College of Natural Science
MICHIGAN STATE UNIVERSITY

Department of Statistics and Probability

Probability and Statistics II Fall 2020 Syllabus

STT 442 - 001

3 Credit Hours

Course Meeting Times: MWF 9:10 – 10:00 am Michigan US Eastern Daylight Time (EDT)

Virtual Classroom: Zoom (https://msu.zoom.us; access link and passcode in D2L course website)

Course Website: https://d2l.msu.edu

Course Modality: Online

Prerequisites: (MTH 309 or MTH 314 or MTH 415) and STT 441, or equivalent

Instructor

Name:	Dr. Jennifer (Jenny) L. Green
Office:	C442 Wells / 223 North Kedzie
Phone:	Phone calls to my offices are not forwarded. Please use email to communicate with me.
Email:	jg@msu.edu or D2L course email system

Email is my preferred method of communication. I commit to responding to emails within 24 hours on weekdays and 24-48 hours on weekends. While I may not be able to answer your question or fully resolve your issue in 24 hours, I will at least acknowledge that you have one and get it resolved in a timely manner. If there are any exceptions, I will inform you ahead of time through the D2L course announcement tool.

Office Hours: Office hours will be held virtually using Zoom on the following days:

Tuesdays, 10:00-11:00 am EDT

Wednesdays and Fridays, 10:00-10:30 am EDT

Appointments may be scheduled (send an email) to meet outside of my regular office hours. These meetings can take place via email, video conferencing (Zoom), or phone call based on the specific needs of the request. Please don't hesitate to contact me with any questions or concerns!

Course Information

Course Description

In this course, we will discuss several topics, including sampling distributions, point estimation, interval estimation, hypothesis testing, likelihood method, nonparametric methods, simple and multiple regression analysis, time series (ARMA model, data analysis, forecasting) and analysis of variance. The course will cover Chapters 5-9, Chapters 11-14, and lecture notes on time series. We will use the free statistical software R through the IDE RStudio for simulations, data visualization, and statistical analyses.

These computer explorations will help to focus on and improve our understanding of fundamental concepts discussed in the course. After completing this course, students will be able to

- Demonstrate knowledge and use of probability theory as a foundation for statistical inference;
- Derive estimators, hypothesis tests and confidence intervals for unknown parameters;
- Compare and evaluate estimators, hypothesis tests and confidence intervals based on desirable statistical properties;
- Demonstrate a basic understanding of computer simulation;
- Apply concepts to practical problems and relate them to other coursework and experiences in statistics.

Course Overview

This course will prepare you for future coursework in statistics. In addition to learning statistical inference theory, you will learn to think and reason statistically. My role, as the instructor, is to facilitate this type of learning by providing you with a variety of meaningful activities and opportunities to learn, as well as by creating an environment conducive for learning. This will manifest in a variety of ways: group work, direct instruction, individual practice, exploration and discovery activities, writing, discussions and/or student-led instruction. The course is structured for understanding, as opposed to mere memorization. Ultimately, you are responsible for your own learning, so please put into the class what you hope to get out of it.

Course Expectations

In this course, you are expected to have professional behavior, meeting deadlines and interacting respectively and productively with others. In addition, you are expected to attend all class meetings on time, be curious, actively engage with the course materials and discussions, ask questions, seek opportunities to learn, and be open and responsive to constructive feedback.

As the instructor, I pledge to give you timely feedback and grades, answer questions in a prompt way, make the learning relevant and engaging for you, and support your success by being responsive to class needs and offering a variety of resources and opportunities to learn the content.

Online Learning Environment

This semester we will be navigating STT 442 in an online setting. Every one of you can be successful in an online style of this course, but it certainly takes work. As an online learner, you are responsible for establishing and maintaining a regular study system – i.e., make a routine and stick to it. It is important to get started right away and to establish a consistent schedule from the beginning.

Each week, pre-recorded videos and notes will be made available in D2L and the OneNote class notebook on Monday at 12:01 am EDT so that you may begin watching the videos and completing the notes. These resources are intended to offer opportunities to learn and reflect upon key learning outcomes and statistical concepts. All students are expected to watch the videos posted and participate in corresponding discussions.
We will not meet synchronously on Mondays to provide time and flexibility for you to review these materials and to work with your group members on assignments.

