MA/SC 381 Fall 2022
Probability

MWF 2:30-3:30PM (Davis 201)

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Office:	Davis Science Center 209
Office Hours:	Monday 5:00-6:00PM, Tuesday 4:00-6:00PM,
	Friday 12:00-1:00PM, & by appointment
Course Website:	`http://personal.colby.edu/~erandles/M381.html`
Personal Website:	`http://personal.colby.edu/~erandles/`

Teaching Assistants:	Ricky Peng	speng24@colby.edu
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(TA Office Hours: 6:00-7:00PM Monday and 7:00-8:00PM Tuesday in (or around) Davis 209A)

"Probability is expectation founded upon partial knowledge. A perfect acquaintance with all the circumstances affecting the occurrence of an event would change expectation into certainty, and leave neither room nor demand for a theory of probabilities." – George Boole

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Course Description: This course is a mathematical introduction to probability theory, the foundation for commonly used inferential statistical techniques (covered in Statistics 482). Students will learn the basic theorems of probability and computational techniques for finding probabilities associated with stochastic processes. Topics include axiomatic foundations, combinatorics, random variables, discrete and continuous probability distributions, special probability distributions, independence, conditional and marginal probability distributions, properties of expectations, moment generating functions, sampling distributions, weak and strong laws of large numbers, and the central limit theorem.

Prerequisites: Mathematics 160 (formerly, 122); or Mathematics 135 and 165 (formerly, 161 and 162). Mathematics 274 is recommended.

Textbook: *A First Course in Probability* by S. Ross, 10th ed.

You are expected to read the course materials, including the textbook, carefully, thoroughly and – ideally – before you come to class. As you know from your previous mathematics courses, reading a mathematics textbook means to read with a pencil/pen in hand and work out all details carefully. When creating material for this course (the homework, exams, etc.), I like to draw from many different sources. In addition to the course textbook, I will often consult *Introduction to Probability*

and Its Applications by R. Scheaffer; *Introduction to Probability* by D. Bertsekas and J. Tsitsiklis; and *Reasoning About Luck* by V. Ambegaokar. While you are not required to obtain these texts, you may want to take a look at them, especially if you plan to continue your studies of vector calculus after this course.

Grading: Your grade will be calculated as follows:

Class participation:	5%
Weekly homework assignments:	30%
Midterm:	30%
Final Exam:	35%

Exams: This course will have one midterm exam and a final exam. The exams will be at the following dates and times:

Midterm	**Wednesday, November 2nd from 7:00-9:00PM**
Final Exam	**(TBA)**

The midterm will be held in Lovejoy 100. It is crucial that you reserve these time slots for these exams. In the event that you are unable to attend a midterm exam, you must let me know at least **two weeks** prior to the exam date.

Attendance and Class Participation: As participation is a big part of this course, class attendance is strongly encouraged and expected whenever possible. To learn mathematics, it is essential to communicate it and to discuss it with others. You will be required to participate in class discussion and you will frequently be called on during lecture. Of course, we may all need to miss class from time to time (e.g., COVID isolation). If, at any point during the course of the semester, you need to isolate and/or will miss two or more consecutive class meetings, please send me a short email so that we can coordinate things to make sure that you have everything you need (e.g., course materials) while you are not able to attend class.

Homework: Homework is the most important part of this course. It is where you will grapple with new ideas, come up with creative solutions and communicate your thoughts and understanding to others. Consequently, it is crucial that you take homework very seriously. You should start homework early and work diligently. If you are having substantial difficulty with a particular exercise, please come talk to me during office hours. I am here to help! You are permitted and encouraged to discuss homework with your classmates, however, when it comes time to write up your solutions, you are required to do so independently and away from your peers (in another room, preferably). You are also permitted to consult other textbooks and, in this case, please give full details (beyond what's in our textbook). If you work with peers or consult material outside the textbook, you are required to cite your sources (including naming the peers with whom you worked); failure to do so is a matter of academic dishonesty and will result in grade penalties and/or reports of academic negligence/dishonesty. Your solutions should communicate your individual process and understanding of the material. What you turn in must be your own.

