Department

Course Title Fall 2020 Syllabus

Course Number: Statistics 351H

Credit Hours: 3

Course meeting days and time: MWF 10:20-11:10

Course location: Synchronous Zoom meetings

Course website address: <https://d2l.msu.edu/d2l/home/1073173>

Course Modality: Synchronous online

## Instructors

Instructor Information

|  |  |
| --- | --- |
| **Instructor**  | **Graduate Assistant** |
| Name: Paul Speaker | Name: Rouwei Huang |
| Office: Wells Hall C431 | Office: |
| Office hours: (Tentative)M: 1:00-2:30W: 12:30-2:00Th: 9:00-10:30 | Office hours:  |
| Phone: (517)353-3237 | Phone: |
| E-mail: speakerp@msu.edu  | E-mail: huangr21@msu.edu  |

Instructor Introduction:

I received a PhD in Applied Mathematics from MSU in 2009. Since then, I have been working as a data scientist in industry, and my focus remains on how data science can be applied for many different business problems. I plan on bringing an applied approach to this course, with a mix of pen-and-paper problem solving and computational work.

### Course Description

From the Registrar’s page: “Probability models and random variables. Estimation, confidence intervals, tests of hypotheses, simple linear regression. Applications to engineering.”

### Course Overview

### Required Textbook & Course Materials:

Devore, *Probability and Statistics for Engineering and the Sciences*. ISBN #9781305748927. Free Online versions are available; for example, at <https://fac.ksu.edu.sa/sites/default/files/probability_and_statistics_for_engineering_and_the_sciences.pdf>

### Required Technologies:

* Computer, with the following software
	+ Zoom.
	+ Ability to write and run your own programs/scripts. The preferred programming language for this course is Python. R can also be used, but please let me know if you intend to use R. For other languages, please ask me first.
* A tool to submit paper homework electronically, either by scanning or photos. Please make sure any images are readable before submitting.
* An internet connection that will support the online lectures and other videos. This will include

Learning Continuity Statement:

In the event you are unable to attend class for an extended period of time, please let me know as soon as possible. Alternative accommodations can be given in this event for homework and other assessments.

Prerequisite: MTH 234 or MTH 254H or LB 220

Course platforms/Structure:

This course will be delivered ***online*** through the course management system and you will need your MSU NetID to login to the course from the ***D2L homepage* (*http://d2l.msu.edu*).**

In ***D2L***, you will access online lessons, course materials, and additional resources. Activities may consist of readings, discussion forums, email, journaling, wikis, and other online activities. ***Add and remove listed activities as appropriate to your course. Include information regarding the synchronous or asynchronous elements of your online course****.*

**Technical Assistance:**

• Visit the MSU Help site at [http://help.msu.edu](http://help.msu.edu/)• Visit the Desire2Learn Help Site at [http://help.d2l.msu.edu](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/>

Consider including pointers for which browsers and internet speeds are best for working with D2L:

Browser/mobile support for D2L: <https://documentation.brightspace.com/EN/brightspace/requirements/all/browser_support.htm>

Guide for internet speed:  <https://broadbandnow.com/guides/how-much-internet-speed-do-i-need>. For most courses, 25 Mbps should work. If there is no mandatory video component, then students may be able to interact with the course with a slower connection. Most courses have a generic statement that says the course requires access to "high speed" internet.

