

# Syllabus

## Math 3355, version 1.2

Effective: February 20, 2018

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### Math 3355—Probability

**Course Description:** Introduction to probability, emphasizing concrete problems and applications; random variables, expectation, conditional probability, law of large numbers, central limit theorem and stochastic processes.

### Textbooks and Other Materials

Read the following textbook information carefully. Please use the ISBN listed below to order the correct materials. ODL is not responsible for student purchases that result in the receipt of the wrong materials. *It is your responsibility* to order the correct textbook materials.

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### Required Textbook

Saeed Ghahramani. *Fundamentals of Probability: With Stochastic Processes*. Third Edition. Upper Saddle River, NJ. Pearson: Prentice Hall, 2005.

**ISBN-13:** 978-0131453401

**ISBN-10:** 131453408

**NOTE:** There are options for electronic versions of the textbook not listed here. There is also a more recent third edition version of this book available through CRC Press, with minor variations in the page numbers, that can also be used in this course.

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### Ordering Information

Please review the following tips for ordering your course materials:

1. Do not purchase your textbooks until your enrollment is approved. During the processing period, a new section may be opened that could require a different textbook or edition.

## Syllabus

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2. *Always order by the ISBN.* Publishers and vendors often offer the same textbook title under different ISBNs. You must have the correct ISBN to access your online website.
3. If you are having problems locating a textbook, contact us at [Answers@outreach.lsu.edu](mailto:Answers@outreach.lsu.edu) for assistance.

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## Other Materials and Resources

A non-graphing, non-programmable calculator will be allowed on exams.

**Required Software:** Microsoft Word, Adobe Acrobat Reader

You must use a recent version of MS Word to upload assignment responses. You will use Acrobat Reader to view the module lecture materials.

We recommend that you use Mozilla Firefox or Google Chrome as your web browser. *Internet Explorer is not compatible with your Moodle course site.*

**Required Hardware:** Web cam with a microphone (built-in or external), headphones or working speakers, and reliable high speed internet

Proctored exams are completed online and require the hardware listed above. You are encouraged to review the technical requirements provided on the ProctorU website and to perform a test on their equipment prior to enrolling in this course to make sure they have the necessary resources available.

**Technical Requirements:** <http://www.proctoru.com/tech.php>

**Equipment Test:** <http://www.proctoru.com/testitout/>

## Nature and Purpose of the Course

### Course Outcomes

Upon completion of this course, students are expected to be able to:

1. Identify the basic axioms and definitions in probability.
2. Use combinatorial methods to assist in probability calculations.
3. Use conditional probability and independence in probability calculations.
4. Construct and calculate with discrete random variables.
5. Work with common discrete random variable distributions.
6. Construct and calculate with continuous random variables.
7. Find the mean, variance, and standard deviation of random variables.
8. Work with transformations of random variables.
9. Work with bivariate and multivariate distributions.
10. Calculate covariance and correlation.

11. Work with the bivariate normal distribution.
12. Calculate moment generating functions.
13. Apply the Central Limit Theorem and laws of large numbers.
14. Approximate the binomial distribution with the normal distribution.

Mathematics 3355 is an introduction to probability theory for mathematics, statistics, actuarial, and computer science majors. Actuarial students using this course as preparation for the actuarial exam should expect to spend considerable additional time (beyond what is needed for this course) to prepare properly for the actuarial exam.

Probability theory has a distinct history in mathematics in that almost all “theory” questions have their roots in real world questions. Probabilistic applications are not merely restricted to games of chance, as the ideas in this topic have found their way into biology, chemistry, and astrophysics, as well as business and finance.

The purpose of this course is both to enable you to have strong familiarity with the basic tools of probabilistic calculation, as well as exposure to a wide variety of classical applications. Specific material to be covered will be sets and basic probability calculations, discrete and continuous distributions, joint distributions, the normal distribution and the Central Limit Theorem, among other topics.

It is assumed that you have completed a second-semester calculus course and are familiar with techniques of integration. If your integration techniques are rusty, then a thorough review is recommended.

### Working with the Course Materials

Remember, this course covers an entire semester of work or the equivalent of a classroom course lasting 15 weeks. That means that each module in this course equals nearly a week of course work and will require the same time and effort on your part. *Do not expect to complete each module in a single study session.* Understand, too, that if you choose to submit assignments at a high pace, your instructor may not be able to grade your work at the same rate.

