

STT 881: Theory of Probability, I

Fall 2020 Syllabus

Course meeting days and time: **M W F 9:10 AM – 10:00 AM**

Course location (ZOOM Meetings and E-mail (or D2L))

<https://msu.zoom.us/j/7849276874>

Password:

Course website address (<https://d2l.msu.edu/>)

Course Modality (online)

Instructor Information

Instructor	Graduate Assistant
Name: Yimin Xiao	Name: Yiqing Wei
Office: C437 Wells Hall	Office:
Office hours: M W F 10:00 AM – 11:00 AM https://msu.zoom.us/j/7849276874 Password:	Office hours:
If the above time slots do not work, please make an appointment with me.	
Phone:	Phone: None
E-mail: xiaoy@msu.edu	E-mail: weiyiqin@msu.edu

Course Description

This course is the first of the series STT 881-882. The content of STT 881-882 includes measure and integration theory (review in nature), limit theorems for independent random variables and theory of stochastic processes. The objective of STT 881-882 is to lay a rigorous foundation on probability theory for graduate students who are interested in working in probability, statistics, data science, and related areas.

Course Overview

STT 881, in addition to a review of measure theory, covers limit theory of independent random variables. Some applications of probabilistic techniques in other areas will be mentioned. Specifically, STT 881 will cover the following topics:

1. Review of measures and integration. Convergence theorems, L^p -spaces and

- inequalities, the Lebesgue decomposition theorem, the Radon-Nikodym theorem, product measures and Fubini's theorem, Kolmogorov's extension theorem.
2. Independence and conditioning. Constructing independent random variables, Kolmogorov's zero-one law, the Borel-Cantelli lemma and its extensions, conditional expectations.
 3. Law of large numbers. Convergence of random series, Cramér's large deviation theorem.
 4. Central limit theorems. Weak convergence, Characteristic functions, the Lindeberg-Feller theorem, the Berry-Esseen theorem, stable laws (if time permits), Poisson convergence.

I will use ZOOM to give live lectures and hold office hours.

Textbook & Course Materials:

- *Probability: Theory and Examples*, Fourth Edition, by Richard Durrett.
- My lectures notes.

Prerequisite:

Students are expected to have good background in undergraduate level real analysis.

Learning Continuity Statement:

If you have to be absent for a prolonged time period, please discuss with me. Lecture notes, videos will be available. Deadlines for homework assignments may be changed depending on the circumstances.

Course Continuity Statement:

An alternative instructor may continue this class in case I have to be absent. I will let you know in advance. Communications through e-mails should remain in place.

Grading Policy

The final grade of a student will be determined from homework assignments, and two exams. The midterm exam will be given on Friday, October 30, during the regular class time and the **final exam will be given on Thursday, December 17, 2020, from 7:45 Am – 9:45 AM.**

Exams will be proctored using Zoom. The video must be turned on for the whole duration of the exam, while the microphone must be muted for the whole duration of the exam. There should be no other people present in the room during the exam. **DO NOT** use virtual background. The camera should show a wide angle with you and the desk where your work is visible.

Grade Dissemination: Students will learn of their grades from assignments and assessments when their graded works are returned. Students may discuss grades with faculty.

Graded Course Activities: Your homework assignments will be graded by a TA who will assign a grade to each of your assignments. At the end of the semester, percentages of your homework grades will be reported to me. You may discuss grades with the TA or me.

Grading Scale:

Grade	Percentage
4.0	90% to 100%
3.5	81% to 89%
3.0	71% to 80%
2.5	61% to 70%
2.0	55% to 60%
1.5	50% to 54%
1.0	≤ 49%

Fall 2020 MSU Holidays and Breaks (tentative)

- *Classes Begin: Wednesday Sept. 2*
- *All In-Person instruction ends: Wednesday Nov. 25*
- *University Closed: Monday Sept. 7*
- *University Closed: Thursday Nov. 26 – Friday Nov. 27*
- *Classes End: Friday Dec. 11*
- *Final Exams: Monday Dec. 14 – Friday Dec. 18*

Attendance Policy: Students are expected to attend classes during scheduled times. Please let me know if you have to miss the class for a period of time.

Group Work Policy: Students are encourage to discuss problems in homework assignments, but are prohibited from copying solutions from other students or other sources (e.g., a solution manual).

Course Recordings: Meetings of this course will be recorded. The recordings will 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 record lectures or other classroom activities and use the recordings only for their own course-related purposes.*
- 2. Students may 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.*

Student Expectations:

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](#)

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](#). Students: to make an appointment with a specialist, call: (517) 353-9642 Or TTY: (517) 355-1293 or visit the [RCPD website](#).

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 Absence Policy](https://msu.edu/unit/ombud/classroom-policies/index.html#GriefAbsencePolicy) (<https://msu.edu/unit/ombud/classroom-policies/index.html#GriefAbsencePolicy>).

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](#).

SIRS (Student Instructional Rating System):

Refer to [MSU’s SIRS Online website](#) if using online SIRS for course evaluations.