

Math 335 – Probability (Fall 2018)

Instructor: Kevin Woods, King 220B, Kevin.Woods@oberlin.edu. Call me Kevin! (he/him/his)

Class: MWF 11-11:50pm, King 239.

Office Hours:

Mon 4-5pm, Tue 12-2pm, Wed 2-3pm, Thu 10-11am, Fri 9-10am. Also, feel free to stop by any time my door is open (but be understanding if I say I am too busy), or you can make an appointment via email.

Textbook:

None! Probability is really a course in problem solving. There are not a huge number of definitions and theorems, so this is material that is best learned by doing problems. I will give you handouts with problems that we will work, plus basic definitions, etc.

I do like the free book available at www.probabilitycourse.com. You do not need to read this, but you are welcome to. I will notate on the problem sheets what sections we're currently covering, and I suggest that you read it *after* we have covered the material.

Prerequisites:

MATH 231 – Multivariable Calculus. We will use several tools from this class: partial derivatives, definition of Riemann integral, evaluating multiple integrals over various sets, changing coordinate systems. MATH 220 – Discrete Mathematics is strongly recommended. This is partly to make sure you are ready for a 300 level class (MATH 232 might serve as a substitute for that). At the beginning of the course, there will be material that I will assume you've seen (permutations, combinations, basic set theory) and which is covered in MATH 220, but you could also review that on your own.

Blackboard:

I will post homework, reading, and other announcements on Blackboard.

Learning Goals:

At the end of this course, students will:

- Have confidence solving a variety of problems in probability theory,
- Have practice presenting mathematics to others,
- Have experience thinking meta-cognitively about their problem-solving practices,
- Understand probability concepts, including discrete probability, continuous probability, conditional probability, expectation, variance, generating functions, parameter estimation, convergence theorems, and Markov models.
- Have a toolbox of useful probability distributions and the background to apply probability to other disciplines.

Grading:

Written Homework (30%),
Presentations and Participation (20%),
Two Take-Home Midterms (17% each),
In-Class Final Exam (16%).

Written Homework (30%).

You will have a written assignment due pretty much every day of class. Generally, Wednesday's assignment (starting on the September 10) will be a standard problem set. Monday and Friday's assignment will be a shorter one designed to get you ready to participate in class (writing up a solution that I may ask you to present). I'm looking for not only correct solutions, but clear ones too.

Presentations and class participation (20%).

Much of class-time will be spent on student presentations. You may be called on to present a solution to a problem that was assigned for that day. Or I may ask for volunteers to present a solution or to talk about how they started attacking a problem.

I know this can be scary for many of you (it used to be scary for me too!), but it is valuable, and you will get better and more comfortable, I promise. I would be happy to hear you give a practice presentation and then let you present that problem in class.

When one person is presenting, every student in the class has a responsibility. Ask yourself, "Is this presentation correct, and is it clear?" We are helping each other learn the material, at the same time as helping each other improve our presentation skills.

Two things go without saying (yet I'm saying them anyway). Firstly, all of this must take place in an atmosphere of respect and encouragement: we have to create an environment where it is ok to tell someone that you think they are wrong or unclear without offending them. Secondly, you cannot participate if you are not here and here on time. I understand that you may have to miss a class or two. Excessive absences or lateness will hurt this portion of your grade.

You will be learning most of the material solely by working problems and hearing presentations. Besides learning the material, there is another reason to follow the presentations carefully: I will always put at least one of these problems, word for word, on the midterms.

If you show up (on time) every day and present adequately when requested, you will earn a B+ on this portion of your grade. To earn a higher grade, you should impress me by presenting harder problems, helping your peers in a supportive manner, etc.

Take-home midterms (17% each).

Tentatively due Wednesday, October 10 and Wednesday, November 21. You will choose a continuous 48 hour period within the span of about 4 days in which to take the test. The exams will be designed to be doable in about 4 hours, but you'll have the extra time to "sleep on it." You will work alone and be able to use my handouts and your notes, but no other outside sources (e.g., no textbooks and no photocopies of someone else's notes).

In-Class Final Exam (16%).

Tuesday, December 18, 2-4pm. The final exam will cover the entire course. It will be closed book, but you will be able to use something like an 8.5x11 sheet with notes.

Working, and working together:

You will get out of this class what you put in it (cliché, but especially true in this class). To me, this means doing the following day-to-day:

- Read the notes on the handouts carefully, so that you will be familiar with any definitions, etc.
- Attempting every problem before it is presented on the board (you will probably not solve every single one ahead of time, but the more work you put into that, the better problem solver you will become).
- Looking back at your notes after class and fixing them so that you have a careful solution to the problem that you will be able to comprehend later (say, exam time). To encourage this, some questions on the midterm exams will be problems that have been presented in class.
- Actively listening when someone is presenting. You should be asking yourself, "Is their presentation correct and clear?" If it isn't, we should discuss it as a class afterwards.

Math goes much easier with someone else around to bounce ideas off of. I encourage you to work together on everything but the exams. I suggest that you take a minute at the end of class today to write down contact information for two other students:

Name: _____ **Contact Information:** _____

Name: _____ **Contact Information:** _____

Name: _____ **Contact Information:** _____

Honor Code:

I encourage you to work together on everything except the exams. Written assignments must be in your own words, however. Work on the problem together, and then go back home and write up your solution. In particular, you should never look at someone else's write-up before it is due.

Some of the problems presented in class will have solutions in the suggested textbook. I recommend only using the textbook for review, but if you do read a problem and solution beforehand, please do not turn in that problem or present it in class.

Support:

- Me! Come by office hours, any time.
- Your peers! Working with other students helps everyone improve.
- If you have a disability of any sort that may affect your performance in this class, please consult with me and with Student Academic Success Programs (Peters 118). All requests for accommodation must go through that office.