Each module contains information, activities, and assignments organized under a consistent series of headings. Get familiar with how the module is organized. Each module in this course is organized into the following sections:

1. The learning objectives for the module
2. Reading assignments from both the lecture material (key terms, theorems, and examples) and the textbook
3. The graded module assignment

## Syllabus

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You should work through these parts of the module in order. Specific recommendations are provided in a link to the course module instructions, which you should review before beginning the first module.

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### Suggested Study Techniques

1. Carefully review the module objectives to help you focus on the information that will be covered on the exams.
2. Concentrate on the reading assignments, the module lecture material, and any additional resources provided. This review should include a detailed examination of any illustrative problems and examples. After an assignment has been completed, a rapid re-reading of the related text and other materials is strongly recommended.
3. Put yourself on a definite schedule. Set aside a certain block of hours per day or week for this course and work in a place where distractions are minimal.
4. Try to submit one assignment each week or at least every two weeks. Delays in submitting assignments usually result in lagging interest and the inability to complete the course.
5. Review your module assignments after they have been graded, paying special attention to any instructor feedback provided. We suggest that you wait for assignment feedback before you submit subsequent assignments.
6. Regardless of how you complete your graded assignments, keep in mind that module completion should not be your sole preparation for your exams. As with any college course, you should study for your exams.

## Reading Assignments

### Topic Outline

This course covers the following specific topics:

<b>Module</b>	<b>Topic</b>
01	Sample Spaces and Probability Axioms
02	Basic Theorems and Continuity of Probability
03	Counting Principles and Permutations
04	Combinations and Stirling's Formula
05	Conditional Probability, the Laws of Multiplication and Total Probability
06	Bayes Theorem and Independence
07	Distribution Functions of Discrete Random Variables and their Expectations
08	Variants and Moments of Discrete Random Variables, the Bernoulli RV

**Mid-Course Examination**

- 09 Poison, Geometric, Negative Binomial, and Hypergeometric RVs
- 10 Continuous Probability Functions, Their Means and Variances
- 11 Uniform, Normal, and Exponential Distributions
- 12 Joint Distributions and Independence
- 13 Conditional, Multivariate, and Multinomial Distributions
- 14 Expected Values of Sums of RVs, Covariance and Correlation
- 15 Bivariate Normal Distribution and Moment Generating Functions
- 16 Sums of Independent RVs, Markov and Chebychev Inequalities
- 17 Laws of Large Numbers and the Central Limit Theorem

**Final Examination**

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**Module Assignments**

A large part of the instructional process is conducted through the Module Assignments that are located at the end of each module. The problems shown in Moodle are the same as those listed in the lecture notes and located in your textbook. You are encouraged to work each problem on pencil and paper at least twice before entering your responses in Moodle and submitting them for grading. You are only allowed to submit your work once. Please see the individual module assignment instructions in Moodle for more information on how to complete your work properly.

Remember, your instructor has seven calendar days to grade each assignment, longer if there are holidays.

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**General Guidelines**

Carefully study the textbook material before you begin to prepare the module assignments. This study should include a detailed examination of the illustrative problems and examples, as well as the assigned reading. The textbook provides many examples to further your understanding of the subject matter.

Additionally, detailed examples and exposition are provided in the lecture materials to aid you with your study. This is a self-taught course and as such, it requires that you possess some self discipline. It is not appropriate for you to obtain outside help with your module assignments.

## Syllabus

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You should submit each module assignment as soon as it is completed. Once you submit an assignment, you cannot revise it, so be sure to check your work. Your instructor will normally post a grade for your assignment *within seven calendar days*. Understand that occasional delays will occur, such as during holidays and semester breaks or if you submit several module assignments within the same week. ODL will alert students in the event of closure or anticipated grading delays.

Do not rely too heavily on your textbook or other resource materials when preparing your assignments. If you do, you may not realize until exam time that the perfect response you prepared for an assignment was only possible because you referred to resource material without really learning or understanding the material and concepts. Therefore, *you should attempt each assignment without referring to the resource material*, and if you find it necessary to look up an answer, be sure you have actually learned the concept and material rather than merely reflecting it in the answer.

