

MATH328

STUDENT WARNING: This course syllabus is from a previous semester archive and serves only as a preparatory reference. Please use this syllabus as a reference only until the professor opens the classroom and you have access to the updated course syllabus. Please do NOT purchase any books or start any work based on this syllabus; this syllabus may NOT be the one that your individual instructor uses for a course that has not yet started. If you need to verify course textbooks, please refer to the online course description through your student portal. This syllabus is proprietary material of APUS.

Course Summary

Course : MATH328 **Title :** Probability Theory with Applications

Length of Course : 8

Prerequisites : MATH226 **Credit Hours :** 3

Description

Course Description: This course introduces students to the basic concepts and applications of probability theory. An understanding of probability theory is essential to statistics, which is the fundamental basis of how all research is done, from science to medicine to business, marketing, and governmental politics. Probability theory is also essential to such disciplines as mathematics, finance, artificial intelligence, and even legalized gambling (such as state lotteries). Examples of applications problems from these areas are included in the course, with a focus on understanding the concepts and methods of probability theory, as well as solving problems taken from real world applications. (Prerequisite: MATH226)

Course Scope:

Successful completion of this course will provide students with a working knowledge of deterministic and probabilistic situations; randomness, samples and sample spaces; counting rules; conditional probability; expected values and variance; discrete probability distributions (including binomial, Poisson and hypergeometric distributions); and continuous probability distributions (including uniform, exponential and normal distributions). The emphasis of the course will be on the proper use of probabilistic techniques, mathematical proofs, and solving application problems within a real world context. Moreover, some mathematics is necessary in order to understand the proper application of the techniques. Thus, you should be familiar with basic mathematics as covered in MATH110 (College Algebra) or an equivalent course. Since this course uses both differential and integral calculus, you should have completed both MATH 225 and MATH 226. (Note: MATH 227, Calculus III, is not required for this course.)

Objectives

After successfully completing this course, you will be able to:

- CO-1. Differentiate probabilistic from deterministic problems.
- CO-2. Explain the concept of randomness and how it underlies samples and sample spaces.
- CO-3. Apply counting rules to real world problems.
- CO-4. Evaluate conditional probability within real world situations.
- CO-5. Apply discrete probability distributions to real world problems.
- CO-6. Differentiate discrete probability applications from continuous probability applications.

CO-7. Apply continuous probability distributions to real world problems.

Outline

Week 1: Combinatorial Analysis and Axioms of Probability

Learning Objectives

CO-1. Differentiate probabilistic from deterministic problems.

CO-3. Apply counting rules to real world problems.

Readings

Text: Ross, Chapters 1 and 2

Lessons for Week 1: Combinatorial Analysis and Axioms of Probability

Assignment

Introductory Forum

Homework – Do the Chapter 1 Self Test Problems and Exercises (pp. 19-20) as well as the Chapter 2 Self Test Problems and Exercises (pp. 54-55)

Week 2: Conditional Probability and Independence

Learning Objectives

CO-4. Evaluate conditional probability within real world situations.

CO-5. Apply discrete probability distributions to real world problems.

Readings

Text: Ross, Chapter 3

Lessons for Week 2: Conditional Probability and Independence

Assignment

Week 2 Forum

Homework – Do the Chapter 3 Self Test Problems and Exercises (pp. 109-111)

Practice Weeks 1-2 Quiz (located in the Lessons area of the classroom, under Week 2 “Reading & Resources.”)

Weeks 1-2 Quiz (located in the link on the left of the classroom “Tests & Quizzes”)

Week 3: Random Variables

Learning Objectives

CO-2. Explain the concept of randomness and how it underlies samples and sample spaces.

CO-3. Apply counting rules to real world problems.

CO-5. Apply discrete probability distributions to real world problems.

Readings

Text: Ross, Chapter 4

Lessons for Week 3: Random Variables

Assignment

Week 3 Forum

Homework – Do the Chapter 4 Self Test Problems and Exercises (pp.173-175)

Week 4: Continuous Random Variables

Learning Objectives

CO-7. Apply continuous probability distributions to real world problems.

Readings

Text: Ross, Chapter 5

Lessons for Week 4: Continuous Random Variables

Assignment

Week 4 Forum

Homework – Do the Chapter 5 Self Test Problems and Exercises (pp. 217-219)

Practice Midterm (located in the Lessons area of the classroom, under Week 4 “Reading & Resources.”)