On Wednesdays and Fridays, we will meet synchronously from 9:10-10:00 am EDT using Zoom, which will be recorded and posted on D2L. The link and passcode to join the Zoom class meetings are provided in the D2L course website. During these meetings, we will work through example problems, engage in

group activities, and ask and discuss questions. The focus will be on practicing and applying the material discussed in the videos. If you are abroad with a technology or timezone issue, please contact the instructor for possible accommodation.

An important aspect of learning in this course is to engage in and discuss the content with one another. Although the course will be online, you will have multiple opportunities to work with others and share ideas. With the constraints we face during this challenging time, it is important to maintain a schedule that allows you to maximize the benefits of learning with and from others while still meeting other responsibilities you may have. If you have any concerns or issues arise this semester, please let me know as soon as possible so that we can seek appropriate accommodations that allow you to prioritize your well-being and still be successful in this course.

Required Textbook & Course Materials

- *Mathematical Statistics and Data Analysis,* 3rd ed.; Rice, 2006. ISBN: 0534399428

- All course materials, videos, and assignments may be accessed through the D2L course website and the OneNote course notebook. It is strongly suggested that you log into the D2L course website and access the OneNote course notebook regularly (at least once/day).

Required Technologies

This course requires the use of multiple technologies. Please make sure you can successfully access the learning platform and meet all of the technical requirements described in this section. ***If you cannot access the learning platform (D2L), have difficulties with any of the online learning tools, or are failing to meet the following technical requirements for this course, please email the instructor and contact the MSU IT Service Desk*** (Phone: (517) 432-6200, toll free (844) 678-6200; Email: ithelp@msu.edu) ***as soon as possible.*** If you are abroad with a technology or timezone issue, please contact the instructor for possible accommodation.

- *Computer/Internet*: Consistent access to a reliable computer and reliable high-speed internet access is required to access content, view videos, collaborate with peers, and submit assignments. If you have any difficulties accessing internet, please contact the MSU IT Service Desk (Phone: (517) 432-6200, toll free (844) 678-6200; Email: ithelp@msu.edu) and email the instructor (jg@msu.edu). You may also reference the following resource with guidelines of how to connect online and a list of companies offering students free or reduced cost internet: https://remote.msu.edu/learning/internet.html

- *D2L*: Course videos, announcements, and materials will be posted to D2L. To access the course website, you will need to be able to log on to D2L through Michigan State University. You can access D2L directly through this link: https://d2l.msu.edu. You will need your Net ID and password to log on to the site. More information about getting started with D2L at MSU is provided at the following link: https://help.d2l.msu.edu/node/4387

- *Zoom*: Synchronous class meetings and virtual office hours will be held using the Zoom platform. Attending online office hours is not required, but it will be another opportunity to discuss ideas and questions. The link and passcode to access class meetings and office hours are posted in the D2L course website. For more information about Zoom, please go to http://msu.zoom.us

- *Spartan 365*: You should have access to Microsoft Office (Word, Excel, PowerPoint) and OneNote Class Notebook for ease of accessing course materials and completing course assignments. You can login to your Spartan 365 account at spartan365.msu.edu. You may access

a list of the available tools and links to resources on how to use them at https://tech.msu.edu/technology/collaborative-tools/spartan365/

- *Eli Review*: Eli Review is a free platform that will be used in this course to facilitate peer-based reviews. More information will be provided later in the semester. Support information is provided at https://elireview.com/support/

- *R and RStudio*: We will use the statistical software R through the IDE RStudio for simulations, data visualization, and statistical analyses. You can access this free software by either downloading it to your computer (Download and install R; Download and install RStudio Desktop) or using RStudio through the RStudio Cloud (RStudio Cloud). Tutorial videos and resources for installing R and RStudio are provided on the D2L course website. If you encounter difficulties, please contact the instructor at jg@msu.edu, post a question to the "R & Technology Questions/Resources" D2L class discussion board topic, and/or reference frequently asked questions about R or frequently asked questions about RStudio.