## Course Outline/Schedule

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| --- | --- | --- | --- |
| **Date** | **Book Section** | **Topic** | **Computational Topic** |
| 2-Sep | 1.1-1.2 | Introduction and Terms |   |
| 4-Sep | 1.2-1.4 | Graphical Views of Data | Statistical Plots; Quantiles |
| 7-Sep | Labor Day |   |   |
| 9-Sep | 2.1-2.2 | Sample Spaces; Probability and its Properties |   |
| 11-Sep | 2.3 | Learning how to Count |   |
| 14-Sep | 2.4 | Conditional Probability |   |
| 16-Sep | 2.4-2.5 | Conditional Probability & Independence |   |
| 18-Sep | 3.1-3.2 | Random Variables and their distributions |   |
| 21-Sep | 3.1-3.2 | Random Variables and their distributions |   |
| 23-Sep | 3.3 | Expected Values | Probabilistic Calculations of Expected Values and Variances |
| 25-Sep | 3.4 | Binomial Distribution |   |
| 28-Sep | 3.6 | Poisson Distribution |   |
| 30-Sep | None | **Exam 1 (Chapters 2 and 3)** |   |
| 2-Oct | 4.1-4.2 | Density Functions |   |
| 5-Oct | 4.1-4.2 | Expected Values |   |
| 7-Oct | 4.3-4.5 | Examples of Continuous Distributions |  Probabilistic Calculations with Continuous random variables |
| 9-Oct | 4.3-4.5 | Examples of Continuous Distributions |   |
| 12-Oct | 4.6 | Probability Plots |  qq plots |
| 14-Oct | 5.1-5.2 | Jointly Distributed Random Variables |   |
| 16-Oct | 5.1-5.2 | Expected Values |   |
| 19-Oct | 5.3 | Covariance and Correlation |   |
| 21-Oct | 5.4 | Central Limit Theorem; Sampling Distributions |   |
| 23-Oct | 5.5 + Supplement | Distributions of Combinations of Random Variables |  |
| 26-Oct | None | **Exam 2 (Chapters 4 and 5)** |   |
| 28-Oct | Supplement | Monte Carlo Simulation | Monte Carlo Simulation  |
| 30-Oct | Supplement | Modeling with Random Variables |  Convergence of Simulations |
| 2-Nov | 6.1-6.2 | Estimate Values |  Sensitivity Analysis |
| 4-Nov | 7.1-7.2 | Introduction to Confidence Intervals |   |
| 6-Nov | 7.1-7.2 | Confidence Intervals |   |
| 9-Nov | 7.1-7.2 | Confidence Intervals |   |
| 11-Nov | 7.3-7.4 | Intervals based on Distributions |   |
| 13-Nov | 8.1-8.3 | Hypothesis Testing |   |
| 16-Nov | 8.1-8.3 | Hypothesis Testing |   |
| 18-Nov | 8.4-8.5 | p-values and other concerns in hypothesis testing |   |
| 20-Nov | None | **Exam 3 (Chapters 6-8)** |   |
| 23-Nov | 12.1-12.3 | Introduction to Linear Regression | Linear Regression |
| 25-Nov | 12.1-12.3 | Parameters of Linear Regression and their estimates |   |
| 27-Nov | Thanksgiving |   |   |
| 30-Nov | 12.4-12.5 | Correlation and use of regression models |   |
| 2-Dec | 12.4-12.5 | Correlation and use of regression models |   |
| 4-Dec | 13.1-13.3 | Nonlinear Regression | Nonlinear Regression |
| 7-Dec | 13.4-13.5 | Multiple Regression | Multiple Linear Regression |
| 9-Dec | 13.4-13.5 | Multiple Regression |   |
| 11-Dec | Review |   |   |

