

# Math/Stat 416: Probability

Fall 2021

Meets: Tuesday and Thursday from 3:00 to 4:15 in UNIV 001

Instructor: Jeff Beckley  
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Virtual Office Hours:

Tuesday 10:00 am to 11:30 am

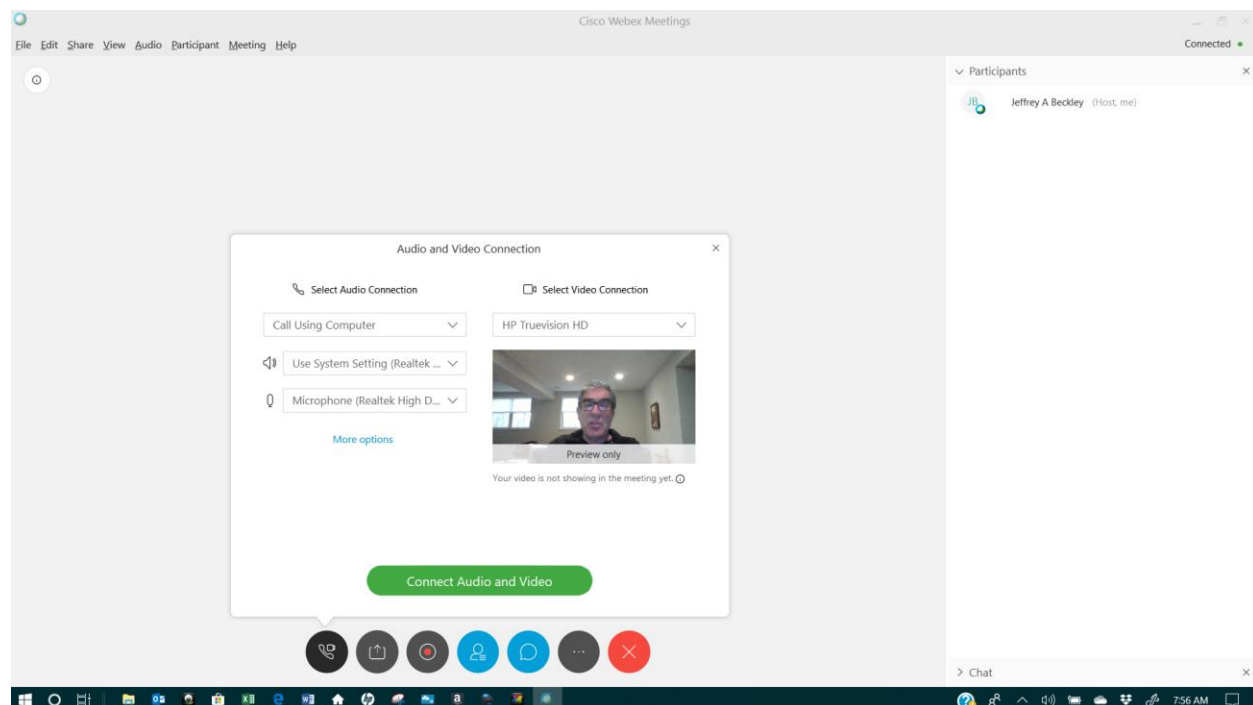
Thursday 10:00 am to 11:30 am

or by appointment (in person or virtual)

To enter the Virtual Office Hours, open a browser and type the following URL into your browser:  
[purdue.webex.com/purdue/meet/jbeckley](http://purdue.webex.com/purdue/meet/jbeckley)

You will be asked to enter your name and email address. You may then need to install a webex addin for your browser.

After about 30 seconds your screen should look like this:



Select Call Using the Computer and Push the green button so we are connected.

If you have any problem, call me at 317-698-8543.

**Please check email daily as this is the method that I will use to communicate with you.**

## **Mask Requirement**

**When in class, you must wear a mask that covers from the bridge of your nose to your chin. If you do not wear such a mask, you will be asked to leave the classroom.**

## **General Information**

The course is an introduction to mathematical probability suitable as preparation for actuarial science, statistical theory, and mathematical modeling. General probability rules, conditional probability and Bayes theorem, discrete and continuous random variables, moments and moment generating functions, joint and conditional distributions, standard discrete and continuous distributions and their properties, law of large numbers and central limit theorem.