Optional References

Mathematical Statistics with Applications, 7th edition; Wackerly, Mendenhall and Scheaffer, 2008.
Introduction to Probability and Mathematical Statistics, 2nd edition; Bain and Engelhardt, 1992.
Introduction to Mathematical Statistics, 5th edition; Hogg and Craig, 1995.
Introduction to Probability Theory and Statistical Inference, 3rd edition; Larson, 1982.
Statistical Inference, 2nd edition; Casella and Berger, 2002.

Learning Continuity Statement

The Department of Statistics and Probability and the course instructor understand and appreciate the exceptional circumstances and likely challenges this semester presents for many of us. To alleviate some stress and to account for any unforeseen circumstances, including illness, care for a loved one, loss of internet, etc., the grading scheme this semester is MUCH more flexible compared to regular semesters. To provide built-in flexibility to students as they progress through their coursework this semester, the lowest two homework scores, lowest two journal entry scores, and lowest two participation scores will be dropped at the end of the semester. Students can miss close to 3 weeks of classes with little impact on their grades, as long as they learn the material they missed and display their knowledge of these topics on the final project. If it will improve one's grade, the midterm project score will be replaced by the score earned on the final project.

In remote learning environments, it is critical to communicate clearly and frequently with your instructor, especially if you encounter a prolonged period where you are unable to engage in course content. In extreme cases where a student cannot reliably progress through course content for more than one week, they must **immediately email the instructor (jg@msu.edu) to inform her** of their situation so that individualized accommodations can be made. Except in the case of emergencies, communication is expected ***prior*** to assignment deadlines.

Students missing work due to illness beyond the flexibility already afforded in the syllabus are advised to meet with an academic advisor to discuss the University's Medical Leave Withdrawal Policy and other avenues for support.

If the instructor becomes sick, the Department of Statistics and Probability will find replacement instructor(s) to teach the material and provide feedback during her absence, so no lapse instruction is

anticipated to occur. If the instructor has a prolonged absence, students will be notified via email and D2L announcements.

Technical Assistance

If you need technical assistance at any time during the course or to report a problem you can:

- Visit the MSU Help Site at http://help.msu.edu
- Visit the Desire2Learn Help Site at http://help.d2l.msu.edu
- Call the MSU IT Service Desk at (517)432-6200, (844)678-6200, or e-mail at ithelp@msu.edu
- Request assistance navigating and requesting instructional design help: https://tech.msu.edu/service-catalog/teaching/instructional-design-development/
- Post a question on the "R & Technology Questions/Resources" D2L discussion topic to reach out to the class community for help.

Course Assignments and Grading

Graded Course Assignments

This course has several types of assignments that will be graded. Your grade in the course will be weighted based on the following required components:

- *Homework (25%):* Approximately 6-10 homework assignments will be made over the course of the semester. The only way to learn statistics is to practice working problems, and homework is therefore an essential part of the course. Homework solutions may be graded partially on completeness and partially on accuracy.

  Engaging with the content with peers and sharing ideas with one another promotes creativity and a deeper understanding of concepts. To foster this type of understanding and collaboration, homework will be completed in groups. Each group member is encouraged to first try each problem on their own and then compare their strategies, approaches and ideas with one another. For each homework assignment, each group member will assume at least one of three different roles: (1) compiler, (2) reviewer, and (3) facilitator. The *compiler* gets to compile the group's approaches into one file that will be submitted for grading in their group's section of the OneNote class notebook. The *reviewer* gets to review the document the compiler created, making edits and changes as necessary before turning in the group's worked solutions. The *facilitator* gets to coordinate group meetings, facilitate discussion and participation by all group members, and summarize the group's collaborations when completing the assignment. These roles will rotate across group members for the different homework assignments so that everyone has an opportunity to assume each role multiple times during the semester.

  We will use OneNote class notebook to collaborate and share work with one another. Groups will each have their own section in the notebook, so they may use that space to brainstorm and eventually compile a final copy of their worked solutions. Handwritten solutions to problems are accepted except when noted, but turned in work needs to be organized and legible. Writing that is too hard to read will not receive credit.

