STT 5811 Statistical Concepts & Applications I (Spring 2026)

Instructor: Dr. Jill E. Thomley

Last updated Sat, Jan 10, 2026 @ 12:56 PM

Contents

Appalachian Policies

This syllabus includes all items from Appalachian's **Syllabi Policy and Statement Information** and **Optional Syllabi Policy and Statement Information** webpages, even when not explicitly written out in this document. Students should review and be familiar with the contents of these pages. More specific guidance on the use of artificial intelligence (AI) is given below.

Please let me know ASAP if you have course any accommodations approved by **Disability Resources** (ODR) at Appalachian.

Instructor Contacts

- **Office:** Walker Hall 228
- **Phone:** 828-262-2383
- **Email: thomleyje@appstate.edu**
- **Page: https://jillthomley.github.io/**

Class Meeting Times

- Our class is WLH format ($< 50\%$ online class periods), which means we will have a mix of in-person and virtual days.

- For in-person days, we will meet Tuesdays and Thursdays from 12:30 pm to 1:45 pm in Walker Hall 307B computer lab.
- More information about which days will be in-person and which will be asynchronous/online can be found on AsULearn.

Bulletin Description

This course provides a more detailed treatment of topics taught in introductory statistics to enhance student understanding and articulation of key introductory statistics concepts. Topics include all standard topics covered in introductory statistics, including basic sampling and experimental designs, observational studies, descriptive statistics for single variable and bivariate analyses, sampling distributions, statistical inference techniques including interval estimation and hypothesis tests, inferential comparisons of multiple populations including ANOVA models and chi-square tests of independence and homogeneity, chi-square tests of goodness of fit, power calculations for hypothesis testing, and an introduction to computationally intensive modern inferential techniques such as the bootstrap and permutation and randomization tests. Use of a statistical programming language will be emphasized for all applications and simulation-based approaches will be utilized throughout the course to help enhance student understanding of key course topics. Prerequisite: STT 5810

Course Learning Goals

Students will be able to:

- use and discuss selected methods for exploring, describing, and comparing data.
- use and discuss selected methods for making inferences and estimations from data.
- use and discuss selected methods for modeling categorical and quantitative relationships.
- compare, connect, and assess simulation-based and theory-based methods of investigation.
- discuss the roles and impact of randomness in statistical processes, sampling, and study design.
- apply and discuss axiomatic probability, probability distributions, and sampling distributions.
- communicate concepts and results using statistical frameworks, vocabulary, and symbols.
- use statistical thinking to evaluate scholarly research and selected media content.
- use a statistical programming language for simulation, analysis, and reporting.
- connect course content to professional standards and pedagogical practices.

Course Communication

- I primarily use the **Course Announcements** forum on AsULearn to send information to the whole class.
- I also use the **Bulletin Board** section at the top of our AsULearn page to post relevant course information.
- You are responsible for knowing the content of all postings on AsULearn, as well as anything I say or show in class.
- Except for major emergencies, all written communication must be handled through your **Private Forum on AsULearn**.
- Monday to Friday, I typically check Private Forums at least once per day between 10:00 am and 7:00 pm. I may check more.
- Per Appalachian's faculty workload policy, tenure-track faculty should spend about 60% of their time (24 hours of a 40-hour week) on teaching-related activities. This necessarily limits my availability to students outside of designated times.

Private Forum: Your Private Forum stores our course-related messages and conversations in a place where we can easily access them throughout the semester. These forums keep my student communications separate from the rest of my email and provide notifications in AsULearn—a system I have found highly effective over many years. **Generally, I do not reply to student emails that are not about major emergency matters. Use your Private Forum.**

Title IX Information Disclosure: I care about my students inside and outside of the classroom, and I want you to get help and support if you need it. In general, conversations between us will be confidential. However, you should be aware that if a student tells a faculty member about an incident of interpersonal violence, the faculty member is **required** by law to report it.

Student Help/Office Hours

Any changes to Dr. Thomley's student help / office hours will be posted on **AsULearn**.

- **MON:** None, but I will check AsULearn Private Forum messages
- **TUE:** 2:00 pm to 3:15 pm (WA 228 or Zoom)
- **WED:** None, but I will check AsULearn Private Forum messages
- **THU:** 2:00 pm to 3:15 pm and 5:00 pm to 6:00 pm (WA 228 or Zoom)
- **FRI:** None, but I will check AsULearn Private Forum messages
- I may schedule student help appointments at other times, if needed. This will vary week to week. **Please ask.**

I prefer that you **book an appointment** for office hours, preferably 24 hours in advance. I do accept walk-ins, but appointments will take precedence. Appointments are available in 15-minute increments. If you feel like you need more than 15 minutes, book more than one time slot. On Tue/Thu we can meet in-person in Walker Hall 228 or we can meet via Zoom. On other days, we will (usually) have to meet via Zoom. For Zoom meetings, you may find yourself temporarily in a waiting room, but I *will* get to you.