## Grading Policy

**Below** is a breakdown of how grades will be determined.

1. **Exams.**  Exams will be an hour long done in the course time. They will consist of 6-9 problems which will be solved on paper or digitally if you have a writing tablet available. Answers will be turned in by images. There will be additional time to accomplish the submissions. The TA and I will be present virtually via Zoom. The exams will be open note and open book. The lowest exam grade will be dropped.
2. **Written Homework.** There will be homework problems assigned, with some of them as practice problems and some to be turned in. The homework will be turned in a similar method as the exams. It will be due a week after being assigned at 11:59:59 pm Eastern time. There will be 1 homework assignment per chapter (except for Chapter 1) and they will be worth 20 points (a couple of assignments will be smaller and worth 10-15 points). The lowest grade will be dropped. Late homework will not be accepted.
3. **Computational Homework.** There will be assignments made that will require some coding. The preferred language is Python. R can also be used, but please let me know if you intend to use R. For other languages, please ask me first. This homework will be simple enough to not require much prior background in the language. Appropriate libraries and commands that are specific to probability and statistics, as well as some plotting, will be pointed out during the lectures. In addition, you can be expected to do some basic coding functions, such as printing out statements and being able to run through commands multiple times, either through loops or function calls. You will turn in both the code and the output. This is not a coding class, so if it works, use it! The calculations should not be computationally intensive. Most of the assignments will be worth 20 points each, and you will have at least a week to complete them. Late in the semester there will be a larger assignment worth 50 points. The lowest grade of the smaller assignments will be dropped. Late homework will not be accepted.
4. **Final Exam.** This will be similar to the individual exams, except for it will be 2 hours. It will be comprehensive for the entire semester. Submission will work the same as other exams, and it also will be open book and open note. It cannot be dropped.

The table below describes the graded course activities including points and activity description. The first column includes the points or possible, and the second column includes a description for each activity.

| **Points or Percentages**  | **Assessment Type** |
| --- | --- |
| 200 points | 2 out of 3 Exams  |
| 150 points | Written Homework |
| 150 points | Computational Homework |
| 200 points | Final Exam |
| 700 points | Total Points Possible |

### Grade Assignment (Grading Scale):

| **Grade** | **Percentage** |
| --- | --- |
| 4.0 | 90-100% |
| 3.5 | 85-89.9% |
| 3.0  | 80-84.9% |
| 2.5 | 75-79.9% |
| 2.0 | 70-74.9% |
| 1.5 | 65-69.9% |
| 1.0 | 60-64.9% |
| 0.0 | < 60% |

## Other Course Policies

### Important Dates to Remember:

|  |  |
| --- | --- |
| **Course Event** | **Date** |
| Exam 1 | September 30th  |
| Exam 2 | October 26th |
| Exam 3 | November 20th  |
|  |  |
| In-Person Instruction Ends | Friday, December 11th  |
| Final Examination | Friday December 18th, 7:45-9:45am |

### **Attendance Policy**:

Attende**nce is highly encouraged, but not required. The live lectures will be recorded (barring technical difficulties) and posted soon after the lecture. In addition there will be short videos available of working through the practice problems.**

**Group Work Policy:**

Homework can be collaboratively worked on, but what is turned in should be substantially your own work. It should look a little different than anyone else’s.

# Technology and Media

## D2L: D2L will be the mode for submitting homework.

## Course Recordings, Intellectual Property and Social Media Use:

* **Course Recordings:** Meetings of this course will be recorded. 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 plan other uses for the recordings beyond this class, students identifiable in the recordings will be notified to request consent prior to such use.

Related Policies:

Institutional Data Policy:

<https://tech.msu.edu/about/guidelines-policies/msu-institutional-data-policy/>

Student Privacy Guidelines and Notification of Rights under FERPA

<https://reg.msu.edu/ROInfo/Notices/PrivacyGuidelines.aspx>

*As members of a learning community, students are expected to respect the intellectual property of course instructors. All course materials presented to students are the copyrighted property of the course instructor and are subject to the following conditions of use:*

1. *Students may (may not) record lectures or an other classroom activities and use the recordings only for their own course-related purposes.*
2. *Students may (may not) share the recordings with other students enrolled in the class. Sharing is limited to using the recordings only for their own course-related purposes.*
3. *Video and audio recordings made of online lectures may contain inaudible or invisible watermarks to identify shared media*: <https://support.zoom.us/hc/en-us/articles/360021839031-Audio-Watermark>
4. *Students* ***may not*** *post the recordings or other course materials online or distribute them to anyone not enrolled in the class without the advance written permission of the course instructor and, if applicable, any students whose voice or image is included in the recordings.*
5. *Any student violating the conditions described above may face academic disciplinary sanctions.*

