
Department of Mathematical Sciences
ELIZABETHTOWN COLLEGE

Office hours: Mo, We, Fr 12:30 – 2:00pm;
Tu, Th 2:00 – 3:30pm.

web page for the course: <http://users.etown.edu/d/doytchinovb/ma351/>

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SYLLABUS

TEXT. Sheldon Ross, *A First Course in Probability*, Ninth Edition, Pearson Education (2014), ISBN 978-0-321-79477-2.

Since I intend to type and distribute all homework problems, all editions of the textbook, from the fifth on (inclusive) are acceptable.

CALCULATORS. You will need a scientific (non-graphing) calculator. I recommend the TI-30XS MultiView.

PREREQUISITES. MA222 (Calculus 3), MA235 (Discrete Mathematics with Proofs).

COURSE GOALS and COVERAGE. This course has two major goals:

- To give you a working knowledge of the basic concepts and techniques of the Theory of Probability, including combinatorics, conditional probability and Bayes' Rule, independence, discrete and continuous random variables, expected values, variance and covariance, joint and conditional distributions, moment generating functions, limit theorems.
- To help you get accustomed to abstract mathematical reasoning, including precise definitions and proofs.

We will cover most of chapters 1 to 8 of the textbook. A detailed list of the topics covered can be found in the schedule on the last page of this syllabus.

STUDENT LEARNING OUTCOMES. By the end of this course you will be able to:

- compute the number of arrangements and combinations using basic principles of combinatorial analysis,
- compute probabilities of random events,
- know and apply the properties of conditional probability and Bayes' Rule
- recognize and use independence of events and random variables,
- compute expected values and variances of discrete and continuous random variables,
- compute characteristics of jointly distributed random variables and their transformations,
- know and apply the properties of moment generating functions,
- prove and apply limit theorems for sums of independent random variables,
- have a working proficiency with the multivariate normal distribution.
- demonstrate the ability to work cooperatively with others;
- demonstrate the ability to write proofs and critically analyze mathematical arguments.

See the schedule below for more details.

ASSESSMENT. Your final grade for the course will be based on the degree of mastery of the course content and your progress toward the learning outcomes listed above, as measured by your performance in class, on homework assignments, tests, projects, and the final exam.

ATTENDANCE. You are expected to attend all classes. Excessive absences may result in a lower grade. If you do miss a class, it is your responsibility to obtain from a classmate any notes, assignments, handouts, or anything else you may have missed.

This is a 4-credit course. This means that you are expected to spend 12 hours per week on it. Of these, you will be spending 4 hours per week in class: three lectures, 80 minutes each. The other 8 hours must be devoted to studying on your own: reading the book, reading and organizing your notes, writing homework, solving additional problems.

You should come to class prepared to discuss homework, ask questions, and share solutions. Homework will be discussed briefly in class, but we will not have sufficient class time for discussion of all homework problems. If all your questions are not addressed during this time, do not hesitate to seek additional help (e.g., office hours).

Absence on any occasion of evaluation (tests and exams) will result in a grade of zero for that evaluation. The only exceptions will be prior approval and written documentation. If some unavoidable circumstance comes up that will prevent you from taking an exam or test as scheduled, you must talk to me about this personally (face to face or on the telephone) and in advance.

HOMEWORK. Homework will be assigned at every lecture, and will be due at the beginning of the following lecture. All homework will be collected and graded. Homework accounts for 20% of your grade.

You are encouraged to discuss homework problems with each other, but not to copy them from each other. The final write-up must be your own. Consulting with me when you need help is encouraged and will not lower your grade. However, looking up solutions online will be considered a violation of academic integrity.

The problems on the tests and the final exam will be similar to the ones discussed in class or assigned as homework. Discipline yourself to write clear readable notes and solutions, they will be of great value as review.

Of course, the assigned problems should be considered to be a minimum. You should solve more problems, especially if you don't feel quite comfortable with any section.

TESTS and EXAMS. There will be four in-class tests, on the following dates (tentatively):

WEDNESDAY, SEPTEMBER 21

FRIDAY, OCTOBER 21

WEDNESDAY, NOVEMBER 9

WEDNESDAY, NOVEMBER 30

Each test is timed and will take 80 minutes. This time limit will be strictly enforced.

There will be a comprehensive final exam on MONDAY, DECEMBER 12, 2016, 7:30 – 10:30am. This date and time have been set by the registrar's office and cannot be changed. Make your travel plans accordingly.

All exams and tests are closed-book. No books or notes of any sort are allowed. You should bring your calculator to the tests and final exam.

FINAL GRADE. Your final grade will be calculated in the following way:
50% of the grade come from the four Tests, (5% the lowest, the others 15% each),
30% of the grade come from the Final Exam,
20% of the grade come from the Homework.