For your homework write-ups, I expect your solutions to be written out correctly and presented in good mathematical prose. Your grade will depend on the correctness of your solutions and the quality of your writing. This means that your writing should follow a coherent logical structure which makes use of complete sentences (whenever possible) and follows standard rules of grammar.

Please do not submit solutions containing incoherent and unstructured calculations. You should be proud of the material you turn in!

Homework Structure and Schedule: Assignments will be posted to the course website and are to be submitted in class on their due date (which usually falls on a Wednesday). It is crucial to keep up with the homework in this course. Therefore, short of the circumstances discussed in the attendance policy above, late homework will not be not accepted. I will drop your lowest homework score on the condition that you attend one Mathematics/Statistics department colloquium and write a short (one paragraph) summary.

Homework Policies:

1. All write-ups are to be submitted in hard copy. They should be single-sided with no more than one problem per page, i.e., if a homework assignment has 5 problems, you should turn in at least 5 pieces of paper.

2. Each paper you turn in should have your name and the due date printed clearly at the top.

3. Your write-ups should be paper-clipped. You should staple all papers corresponding to a single exercise together, but please paper-clip (not staple) the group of exercises together. It is your responsibility to make sure that your homework is complete and all pages are accounted for.

Office Hours: As advertised above, there are a number of times during the week that I have reserved for office hours. Some of these time slots are dedicated for Probability (e.g., Tuesday 5:00-6:00PM) and some are open to all of my students. The practices of learning and doing mathematics benefit from interacting with others – discussing it, asking questions, and explaining it to others – and my office hours are designed for exactly this. Please come frequently and interact with me and your peers and be ready to ask questions, exchange ideas, and be challenged. In this way, we will all learn together!

Open Door Policy: I maintain an "open door policy." This means that, if you find my (inner) office door open and I'm inside, I am likely available to chat and help. In that case, please knock on my door and ask if I am available.

My Email Policy: I love talking about mathematics and I always prefer to do it in person. For this reason, I like to, whenever possible, reserve email for logistical things. However, when you are stuck and cannot come see me in person, please feel free to email me. I am here to help!

As my life is busy and I have many responsibilities, I usually only check and respond to email once per day and sometimes not at all on weekends. For this reason, I try to uphold the following 24-48 hour rule: If you send an email Sunday through Thursday, I will do my best to respond within 24 hours. If you send an email on Friday or Saturday, I will do my best to respond within 48 hours. If I do not respond within these windows, feel free to email me again as I may have missed it.

Academic Integrity: Honesty, integrity, and personal responsibility are cornerstones of a Colby education and provide the foundation for scholarly inquiry, intellectual discourse, and an open and welcoming campus community. These values are articulated in the Colby Affirmation and are central to this course. You are expected to demonstrate academic honesty in all aspects of this course.

If you are clear about course expectations, give credit to those whose work you rely on, and submit your best work, you are highly unlikely to commit an act of academic dishonesty.

Academic dishonesty includes, but is not limited to: violating clearly stated rules for taking an exam or completing homework; plagiarism (including material from sources without a citation and quotation marks around any borrowed words); claiming another's work or a modification of another's work as one's own; buying or attempting to buy papers or projects for a course; fabricating information or citations; knowingly assisting others in acts of academic dishonesty; misrepresentations to faculty within the context of a course; and submitting the same work, including an essay that you wrote, in more than one course without the permission of the instructors.

Academic dishonesty is a serious offense against the college. Sanctions for academic dishonesty are assigned by an academic review board and may include failure on the assignment, failure in the course, or suspension or expulsion from the College.

For more on recognizing and avoiding plagiarism, see the library guide at the following website: libguides.colby.edu/avoidingplagiarism

The Colby Affirmation

Colby College is a community dedicated to learning and committed to the growth and well-being of all its members.

As a community devoted to intellectual growth, we value academic integrity. We agree to take ownership of our academic work, to submit only work that is our own, to fully acknowledge the research and ideas of others in our work, and to abide by the instructions and regulations governing academic work established by the faculty.

As a community built on respect for ourselves, each other, and our physical environment, we recognize the diversity of people that have gathered here and that genuine inclusivity requires active, honest, and compassionate engagement with one another. We agree to respect each other, to honor community expectations, and to comply with college policies.

As a member of this community, I pledge to hold myself and others accountable to these values.