Homework is due **before grading begins**. In the event of extenuating circumstances, other arrangements will be considered if prior notification is provided. In those situations, please email the instructor as soon as practical. The lowest two homework scores will be dropped at the end of the semester.

- *Course Participation (25%)*: Critical/statistical thinking is an integral component of the course. To help you develop your critical thinking skills and better understand some of the ideas presented this semester, you will be asked to do some in-class writing assignments, questions, and activities during our synchronous class meetings on Wednesdays and Fridays. The writing assignments may include 'minute' essays, a summary of the lecture, or others. Because these participation assignments are designed to assist in your learning, rather than to demonstrate what you have learned, these assignments will be graded on a participation basis. The in-class questions will reinforce concepts and/or motivate new topic(s). These participation assignments will typically involve group work during the synchronous class meetings and may require additional work outside of class in preparation for the following class. If you are abroad with a technology or timezone issue or if you have circumstances that prevent you from attending the synchronous class meetings, please contact the instructor for possible accommodation. The lowest two course participation scores will be dropped at the end of the semester.

- *Journal Entries (25%)*: After each homework assignment you will create a journal entry in your individual section of the OneNote class notebook to reflect upon your learning. In the journal entry, identify and reflect upon one activity or problem that was most meaningful to you. The journal entry should identify the problem or activity, describe why you found the problem or activity to be meaningful, and describe what the problem or activity helped to establish in the content for you. Journal entries are due two days after the corresponding homework due date. Thoughtful responses with insightful, thorough reflections and correctly described statistical concepts will receive full credit. The lowest two journal entry scores will be dropped at the end of the semester.

- *Projects (25%):* To help you extend concepts we have learned in class to other real-world applications and problems, there will be two projects (one midterm project and one final project) assigned this semester. The projects may entail group and/or individual work, as well as the use and exploration of statistical software. More information about the project requirements will be provided as the semester progresses. If it will improve one's grade, the midterm project score will be replaced by the score earned on the final project.

Grades and feedback on assignments will be posted on D2L and/or the OneNote class notebook. If you suspect an assignment has been incorrectly graded or a grade has been incorrectly recorded, please notify the instructor via email within one week of receiving your grade. It is the students' responsibility to retain all returned material in case any concerns include grade calculations.

Course Grade

The final course grade will be calculated using the following weights:

- Homework: 25%
- Course Participation: 25%
- Journal Entries: 25%
- Projects (2 total): 25%

At the end of the semester, the lowest two homework scores, lowest two journal entry scores, and lowest two participation scores will be dropped before the final course grade is calculated. If it will improve one's grade, the midterm project score will be replaced by the score earned on the final project.

Final grades will be assigned using the following grading scale:

Grade	Percentage	Grade	Percentage
4.0	90% to 100%	2.0	60% to 64%
3.5	80% to 89%	1.5	55% to 59%
3.0	70% to 79%	1.0	50% to 54%
2.5	65% to 69%	0	0% to 49%

Other Course Policies and Information

Important Dates

Due dates for assignments will be announced and posted in D2L. The final project, which replaces the final exam, will be due during the scheduled final exam time for this course, Thursday, December 17 from 7:45-9:45 am EST. Please reference the **MSU Final Exam Policy** for additional information about final exams.

Classes Begin: Wednesday Sept. 2
University Closed: Monday, Sept. 7
Last day to drop with refund (8:00 pm EDT): Monday, Sept. 28
Last day to drop with no grade reported (8:00 pm EDT): Wednesday, Oct. 21
University Closed: Thursday, Nov. 26 – Friday, Nov. 27
Classes End: Friday, Dec. 11

D2L Discussion Board

D2L has discussion board forums where you can access, ask, and respond to questions about course content, homework, technology, etc. You can also share helpful resources with one another! Questions about homework problems, technology, etc. should be posted as new threads under the corresponding topic within a discussion forum. Other students and/or I will answer the questions by replying to your posts. Please try to refrain from duplicating someone else's question. E-mail should be used for personal matters. Content questions and comments should be posted on the discussion board.