Other Assistance: If you struggle to afford groceries and do not have sufficient food every day, or do not have a safe and stable place to live, please contact the **Dean of Students**. **Mountaineer Food Hub & Free Store** has a pantry and personal care items, free of charge. See **Campus Resources** for other types of help that are available for students.

Assessment & Grading

Textbook & Technology Our primary electronic textbook is ***Introduction to Modern Statistics, 2nd Edition*** by Mine Çetinkaya-Rundel and Johanna Hardin. You can download a pdf if you want an offline version, and bound copies can be purchased for $25. Our supplemental electronic textbook is ***Statistical Inference via Data Science: A ModernDive into R and the Tidyverse, 2nd Edition*** by Chester Ismay, Albert Y. Kim, and Arturo Valdivi. All course materials will be found on or linked from **AsULearn**. More specific information about individual assignments will be provided on AsULearn.

All face-to-face classes will be held in a computer lab. To participate in learning activities and to complete assignments outside of class, you need access to an electronic device on which you can access Zoom, web-based simulation applets, R and RStudio, our digital textbooks, videos, or other digital materials. There is no need for cell phones in face-to-face classes, other than for logging into lab computers using Appalachian's dual authentication protocol.

Written work typically will be completed using R Markdown, including R programming and LaTeX code as needed. We will use our Appalachian RStudio server in class. You are welcome to download R and RStudio to your own computer to use offline.

Links (also provided on AsULearn):

- Introduction to Modern Statistics, 2nd Edition (IMS2E): https://openintro-ims.netlify.app/

- A Modern Dive into R and the Tidyverse, 2nd Edition (MD2E): https://moderndive.com/v2/
- RStudio Server (use your Appalachian credentials): https://mathr.appstate.edu/
- The R Project for Statistical Computing: https://www.r-project.org/
- Posit—Download RStudio IDE: https://posit.co/downloads/

Course Assessments

- **DataCamp (20%):** Six DataCamp assignments will introduce and reinforce statistics and R programming concepts. These online modules allow for iterative practice and immediate feedback. For each exercise you complete, you earn XP. If you feel stuck, hints are available at the cost of a few XP. There is also embedded AI help. The goal is to practice and learn. Grading is credit (1)/no credit (0). To get credit, you must earn 80% or more of available XP. You will submit screen shots on AsULearn as evidence of XP earned. DataCamp modules are primarily formative assessments.
- **Homework (10%):** You will complete several homework assignments, roughly one per week. These are primarily formative assessments of your knowledge and skills, and will be graded on a 5-point scale that reflects accuracy and completion/effort. Submission may be online or printed, as specified in the assignment on AsULearn. Note that **correct** also means there is no extraneous code, output, messages, warnings, or printouts of data.
  - **5** = All problems complete (includes work, steps, or details shown) with $\geq$ 75% fully correct.
  - **4** = All problems complete with 50% to 75% correct; **OR** nearly all problems complete with $\geq$ 75% correct.
  - **3** = Nearly all problems complete with $<$ 75% correct.
  - **2** = More than half but fewer than all problems complete with $\geq$ 75% correct.
  - **1** = More than half but fewer than all problems complete with $<$ 75% correct; **OR** fewer than half complete.
  - **0** = No work submitted; **OR** fewer than half of problems complete.
- **Data Labs (20%):** You will complete seven lab assignments to apply probability and data analysis skills. These are primarily formative assessments of your knowledge and skills, and will be graded using the same scale as the homework. Submission might be online or paper, depending on the assignment.
- **Project (15%):** You will complete a group data analysis project, including a written report and final presentation. These are primarily summative assessments of your skills, with some formative feedback.
- **Exams (30%):** You will have two take-home exams, tentatively planned for the week before spring break and during finals. These are summative assessments of your acquired knowledge and skills.
- **Ethics (5%):** Society benefits from research and decision-making that is supported by ethical statistical practice. All people who engage in research are expected to follow ethical guidelines and encourage others to do the same. Unfortunately, this has not always been true. You will complete the type of online training required of any person at Appalachian who wishes to engage in human subjects research. Grading is credit (1)/no credit (0). To get credit, you must score 80% or more on a series of short quizzes (cumulative). Questions related to professional ethics may appear in other assignments.

