

**Instructor:** Dr. Anna Little

**Office:** LCB 106

**E-mail:** little@math.utah.edu

**Office Hours:** Tuesday/Wednesday 1-2 PM

**Class Meets:** MW 10:45 AM - 12:05 PM in LCB 323

## Course Information

**Course Materials** Textbook: *Probability*, ISBN-13: 978-0821842157, by Davar Khoshnevisan. A pdf of the textbook is posted on CANVAS under “Files”.

**Technology** Students should check their Utah email accounts regularly as course updates and information may be communicated through **email**. Resources, homeworks, grades, and announcements will be posted on **CANVAS**. There is a course **SLACK** channel which will be used for course discussion; I encourage you to post homework questions to the SLACK channel. I will monitor the SLACK channel but strongly encourage you to respond to other students’ questions when you can.

**Grading** Your grade will be based on homework, a midterm, and a final, weighted as follows:

Homework:	30%
Midterm:	30%
Final:	40%

A course average of at least 93% will guarantee a High Pass (A), and a course average of at least 87% will guarantee a Pass (B+ or A-).

**Attendance** Given the nature of this course, attendance is required and adjustments cannot be granted to allow non-attendance. However, if you need to seek an ADA accommodation to request an exception to this attendance policy due to a disability, please contact the Center for Disability and Access (CDA). CDA will work with us to determine what, if any, ADA accommodations are reasonable and appropriate.

**Reading** Reading the textbook sections as outlined in the schedule is essential to understanding the material. We will not have time to cover everything during class, and going over the material multiple times (by reading the textbook and then attending class and working on the homework) greatly increases comprehension.

**Video Resources** There are video lectures covering much of the course content made by Firas Rassoul-Agha when he taught the course in Fall 2020. These videos are available at <http://www.math.utah.edu/~firas/Videos/6040/>. Although course content will differ slightly from last year, these are a great resource should you have to miss class for an extenuating circumstance or COVID (or if you just want to hear it again!). Thus I have tried to match up the videos from last year to this year’s schedule whenever possible (see the Tentative Schedule).

**Homework** There will be regular homework assignments consisting mainly of selected exercises from the textbook. A subset of these problems will be graded. Late submissions will not be accepted unless there is an extenuating circumstance (illness or family emergency, etc.). However I will drop your lowest homework at the end of the semester. You are encouraged to post homework related questions to the SLACK channel. Also if you post questions before class, I will be better prepared to answer your questions in class.

**Exams** The midterm exam is on **Wednesday October 20th** during class. The final exam is on **Wednesday December 15th 10:30 am-12:30 pm** in the regular classroom. The time of this final is fixed by the Registrar's office and cannot be changed. Registering for this class confirms that you are able to take the final on this date. This is a qual credit course and the final exam will be similar to previous qualifying exams in probability. Past exams are available at <https://www.math.utah.edu/grad/qual exams.php>.

**Group work, Academic Honesty:** It is fine to work with your fellow class mates on the homework assignments; collaboration in these areas is in fact encouraged. However, it is unacceptable to copy off of another student's paper (your write-up should be your own), or to receive any kind of assistance on an **exam**. Academic dishonesty is taken very seriously at the U. Feel free to come talk to me if you have any questions about what is acceptable.

**Note:** In this syllabus, I have outlined course policy and content to the best of my ability. However, certain policies and content may change during the course of the semester.

## COVID-related Recommendations and Resources

University leadership has urged all faculty, students, and staff to model the vaccination, testing, and masking behaviors we want to see in our campus community. These include:

- Vaccination
- Masking indoors
- If unvaccinated, getting weekly asymptomatic coronavirus testing

### Vaccination

- Get a COVID-19 vaccination if you have not already done so. Vaccination is proving highly effective in preventing severe COVID-19 symptoms, hospitalization and death from coronavirus. Vaccination is the single best way to stop this COVID resurgence in its tracks.
- Many in the campus community already have gotten vaccinated: more than 80% of U. employees and over 70% of U. students.
- Visit <http://mychart.med.utah.edu/>, <http://alert.utah.edu/covid/vaccine/>, or <http://vaccines.gov/> to schedule your vaccination.

### Masking

While masks are no longer required outside of Health Sciences facilities, UTA buses and campus shuttles, CDC guidelines now call for everyone to wear face masks indoors.

- Check the CDC website periodically for masking updates-  
<https://www.cdc.gov/coronavirus/2019-ncov/vaccines/fully-vaccinated-guidance.html>
- Treat masks like seasonal clothing (i.e. during community surges in COVID transmission, masks are strongly encouraged indoors and in close groups outside).

## Testing

- **If you are not yet vaccinated, get weekly asymptomatic coronavirus tests.** This is a helpful way to protect yourself and those around you because asymptomatic individuals can unknowingly spread the coronavirus to others. Asymptomatic testing centers are open and convenient:
  - Online scheduling
  - Saliva test (no nasal swabs)
  - Free to all students returning to campus (required for students in University housing)
  - Results often within 24 hours
  - Visit [alert.utah.edu/covid/testing/](https://alert.utah.edu/covid/testing/)
- **Remember: Students must self-report if they test positive for COVID-19** via this website: <https://coronavirus.utah.edu/>.

## Student Mental Health Resources

- Rates of burnout, anxiety, depression, isolation, and loneliness have noticeably increased during the pandemic. If you need help, reach out for campus mental health resources (<https://studentaffairs.utah.edu/mental-health-resources/index.php>), including counseling, trainings and other support.
- Consider participating in a Mental Health First Aid (<https://studentaffairs.utah.edu/mental-health-first-aid.php>) or other wellness-themed training (<https://wellness.utah.edu/workshops-training/>) provided by our Center for Student Wellness and sharing these opportunities with your peers, teaching assistants and department colleagues.