Midterm (located in the link on the left of the classroom “Tests & Quizzes”)

Week 5: Jointly Distributed Random Variables

Learning Objectives

CO-6. Differentiate discrete probability applications from continuous probability applications.

Readings

Text: Ross, Chapter 6

Lessons for Week 5: Jointly Distributed Random Variables

Assignment

Week 5 Forum

Homework – Do the Chapter 6 Self Test Problems and Exercises (pp.277-279)

Week 6: Properties of Expectation

Learning Objectives

CO-5. Apply discrete probability distributions to real world problems.

CO-7. Apply continuous probability distributions to real world problems.

Readings

Text: Ross, Chapter 7

Lessons for Week 6: Properties of Expectation

Assignment

Week 6 Forum

Homework – Do the Chapter 7 Self Test Problems and Exercises (pp.363-366)

Practice Weeks 5-6 Quiz (located in the Lessons area of the classroom, under Week 6 “Reading & Resources.”)

Weeks 5-6 Quiz (located in the link on the left of the classroom “Tests & Quizzes”)

Week 7: Limit Theorems and Additional Topics

Learning Objectives

CO-6. Differentiate discrete probability applications from continuous probability applications.

CO-7. Apply continuous probability distributions to real world problems.

Readings

Text: Ross, Chapters 8 and 9

Lessons for Week 7: Limit Theorems and Additional Topics

Assignment

Week 7 Forum

Homework – Do the Chapter 8 Self Test Problems and Exercises (pp. 393-394) as well as the Chapter 9 Self Test Problems and Exercises (p.413)

Week 8: Final Examination (Writing Project)

Learning Objectives

CO-1. Differentiate probabilistic from deterministic problems.

CO-2. Explain the concept of randomness and how it underlies samples and sample spaces.

CO-3. Apply counting rules to real world problems.

CO-4. Evaluate conditional probability within real world situations.

CO-5. Apply discrete probability distributions to real world problems.

CO-6. Differentiate discrete probability applications from continuous probability applications.

CO-7. Apply continuous probability distributions to real world problems.

Readings

Review for the Final Examination.

Description of the Writing Project may be found posted in the Syllabus area of the classroom, as an attachment.

Assignment

Week 8 Forum

Practice Final Exam (located in the Lessons area of the classroom, under Week 8 "Reading & Resources.")

Final Examination (located in the link on the left of the classroom "Tests & Quizzes")

Writing Project (Submit in the link on the left of the classroom "Assignments")

Evaluation

Your course grade will be determined as follows:

Forum Assignments:

There will be an Introductory Forum worth 2.5% of the final grade and 7 other Forums, one in each of Weeks 2, 3, 4, 5, 6, 7 and 8, worth 2.5% each for a total altogether of 20% of the final grade.

Your weekly discussion forum posts must meet the minimum requirement for the number of posts and the content for that assignment:

An initial response post and at least two student replies are required for each weekly forum. Posts should be made as indicated in the forum instructions. Typically, this will consist of an "initial post" in response to the question posed in the forum description, and at least two responses to what other students (or the instructor) say in the forum. Be sure to click on the link "Read Full Description" that appears below each forum name, since sometimes the requirements for a particular forum will be different. (Note that the grading and description for a particular forum override this general introduction, so be sure to read it carefully for each individual forum.) Typically, a discussion forum is graded using a 10 point scale and you will receive 6 points for your response to the forum question or assignment, and 2 points for each student response.

To receive full credit, a post must be substantive in content. This means initial posts which contain at least 250 words and respond in a focused and substantial manner to the question assigned. Single sentence responses such as "Now I understand" or "Thank you for your help" do not constitute significant posts. For student responses, replies of at least 100 words or more are generally required.

Grading for each forum will follow the point structure outlined in the description for each forum.

Introductory Forum: It is very important that you submit a post to, and participate in, the Introductory Forum. Please introduce yourself to me and the class. Share where you work or plan to work after completing your program, your family, and any hobbies or special interests. Also tell us why you are taking this course and what you hope to gain from obtaining your degree. In addition, please take a look at the course objectives in the syllabus and discuss the relevance to your career goals.