Put yourself on a definite schedule. Set aside a certain block of hours per day or week for this course and work in a place where distractions are minimal. Try to submit a module each week or at least every two weeks. Delays in submitting modules usually result in lagging interest and the inability to complete the course.

## Academic Integrity

Students in Online Distance Learning (ODL) courses must comply with the *LSU Code of Student Conduct*. Suspected violations of the academic integrity policy may be referred to LSU Student Advocacy & Accountability (SAA), a unit of the Dean of Students. If found responsible of a violation, you will then be subject to whatever penalty SAA determines and will forfeit all course tuition and fees.

### Plagiarism

Students are responsible for completing and submitting their own course work and preparing their own modules. All work submitted in the course modules must be the student's own work unless outside work is appropriate to the assignment; all outside material must be properly acknowledged. It is also unacceptable to copy directly from your textbook or to use published answer keys or the teacher's edition of a textbook.

### Collaboration

Unauthorized collaboration constitutes plagiarism. Collaborative efforts that extend beyond the limits approved by the instructor are violations of the academic integrity policy. Students who study together are expected to prepare and write their own individual work for submission and grading.

For more information and links to the *LSU Code of Student Conduct* and the SAA website, go to the [ODL Academic Integrity policy](#) on our website.

## Examinations and Grading Policy

There will be two multiple-choice examinations. A separate response box will be provided for each question where you can show your work using the same math tool used in the Module Assignments. You are not required to show your work, but you may receive partial credit by doing so. The mid-course exam covers material in Modules 01–08 and follows Module 08, and the final exam covers material in Modules 09–17 and follows Module 17. You will have a maximum of three hours to complete the exams.

You are allowed a blank white board during the exam. To verify the white board is blank, you must show your white board to the proctor before you begin your exam. At the end of the exam, the proctor will instruct you to wipe clean the white board; the proctor must witness you wiping clean the white board.

Module assignments are 100 points each, and exams are 100 points each.

Course grade = average of module assignments + exam scores. Each component is weighted by the following predetermined percentages.

Component	Weight (%)
Module Assignments	40%
Mid-Course Exam	30%
Final Exam	30%

### **YOU MUST EARN A PASSING AVERAGE ON THE EXAMINATIONS IN ORDER TO PASS THE COURSE**

The following grading scale applies:

97%–100%	= A+
93%–96%	= A
90%–92%	= A-
87%–89%	= B+
83%–86%	= B
80%–82%	= B-
77%–79%	= C+
73%–76%	= C
70%–72%	= C-
67%–69%	= D+
63%–66%	= D
60%–62%	= D-

## Syllabus

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0%–59% = F

**IMPORTANT:** The final exam cannot be taken until you meet the following requirements. Under no circumstances may the final exam be taken earlier.

1. You must have been enrolled in the course for *at least three weeks*, regardless of when the modules and other exams are completed.
2. You must have a grade posted in the Moodle grade book for the **Module 17** Assignment in order to unlock access to the final exam. Please allow at least seven days for the final assignment grade to be posted in the gradebook.

To read the full exam policy and other policy statements, visit <http://www.outreach.lsu.edu/Extended-Campus/Online-Distance-Learning/Guidelines-Policies/Policies>.

## Taking Your Examinations

You are required to create a Louisiana State University ODL ProctorU account and to take your examinations through ProctorU, a remote proctoring service that allows you to take exams anywhere with internet access (some restrictions apply). Information on creating your ProctorU account can be found in the “Getting Started” module in Moodle. You cannot use an account created through another university, so if you already have an account, you will still need to create an account associated with LSU Online Distance Learning (ODL).

There is a separate charge for each proctored exam. The ProctorU website provides links you can use to find out how ProctorU works and to check your computer to see that it meets the technical requirements. In addition, to test using ProctorU, you need access to a web cam with a microphone (built-in or external), headphones or working speakers, and reliable high speed internet to use this service. A complete list of technical requirements is available from the ProctorU website.

You should schedule your exams about a week before you are ready to take them in order to avoid any additional charges.

## Transcript Information

After you have completed this course, your grade will be filed with the Office of the University Registrar. If a transcript is needed, it is your responsibility to make a request to the registrar. If you would like to order a transcript, visit the Office of the University Registrar Transcript Requests page to view your options at <http://sites01.lsu.edu/wp/registraroffice/student-services/transcript-request/>.

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