Formative Assessment: This ongoing process is used to gauge student progress and give feedback. It helps find areas where students may need additional support or reinforcement before engaging in summative assessments. Grading is lower-stakes. Some examples include class discussions, exit tickets, homework, polls, quizzes, think-pair-share, and self-assessments.

Summative Assessment: This happens at the end of an instructional unit to assess how well students have achieved specific learning goals. It measures achievement and performance. Grading is typically higher-stakes. Some examples include exams, research papers, projects, and presentations. They are often cumulative across units to evaluate long-term retention.

Course Grading Scale This course will use the standard 10-point grading scale (93–100 = A, 90–92 = A–, 87–89 = B+, etc.) to determine final grades, based on a weighted average of the course assessments. Grades will be kept on AsULearn. You should monitor your grades throughout the semester to make sure they are complete and accurate. Contact Dr. Thomley if you have questions.

Late Submission Policy In general, assessments are available to you online well before their due date. Computers are unpredictable and waiting until the last minute to complete your work is stressful and an unproductive way to approach learning and demonstrating what you know, and it leads to poor retention. This is a fast-paced course, so getting behind can snowball quickly. Extensions or late submissions will be granted at the sole discretion of the instructor. **Communicate as early as possible.** Reaching out before the due date has passed, when feasible, demonstrates more responsibility than doing so after the fact.

AI Policy for This Course Like any other technology (e.g., calculators and statistical software), AI tools should enhance—not replace—your learning. Misuse of AI can prevent you from grasping key concepts and solidifying your own knowledge. Software increasingly runs on AI, whether we want it or not, and this may not be apparent. **I will generally assume that AI tools may have been used in any submitted work**. However, AI is not always reliable for solving statistical problems or explaining statistical concepts. It can produce answers that seem correct, but are mathematically or statistically flawed, incomplete, misleading, or do not align with our course. Students are responsible for independently verifying the validity, accuracy, and applicability of any AI-generated content they choose to use, as well as making sure it follows course requirements. **AI draws its answers wholly from other sources, so rewriting responses in your own words prevents unintended plagiarism.**

On some assignments, you will be asked to cite sources you use, including AI tools. Rubrics for some assessments will require you to show your work (e.g., calculations or software inputs/outputs). You must also discuss concepts, processes, and results in your own words using the **language of our class**. By this, I mean the symbols, definitions, formulas, reasoning, and approaches from our course materials and activities. Engaging with course-specific language promotes effective and meaningful participation that strengthens collaboration, class discussions, and written assessments.

Sometimes students use AI to try to clarify questions being asked on assignments. You are better served by asking Dr. Thomley to explain these questions, as AI may not understand their meaning in the context of this course.

Do not copy and paste content from any copyright-protected materials, such as our digital textbook or WileyPlus questions, into any AI tool. Similarly, **do not upload** or copy and paste course documents into AI tools. If you choose to use AI tools, you should be crafting and refining your own queries.

Sharing Course Materials All course materials may be subject to legal intellectual property protections. Students **may** copy or record materials for personal use, study, and tutoring while they are enrolled in this course, and retain copies for personal use later. However, students **DO NOT** have permission to add or upload materials to any digital platform outside of Appalachian, or add them to any physical repository, without Dr. Thomley's written permission. **Misuse of Academic Materials** is a violation of Appalachian's Academic Integrity Code. **If you are unsure about whether or not something is appropriate, ask first.**

Expectations for Students

Attendance Policy I take attendance for administrative purposes, since I am often asked to submit student progress reports. It also helps me to reach out to students who are not engaging effectively with course material. If you are absent from too many classes, especially without explanation, or you have other performance issues that raise concerns, I may submit a **Referral** to **Office of Student Success**.

Even during our asynchronous/online class days, it is important for you to remember that our "class time" (i.e., an equivalent amount of time) should be allocated to STT 5811 course activities. They are not a "days off" from class.

Structure & Workflow Our course is structured in part as a flipped classroom. This is a pedagogical (teaching) approach that inverts or "flips" traditional models where information is provided via lecture in class and practice is done alone at home. Direct instruction is moved out of the group learning space (classroom) and into the individual learning space, in this case via readings, videos, and other materials. This way, the classroom is an interactive environment where students actively engage with the material, alone or in groups, and the teacher acts as a guide. Our scheduled "class" time is only 2.5 hours (sometimes less) each week over 29 class periods, so it is important that your attention be focused and engaged when we are together in-person.

There are typically three components to each class period, as you will see on AsULearn.

