begins, of the date of each absence. Although students are required to provide notice within the first 14 days after a course begins, instructors are strongly encouraged to work with the student to provide a reasonable accommodation if a request is made outside the notice period. A student may not be penalized for an absence approved under this policy.

If students have questions or disputes related to academic accommodations, they should contact their course instructor, and then their department or college office. For questions or to report discrimination or harassment based on religion, individuals should contact the [Civil Rights Compliance Office](#). (Policy: [Religious Holidays, Holy Days and Observances](#))

Intellectual diversity

Ohio State is committed to fostering a culture of open inquiry and intellectual diversity within the classroom. This course will cover a range of information and may include discussions or debates about controversial issues, beliefs, or policies. Any such discussions and debates are intended to support understanding of the approved curriculum and relevant course objectives rather than promote any specific point of view. Students will be assessed on principles applicable to the field of study and the content covered in the course. Preparing students for citizenship includes helping them develop critical thinking skills that will allow them to reach their own conclusions regarding complex or controversial matters.