Textbook:               A First Course in Probability, Tenth Edition  
                              Sheldon Ross

**The book is not required for this class.**

## **Class Structure**

This is an in-person class. You are expected to attend each class in person. It is my intent to record each lecture. However, if a recording of the classroom lecture fails for any reason, then no recording will be available. You are strongly encouraged to attend class provided that you are healthy. There is value in attending the class versus watching the video of the lecture. However, if you are not healthy, you should NOT attend class. Please be considerate of your classmates (and me). Attendance will be taken and you earn bonus points by attending class.

All lectures will be recorded and made available to all the students in the class. For students who attend class, you may or may not want to take advantage of the recorded lectures. If you are unable to make it to class, then you should watch the recorded lecture.

As mentioned below, all homework for this class will be provided on the class website. You will submit your homework in Brightspace.

The process for tests and quizzes will be discussed below.

## **Classroom Procedures**

### ***Attendance***

This course follows Purdue's academic regulations regarding attendance, which states that students are expected to be present for every meeting of the classes in which they are enrolled. Attendance will be taken at the beginning of each class. When conflicts or absences can be anticipated, such as for many University-sponsored activities and religious observations, the student should inform the instructor of the situation as far in advance as possible. For unanticipated or emergency absences when advance notification to the instructor is not possible, the student should contact the instructor

as soon as possible by email or phone. When the student is unable to make direct contact with the instructor and is unable to leave word with the instructor's department because of circumstances beyond the student's control, and in cases falling under excused absence regulations, the student or the student's representative should contact or go to the [Office of the Dean of Students website](#) to complete appropriate forms for instructor notification. Under academic regulations, excused absences may be granted for cases of grief/bereavement, military service, jury duty, and parenting leave. For details, see the [Academic Regulations & Student Conduct section](#) of the University Catalog website.

Guidance on class attendance related to COVID-19 are outlined in the [Protect Purdue Pledge for Fall 2021](#) on the Protect Purdue website.

### ***In Event of Quarantine or Isolation***

If you must miss class at any point in time during the semester, please reach out to me via email so that we can communicate about how you can maintain your academic progress. If you find yourself too sick to progress in the course, notify your adviser and notify me via email. We will make arrangements based on your particular situation. Please note that, according to [Details for Students on Normal Operations for Fall 2021](#) announced on the Protect Purdue website, "individuals who test positive for COVID-19 are not guaranteed remote access to all course activities, materials, and assignments."

## **Calculators**

Graphing calculators will not be permitted on the tests or quizzes.

**Please bring your calculator to each class.**

## **Procedures**

Evaluation will be based on a combination of tests, quizzes, and homework assignments.

There will be 6 quizzes during the semester. Quizzes will be announced. The lowest quiz grade will be disregarded.

There will be 2 tests of an hour and 15 minutes each and one test of 2 hours. The first two tests will be during class time. Test 3 will be given during finals week. The dates of the tests are listed in the schedule at the end of this document. If there are problems with taking the test this day due to illness only, then we will work out an alternative.

All tests and quizzes will be closed book and closed notes. Calculators are allowed. All tests and quizzes will be taken in class on the date scheduled. Except for illness, you will not be able to reschedule a test or quiz. If you are ill, then there will be a make-up exam. This make-up test or quiz will have different questions and may take a different format than that taken by the other students.

For quizzes and tests, answers are expected to include all the work necessary to do the problems.

You are asked to schedule a meeting with me two times during the semester. This will be a virtual meeting with just the two of us. **It is your responsibility to schedule the meeting. Information on scheduling this meeting will be provided the first day of class.** If you schedule and attend the meetings, you will earn the two points listed below. The meetings will occur as follows:

- Meeting 1 - Between September 14 and September 16
- Meeting 2 - Between November 9 and November 11

Final grades will be based on the following weights:

Quizzes	20%
Homework	6%
Virtual Meetings	2%
Test 1	24%
Test 2	24%
Test 3	24%
Total	100%

Homework: Homework is due at 3:00 pm West Lafayette time on the date listed in the syllabus. Most homework will be assigned on Thursday and due on Tuesday. Homework must be submitted in Brightspace. Paper submission of homework is not permitted. Doing the homework is essential to understanding the material. No homework will be accepted past the due date and time. NO homework scores will be dropped.