Attendance Policy

Participation is an important aspect of this course that accounts for 25% of your course grade. Students are expected to attend and actively participate in all synchronous class meetings on Wednesdays and Fridays from 9:10-10:00 am EDT using Zoom, which will be recorded and posted on D2L. Some in-class participation assignments will be submitted and reviewed for participation credit. Other participation assignments will be assigned participation credit based on attendance data pulled from the live Zoom classes. It is important that you authenticate with your MSU email so that you may receive participation credit for the activities on those days. Scores for participation assignments will be posted in D2L.

If you are abroad with a technology or timezone issue, please contact the instructor for possible accommodation. If have circumstances that warrant you missing an in-class participation assignment, please communicate with me. I am more than willing to work with people who have serious conflicts. Except in the case of emergencies, communication is expected **prior** to assignment deadlines. At the end of the semester, the two lowest participation scores will be dropped.

Late Work Policy

All work needs to be turned in on time to receive credit. If you have circumstances that warrant you handing an assignment in late and/or missing an in-class participation activity, please communicate with me. I am more than willing to work with people who have serious conflicts. Except in the case of emergencies, communication is expected **prior** to assignment deadlines. Without prior notification, late work will be assigned a grade of zero. To offer built-in flexibility, the two lowest homework, course participation, and journal entry scores will be dropped at the end of the semester.

Academic Integrity

All participants in this class are held to the standard set by MSU's Policy on Integrity of Scholarship and Grades. The policy can be read in full at the [MSU Ombudsperson's website](#)

You are expected to develop original work in this course. The work you turn in must be your own and must be written in your own words (unless the assignment specifically states otherwise). Paraphrasing or quoting another's work without citing the source is a form of academic dishonesty. Even inadvertent or unintentional misuse or appropriation of another's work (such as relying heavily on source material that is not expressly acknowledged) is considered plagiarism.

Students who violate MSU academic integrity rules may receive a penalty grade, including a failing grade on the assignment or in the course and an Academic Dishonesty Report will be filed to the University. If you have any questions about the appropriateness of your coursework, the limits of collaboration, or about using and citing sources, contact the instructor to ask for clarification.

Spartan Code of Honor

"As a Spartan, I will strive to uphold values of the highest ethical standard. I will practice honesty in my work, foster honesty in my peers, and take pride in knowing that honor is worth more than grades. I will carry these values beyond my time as a student at Michigan State University, continuing the endeavor to build personal integrity in all that I do."

Accommodations for Students with Disabilities

Michigan State University is committed to providing equal opportunity for participation in all programs, services and activities. Requests for accommodations by persons with disabilities may be made by contacting the Resource Center for Persons with Disabilities at 517-884-RCPD or on the web at rcpd.msu.edu. Once your eligibility for an accommodation has been determined, you will be issued a verified individual services accommodation ("VISA") form. Please present this form to me at the start of the term and/or two weeks prior to the accommodation date (test, project, etc). Requests received after this date will be honored whenever possible.

Course Recordings:

Class meetings will be recorded, and the recordings may be available to students registered for this class. This is intended to supplement the classroom experience. Students are expected to follow

appropriate University policies and maintain the security of passwords used to access recorded lectures. Recordings may not be reproduced, shared with those not in the class, or uploaded to other online environments. Doing so may result in disciplinary action. If the instructor or another University office plans other uses for the recordings beyond this class, students identifiable in the recordings will be notified to request consent prior to such use. For more information, please reference the [Institutional Data Policy](#) and the [Student Privacy Guidelines and Notification of Rights under FERPA](#)

Disclaimer

Information contained in this syllabus was, to the best knowledge of the instructor, considered correct and complete when distributed at the beginning of the term. The instructor reserves the right, acting within the policies and procedure of MSU, to make changes in course content or instructional technique without notice or obligation.

College of Natural Science
MICHIGAN STATE UNIVERSITY

Syllabus Signature Page

Instructor:

Course:

Semester:

I _____ do agree that I received a copy of the course syllabus for the class mentioned above. I understand the course requirements and the policies entailed in this document. I further understand that my participation and conduct in this course is a key contributor to my success and the success of this course.

I pledge to come to class prepared and to conduct myself respectfully at all times.

_____
Print Full Name

_____   _____
Signature   Date