These scores are combined into a number of points, between 0 and 100. The ranges for the final grades are:

A	93-100
A-	90-92.9
B+	87-89.9
B	83-86.9

B-	80-82.9
C+	77-79.9
C	73-76.9
C-	70-72.9

D+	67-69.9
D	63-66.9
D-	60-62.9
F	0-59.9

SCHOOL CLOSURE POLICY. Occasionally, the college is closed and classes are cancelled due to inclement weather or other emergency situations. To minimize the negative impact of such disruptions on your learning, the following School Closure Policy will be in effect for this course. In case of school closure, an alternative form of the lecture will be provided (voice-over slides, instructional video, additional assigned reading, or a combination of these), and you will still need to complete the homework assignment. Concrete details will be communicated to you at the time of the closure announcement. In case the closure falls on an exam day, an alternative date and time for the exam will be announced.

INTEGRITY. All work you submit for grading must be your own and must comply with the Standards of Integrity set forth in the Elizabethtown College Catalog. In particular, no collaboration on quizzes or exams is allowed. Also, emphatically, looking up solutions to homework problems, either online or in a solution manual, will be considered a violation of academic integrity.

DISABILITIES. Elizabethtown College welcomes otherwise qualified students with disabilities to participate in all of its courses, programs, services, and activities. If you have a documented disability and would like to request accommodations in order to access course material, activities, or requirements, please contact the Director of Disability Services, Lynne Davies, by phone (717-361-1227) or e-mail daviesl@etown.edu.

If your documentation meets the college's documentation guidelines, you will be given a letter from Disability Services for each of your professors. Students experiencing certain documented temporary conditions, such as post-concussive symptoms, may also qualify for temporary academic accommodations and adjustments.

As early as possible in the semester, set up an appointment to meet with me, the instructor, to discuss the academic adjustments specified in your accommodations letter as they pertain to my class.

STATEMENT ON RELIGIOUS OBSERVANCES. The College is willing to accommodate individual religious beliefs and practices. It is your responsibility to meet with the class instructor in advance to request accommodation related to your religious observances that may conflict with this class, and to make appropriate plans to make up any missed work.

The following is a tentative schedule. Most of the time, we will be following it closely, but occasional deviations are to be expected.

MA351, Fall 2016

SCHEDULE

Day	Date	Topic	Sections
Mo	08/29	Combinatorics: counting	1.1 – 1.4
We	08/31	More combinatorics	1.5
Fr	09/02	Elementary probability	2.5
We	09/07	Axiomatics: events	2.1, 2.2, 2.6
Fr	09/09	Axiomatics: measure and probability	2.3, 2.4, 2.6
Mo	09/12	Conditional probability	3.2
We	09/14	Independent events	3.4
Fr	09/16	Total probability law, Bayes	3.3, 3.5
Mo	09/19	Review	
We	09/21	TEST 1	
Fr	09/23	Discrete random variables, expectation	4.1 – 4.5
Mo	09/26	Binomial model	4.6
We	09/28	Other discrete random variables	4.7, 4.8
Fr	09/30	General random variables: cdf	4.9, 4.10
Mo	10/03	Continuous distributions: densities	5.2, 5.3, 5.7
We	10/05	General random variables: expectation	5.2
Mo	10/10	Normal and exponential distributions	5.4, 5.5
We	10/12	Normal approximation	5.4.1
Fr	10/14	Other continuous distributions	5.6
Mo	10/17	More continuous distributions	5.6
We	10/19	Review	
Fr	10/21	TEST 2	
Mo	10/24	Joint distributions	6.1, 6.2
We	10/26	Sums of random variables	6.3
Fr	10/28	Conditional distributions: discrete	6.4
Mo	10/31	Conditional distributions: continuous	6.5
We	11/02	Transformations of random vectors	6.7
Fr	11/04	Conditional expectation and variance	7.5, 7.6
Mo	11/07	Review	
We	11/09	TEST 3	
Fr	11/11	Moment generating functions	7.7
Mo	11/14	Inequalities, Chernoff bounds	8.2, 8.5
We	11/16	Convergence of r.v. and distributions	8.2
Fr	11/18	Weak Law of Large Numbers	8.2
Mo	11/21	Central Limit Theorem	8.3
We	11/23	Strong Law of Large Numbers	8.4
Mo	11/28	Review	
We	11/30	TEST 4	
Fr	12/02	Multivariate mgf	7.7.1
Mo	12/05	Multivariate normal distribution	7.8
We	12/07	Bivariate normal: mean and variance	7.8
Fr	12/09	Review	
Mo	12/12	Final Exam, 7:30 – 10:30am, E 382	