For homework, quizzes, and tests, answers are expected to include all the work necessary to do the problems.

Attendance will earn you bonus points. You will earn 0.15 point for each class that you attend up to a total of 4 bonus points.

## Grades

Grades will be on a plus/minus scale as follows:

Score	Grade
99.5% and above	A+
93-99.4	A
90-92.9	A-
87-89.9	B+
83-86.9	B
80-82.9	B-
77-79.9	C+
73-76.9	C
70-72.9	C-
67-69.9	D+
63-66.9	D
60-62.9	D-
59.9 and below	F

## Cheating

- **Cheating will not be tolerated!**
- **Copying someone else's HW is Cheating! Giving your homework to someone else who copies it is cheating.**
- **If you cheat on HW or Quiz, penalty is a zero on the homework or Quiz and 5% of the total score for the class. You will not be allowed to drop the HW or Quiz.**
- **If you cheat on a Test, you will receive a failing grade in this class.**

Purdue has a student-initiated Purdue Honors Pledge:

“As a boilermaker pursuing academic excellence, I pledge to be honest and true in all that I do. Accountable together - we are Purdue.”

You will be asked to sign this pledge for each exam and quiz.

Students can report issues of academic integrity that they observe, either through the Office of the Dean of Students ([purdue.edu/odos](http://purdue.edu/odos)), call 765-494-8778 or email [integrity@purdue.edu](mailto:integrity@purdue.edu) .

## Academic Adjustments

Students who have been certified by the Office of the Dean of Students -- Adaptive Programs as eligible for academic adjustments should see me to discuss the procedures to be followed. This should be done during the first week of classes. Only students who have been certified by the ODOS-Adaptive Programs and who have requested ODOS to send their certification letters to their instructors are eligible for academic adjustments.

Students who are currently undergoing an evaluation process to determine whether they are eligible for academic adjustments, are encouraged to talk to me regarding procedures to be followed.

## Course Outline

November 30, 2021

While this outline tries to be complete and accurate, there will be changes in the schedule of the course; these will be announced in class and on the class website. The homework is to be turned in on the date listed. For example, you will turn in the Homework listed on the September 7 on the 7<sup>th</sup>.

The Homework for the class will consist of the problems that will be posted on the class website. This syllabus will be updated with the Homework assignment after each class. Homework will be due on Tuesday and Thursday.

Day	Date	Lecture	Class Homework
Tu	8/24	Notation and Terminology	
Th	8/26	Notation and Terminology	
Tu	8/31	Counting	
Th	9/2	Counting	
Tu	9/7	Counting	Homework 1 – Questions 1-25
Th	9/9	Independence, Quiz 1	
Tu	9/14	Conditional Probability	Homework 2 – Questions 26-39
Th	9/16	Conditional Probability	
Tu	9/21	Random Variables	Homework 3 – Questions 40-48
Th	9/23	TEST 1	
Tu	9/28	Random Variables	
Th	9/30	Random Variables	
Tu	10/5	Random Variables	Homework 4 – Questions 49-58
Th	10/7	Expectation, Quiz 2	
Tu	10/12	Fall Break	
Th	10/14	Expectations	
Tu	10/19	Indicator Variables	Homework 5 – Questions 59-72
Th	10/21	Nth Moment, Quiz 3	
Tu	10/26	Nth Moment	Homework 6 – Questions 73-84
Th	10/28	Moment Generating Function	
Tu	11/2	Discrete Distributions	Homework 7 – Questions 85-97
Th	11/4	TEST 2	
Tu	11/9	Discrete Distributions	
Th	11/11	Continuous Distributions	
Tu	11/16	Continuous Distributions, Quiz 4	Homework 8 – Questions 98 – 107
Th	11/18	Continuous Distributions	
Tu	11/23	Joint Probability, Quiz 5	Homework 9 – Questions 108 -116
Th	11/25	BREAK	
Tu	11/30	Joint Probability	
Th	12/2	Covariance, Quiz 6	
Tu	12/7	Conditional Distributions	Homework 10 – Questions 117 – 131
Th	12/9	Conditional Distributions	
Th	12/16	TEST 3	7:00 pm to 9:00 pm, Lilly 3118