## General Policies and Resources

**The Americans with Disabilities Act:** The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If you will need accommodations in the class, reasonable prior notice needs to be given to the Center for Disability & Access, 162 Olpin Union Building, 801-581-5020, <https://disability.utah.edu/>. CDA will work with you and the instructor to make arrangements for accommodations. All written information in this course can be made available in alternative format with prior notification to the Center for Disability & Access.

**Addressing Sexual Misconduct:** Title IX makes it clear that violence and harassment based on sex and gender (which includes sexual orientation and gender identity/expression) is a Civil Rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veteran's status or genetic information. If you or someone you know

has been harassed or assaulted on the basis of your sex, office for equal opportunity and affirmative action including sexual orientation or gender identity/expression, you are encouraged to report it to the University's Title IX Coordinator; Director, Office of Equal Opportunity and Affirmative Action, 135 Park Building, 801-581-8365, <https://oeo.utah.edu/contact-us/index.php> or to the Office of the Dean of Students, 270 Union Building, 801-581-7066, <https://deanofstudents.utah.edu/>. For support and confidential consultation, contact the Center for Student Wellness, 426 SSB, 801-581-7776. To report to police, contact the Department of Public Safety, 801-585-2677(COPS), <https://police.utah.edu/>.

**Campus Safety:** The University of Utah values the safety of all campus community members. To report suspicious activity or to request a courtesy escort, call campus police at 801-585-COPS (801-585-2677). You will receive important emergency alerts and safety messages regarding campus safety via text message. For more information regarding safety and to view available training resources, including helpful videos, visit [safeu.utah.edu](http://safeu.utah.edu).

**University Counseling Center:** The UCC staff is committed to supporting the mental health needs of our campus community. Their phone number is 801-581-6826. Their hours are Monday-Friday, 8:00am-5:00pm. For after-hours emergencies, contact the 24/7 Crisis Line: 801-587-3000. More information is at <https://counselingcenter.utah.edu/>.

**Office of the Dean of Students:** The Office of the Dean of Students is dedicated to being a resource to students through support, advocacy, involvement, and accountability. It serves as a support for students facing challenges to their success as students, and assists with the interpretation of University policy and regulations. To contact the Office of the Dean of Students, please email [deanofstudents@utah.edu](mailto:deanofstudents@utah.edu) or call 801-581-7066. There is more information at <https://deanofstudents.utah.edu/>.

## Tentative Schedule

Week:	Date:	Topic:	Reading:	Video resources:
Week 1	8/23/21	Syllabus, intro, and review	Ch. 1-2	NA
	8/25/21	Algebras, Measures, and Lebesgue Measure	3.1-3.2	1-1, 1-2, 1-3
Week 2	8/30/21	Caratheodory Extension Theorem	3.3-3.4	2-1, 2-2, 2-3
	9/1/21	Measureable functions & Integration	4.1-4.2	3-1, 3-2, 3-3
Week 3	9/6/21	<b>Labor Day (NO CLASS)</b>		-
	9/8/21	Integration and $L_p$ Spaces	4.2-4.3	4-1, 4-2
Week 4	9/13/21	Convergence and Limit Theorems	4.4-4.5	4-3, 5-1
	9/15/21	Limit Theorems and Radon–Nikodym Thm	4.5-4.6	5-2, 5-3, 6-1
Week 5	9/20/21	Product Spaces, Fubini, and Infinite Products	5.1-5.2	6-2, 7-1, 7-2
	9/22/21	Distributions, Expectation, and Variance	6.1	7-3, 8-1
Week 6	9/27/21	Independence	6.2	8-2, 9-1
	9/29/21	Kolmogorov 0-1 and Weak LLN	6.3-6.4	9-2, 9-3, 10-1
Week 7	10/4/21	Borel Cantelli and Strong LLN	6.5	10-2, 10-3, 11-1, 11-2
	10/6/21	LNN Applications	6.6	11-3, 11-4, 11-5, 12-1
Week 8	10/11/21	<b>Fall Break (NO CLASS)</b>		-
	10/13/21	<b>Fall Break (NO CLASS)</b>		-
Week 9	10/18/21	Review and catch-up		-
	10/20/21	<b>Midterm (Ch. 3-6)</b>		-
Week 10	10/25/21	Weak Convergence	7.1-7.2	17-2, 18-1
	10/27/21	Harmonic Analysis, Convolution, Plancherel	7.3-7.4	18-2, 18-3, 19-1
Week 11	11/1/21	Central Limit Theorem	7.5-7.6	19-2, 19-3, 19-4
	11/3/21	Lindeberg-Feller CLT ( <i>short</i> )	7.6	20-1
Week 12	11/8/21	Conditional Expectation and Probability ( <i>long</i> )	8.1	13-1, 13-2, 13-3, 14-1
	11/10/21	Martingales and Stopping Times	8.2-8.3	21-1, 21-2
Week 13	11/15/21	Applications to Random Walks	8.4	22-1, 22-2, 22-3
	11/17/21	Doob's Inequalities, Martingale Convergence	8.5	23-2, 23-3, 24-1
Week 14	11/22/21	Applications (LIL, abracadabra, etc.)	8.6	24-3, 24-4, 24-5, 25-1
	11/24/21	Gaussian Processes	9.1	NA
Week 15	11/29/21	Brownian Motion, Nowhere Differentiability	9.2-9.3	NA
	12/1/21	Stopping Times and Strong Markov Property	9.4-9.6	NA
Week 16	12/6/21	Additional Topics		-
	12/8/21	Review and catch-up		-
Week 17	12/15/21	<b>FINAL EXAM (10:30-12:30)</b> 5		-