## Classroom Devices:

Describe your policies for using calculators, tape recorders, other audio & technology devices for your course

# Student Expectations

### The All-University Policy on Integrity Of Scholarship and Grades:

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](http://splife.studentlife.msu.edu/regulations/selected/integrity-of-scholarship-and-grades)

### Spartan Code of Honor:

On March 22, 2016, The Associated Students of Michigan State University (ASMSU) adopted the following 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.”***

### **Disability Access:**

Students must inform the instructor of any accommodations needed. Information related to disability access is available on the [Resource Center for Persons with Disabilities (RCPD) website](http://www.rcpd.msu.edu/Awareness/Home). Students: to make an appointment with a specialist, call: (517) 353-9642 Or TTY: (517) 355-1293 or visit the [RCPD website](http://myprofile.rcpd.msu.edu/).

### Americans with Disabilities Act Accommodations:

* Include a statement inviting ADA accommodation requests. [**Statement on ADA Compliance**](https://webaccess.msu.edu/Policy_and_Guidelines/web-accessibility-policy.html)**:** *This is your opportunity to describe what efforts you have made to ensure compliance with the Americans with Disabilities Act for the online version or portion of the course and how people with disabilities can contact you and RCPD if aspects of the course are not accessible due to a disability.*

Sample accessibility statement: [**RCPD Disability Accommodations Statement**](https://www.rcpd.msu.edu/get-started/faculty-departmental-resources/model-statements-disability-inclusion)

**“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.”**

### Grief Absences and Mental Health:

*If a student experiences death of a family member or emotional distress from a similar tragedy, refer to* [*MSU’s Grief Absense Policy*](https://michiganstate-my.sharepoint.com/personal/vanhofje_msu_edu/Documents/OneDrive%20Sync/Documents/Accessibility/MSU%27s%20Grief%20Absense%20Policy) *(*[*https://msu.edu/unit/ombud/classroom-policies/index.html#GriefAbsencePolicy*](https://msu.edu/unit/ombud/classroom-policies/index.html#GriefAbsencePolicy)*).*

* *For Mental Health resources see:* [**Mental Health**](https://caps.msu.edu/faculty-staff/Syllabus-Language.html)

**Commercialized Lecture Notes:** Commercialization of lecture notes and university-provided course materials is not permitted in this course.

### Student Rights and Responsibilities:

Students have a range of support and information options available to them to discuss actions or activities related to their academic, personal or professional lives at MSU. These rights and resources are detailed on the [ombudsperson’s website](https://ombud.msu.edu/index.html).

### Emergency Procedures:

In the event of an emergency arising within the [classroom/lab], the [Professor, Teaching Assistant (TA), graduate student, instructor, Facilitator] will notify you of what actions that may be required to ensure your safety. It is the responsibility of each student to understand the evacuation, “shelter-in-place,” and “secure-in-place” guidelines posted in each facility and to act in a safe manner. You are allowed to maintain cellular devices in a silent mode during this course, in order to receive emergency SMS text, phone or email messages distributed by the university. When anyone receives such a notification or observes an emergency situation, they should immediately bring it to the attention of the [Professor, Teaching Assistant (TA), graduate student, instructor, Facilitator] in a way that causes the least disruption. If an evacuation is ordered, please ensure that you do it in a safe manner and facilitate those around you that may not otherwise be able to safely leave. When these orders are given, you do have the right as a member of this community to follow that order. Also, if a shelter-in-place or secure-in-place is ordered, please seek areas of refuge that are safe depending on the emergency encountered and provide assistance if it is advisable to do so.” Prepared by: Captain Penny Fischer Michigan State University Police.

**Policies for Student Athletes:**

* [**Student Athletes**](https://hr.msu.edu/policies-procedures/faculty-academic-staff/faculty-handbook/student_athlete_relationships.html)

## A close up of a sign  Description automatically generatedSyllabus 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