- **Before Class:** Read the textbook, view videos, and engage with other provided content. Take notes on vocabulary, concepts, and procedures.This will be your first introduction to the class material and provide a baseline to build on During Class.
- **During Class:** Come to class and fully engage in the hands-on activities. You will apply, build on, and clarify content from the Before Class work. During asynchronous days, you may work alone on a larger assessment assignment. In some cases, you will be required to engage in self-assessment or meet with Dr. Thomley about your course progress before proceeding to an assigned summative assessment.
- **After Class:** Practice, refine, and integrate the knowledge and skills that you gained Before Class and During Class. This may include both formative and summative assignments. Also, review notes, work with tutors, come to office hours, self-assess your progress. **In general, actively work to solidify your learning.**

To help facilitate the face-to-face learning experience for you and your peers:

- Participate fully in all active learning activities, both individually and in groups.
- Be ready to participate when class starts (e.g., notebooks out and phone put away).
- Do not pack up at the end of class until I am finished teaching and dismiss you.
- Do not try to multitask, such as web surfing or doing work for other classes.
- Do not sit in the back and "check out" during the class—yes, it is obvious.

You have the right to make choices about your learning, but you do not have the right to choose for others. Failing to engage in a professional manner during class can be a significant distraction for those around you. **Your cell phone must be silent and out of sight.** If you are using your own laptop or tablet in class, close chat apps and social media. I may ask students to move and change seats during our class, to better facilitate peer interaction.

Academic Integrity Code Everyone in the Appalachian community is responsible for promoting an ethical learning environment. The **Academic Integrity Code** is designed to create an atmosphere of trust, respect, fairness, honesty, and responsibility. Appalachian students agree to abide by the following standards: (1) students will not lie, cheat, or steal to gain academic advantage; and (2) students will oppose every instance of academic dishonesty. You are responsible for yourselves and others.

By submitting assignments under your name, you are attesting that you have abided by the Academic Integrity Code, including all class policies. Academic integrity violations will be treated very seriously. **Penalties** can include a reduced (or failing) grade for the assignment or course, academic probation, academic integrity training, or even expulsion.

Individual assignments will specify whether or not you are allowed to collaborate or consult with any outside sources of help.

Invest Appropriate Time Appalachian's Statement on Student Engagement with Courses states: "the foremost activity of Appalachian students is an intense engagement with their courses," and you should expect to spend 2–3 hours on course work outside of class for every hour of class time. For a course that does

not meet in a typical face-to-face lecture format, in-class versus out-of-class time may seem less clear; you need to resist the urge to procrastinate. Having a job or participating in other activities does not change the requirements for this (or any) course. Budget your time accordingly and pace yourself to maximize your learning and achievement.

In general, for a 3-credit grad course like STT 5811, you should be spending about 9–12 hours **per week** on course content.

Engagement & Environment Each of you is capable of succeeding in STT 5811. However, you may need to change certain behaviors, study habits, or emotional reactions to achieve that success. In this course, you will be challenged with concepts and problems you have never seen before. I do not expect you to be able to understand them all immediately. A critical first step in learning new material is figuring out what you can do on your own. This might feel uncomfortable and frustrating. Success in learning statistics is not based on whether new ideas "come naturally" to you or whether a topic seems "clear" the first time you are introduced to it. Instead, success comes from learning to use mistakes and material we might be struggling with to self-assess and grow. Each time we get stuck, that challenge teaches us something about the problem we are working on and leads us to develop greater skill and better understanding of the content—a firm foundation for the next layer of course material. **Be proactive and take charge of your own learning!**

OVERALL CLASS ENVIRONMENT: I intend for our class to be a welcoming environment where everyone can engage, explore, and learn, to achieve their full potential. Appalachian prepares its students to use various modes of communication that can help communities reach consensus or respectful disagreement. Successful communicators interact effectively with people of both similar and different experiences and values. To make this possible, we need to be respectful to each other, regardless of gender, political party, race, religion, sexuality, disability, etc. This includes choices about health precautions, such as masks or social distancing. This class is also about scientific, data-based decision-making, so you need to objectively assess your own reactions to evidence that challenges preconceived ideas you may hold. Activities that distract or disrupt your fellow students or Dr. Thomley may result in a lower course grade. First/minor offenses typically will be dealt with by Dr. Thomley. Repeated, escalating, or more serious issues will be referred to the **Office of Student Conduct**.

PROFESSIONAL DISPOSITIONS FOR FUTURE TEACHERS: Students in this course are expected to demonstrate professional dispositions such as maintaining a positive and enthusiastic attitude, acting mindfully on feedback, collaborating respectfully, communicating effectively, taking responsibility for their own learning, and upholding academic integrity. Strong professional dispositions demonstrated throughout the course may positively influence your final grade. Persistent deficits in these areas, particularly when feedback has been given, may negatively affect your final grade.