In general, notes are “considered to be ‘derivative works’ of the instructor's presentations and materials, and they are thus subject to the instructor's copyright in such presentations and materials.” I consider class notes, tests, and quizzes to be derivative works and therefore copyrighted. Class notes, tests, and quizzes may not be sold, bartered, or even given to websites or other resources. Examples of such websites are Course Hero, Chegg, or Quizlet.

## **How to Succeed in this Course**

If you want to be a successful student:

- Be self-motivated and self-disciplined.
- Be willing to “speak up” if problems arise or you start to feel lost.
- Be willing and able to commit to 8 hours per week for this course.
- Complete all homework on time without help from your friends or solutions from past years.
- Study for the tests by working all the practice questions.
- Attend class.
- Actively participate in and understand the group projects.
- Familiarize yourself with Brightspace. Check your grades in Brightspace on a regular basis.

In contrast, here are some common behaviors that lead to failing the course.

- Wait until the last day to begin assignments.
- Only study for a test the night before.
- When you are working practice questions, you look at the solutions prior to completing your work.
- Not meeting deadlines.
- Ignore emails from the instructor.
- Don't get familiar with the grade book and syllabus.

## **Nondiscrimination Statement**

Purdue University is committed to maintaining a community which recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her own potential. In pursuit of its goal of academic excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life.

## **Mental Health Statement**

**If you find yourself beginning to feel some stress, anxiety and/or feeling slightly overwhelmed, try [WellTrack](#).** Sign in and find information and tools at your fingertips, available to you at any time.

**If you need support and information about options and resources,** please contact or see the [Office of the Dean of Students](#). Normal drop-in hours are M-F, 8 am- 5 pm.

Purdue University is committed to advancing the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of support, services are available. For help, such individuals should contact Counseling and Psychological Services (CAPS) at (765)494-6995 and <http://www.purdue.edu/caps/> during and after hours, on weekends and holidays, or through its counselors physically located in the Purdue University Student Health Center (PUSH) during business hours.

## **Emergency Preparation**

A link to Purdue's Emergency Preparedness resources is:

[https://www.purdue.edu/ehps/emergency\\_preparedness/](https://www.purdue.edu/ehps/emergency_preparedness/)

You are strongly encourage to review these procedures.

There are emergency procedures outlined in the attachment.

## **Violent Behavior Policy**

Purdue University is committed to providing a safe and secure campus environment for members of the university community. Purdue strives to create an educational environment for students and a work environment for employees that promote educational and career goals. Violent Behavior impedes such goals. Therefore, Violent Behavior is prohibited in or on any University Facility or while participating in any university activity. See our course Brightspace under University Policies for a link to the full Violent Behavior Policy.

## **Diversity & Inclusion**

In our discussions, structured and unstructured, we will explore a variety of challenging issues, which can help us enhance our understanding of different experiences and perspectives. This can be challenging, but in overcoming these challenges we find the greatest rewards. While we will design guidelines as a group, everyone should remember the following points:

- We are all in the process of learning about others and their experiences. Please speak with me, anonymously if needed, if something has made you uncomfortable.
- Intention and impact are not always aligned, and we should respect the impact something may have on someone even if it was not the speaker's intention.
- We all come to the class with a variety of experiences and a range of expertise, we should respect these in others while critically examining them in ourselves.

## **Basic Needs Security**

Any student who faces challenges securing their food or housing and believes this may affect their performance in the course is urged to contact the Dean of Students for support. There is no appointment needed and Student Support Services is available to serve students from 8:00 – 5:00, Monday through Friday. Considering the significant disruptions caused by the current global crisis as it related to COVID-19, students may submit requests for emergency funds. Click [here](#) for details and the request form.