Instructions: Your initial post should be at least 250 words. Please respond to at least 2 other students. Responses should be a minimum of 100 words. This forum submission serves as your official entry into the course and that is why we have drawn special attention to this assignment. You will be reminded of this Forum again in the Week 1 Lesson Module, but please keep in mind that this Introduction Forum must be submitted by 11:55 p.m., ET, on Sunday of Week 1 to maintain your registration in the course.

Homework Assignments:

There will be eight (8) homework assignments in Weeks 1-8 assigned from the course textbook. While the homework each week is not a graded assignment (and earns no points towards your final grade), be sure to do it all in order to master all the concepts covered, since you will be tested on the material the homework covers. Please note that the answers – not the solutions but the answers alone – to selected textbook problems at the end of each section are available at the end of the textbook. So be sure to check your answers against the textbook answers to check your understanding of the material.

Also, the assignments give you the choice of what problems to do for your homework. Be sure to not choose “the first three” problems in each section, thinking that they will be the easiest. Remember, the goal of doing homework problems is to *learn the material*. So be sure to do problems that cover the entirety of what the chapter talks about, since any of the material in the chapter is likely to show up on weekly test or the Final Exam.

Exams/Quizzes

There will be 7 weekly Tests, for weeks 1-7, worth 8% each for a total of 56% of the final grade. These are found via the navigation link on the left of the classroom, labeled “Tests & Quizzes.” Please complete each test by the due date noted in the syllabus and in the classroom. These are open-book and open-note tests, but they are not collaborative efforts. They are timed at two and one half hours each, so be sure that you have the appropriate time available before you enter each test. These are single-access tests. Once you have accessed the test, it cannot be made up. Note that no help or assistance from anyone else is allowed on any weekly test. Tests are due Sunday night at 11:55pm ET of the week they are assigned to.

Final Exam:

There will be a Final Exam in week 8, worth 20% of the Final Grade, and it is located in the navigation link on the left of the classroom, labeled “Tests & Quizzes.” It is highly recommended that you take the Practice Final before attempting the actual Final Exam. The Practice Final is located in the Lessons area of the classroom, under Week 8 “Reading & Resources.”

The final exam is to be completed during the last week of the term, and is a 4-hour timed exam. The final exam will be open-book and open-notes and you may not receive help from anyone. The final exam will consist of all material covered during the entire term. You will not need a proctor to take the final exam. The final exam is due Sunday night at 11:55pm ET of week 8 (that is, the last day of the course).

Writing Assignment

There is one writing assignment worth 4% of your final grade, and it is due at the end of week 8. A detailed description of this assignment may be found posted in the week 1 announcement on the writing project, and also in the Lessons area of the classroom under Course Guidance, along with the grading rubric that will be used to evaluate it.

The Writing Project should be submitted to the Assignments area in the Sakai classroom in APA format and include a complete list of references.

Time Management:

Students must plan and manage competing demands and priorities on their time and are expected to submit classroom assignments on time. A schedule of all assignments (homework, tests and exams, readings, discussion, and any other assignments), and the weeks they are due, is included in the syllabus below. All assignments are due Sunday night of the week noted. You should also check the announcements, as they may contain reminders of what assignments are due each week. However, be sure to not rely on the announcements to remind you; in all cases the syllabus (and the homework schedule at the end of it) function as the class contract.

Students are expected to submit classroom assignments by the posted due date and to complete the course according to the published class schedule. For late assignments, students need to contact the faculty

member ahead of time about their individual situation.

While tests and exams, and homework, may be submitted up to the last day of class, all discussion postings and all discussion forum assignments are due the week that the discussion forum is active. No late discussion postings, or assignment postings to a discussion forum, are permitted. Be sure to plan your work and week accordingly. If you will be out of internet contact entirely for the whole week and it is due to circumstances beyond your control, be sure to contact the faculty member ahead of time about your individual situation.

All assignments, tests, and exams must be submitted by the last day of class unless you have an approved, school-issued course extension.

The points earned on the graded course assignments will determine the course grade. The final grade in the course will be based on total points and percentage weighting. Grades will be assigned according to the university grading schedule, and based on the following possible total points and percentage weighting for each assignment.

Please note that points for any one assignment and its percentage of your final grade may not be the same. This is because the assignments have been weighted differently. So be sure to take careful note of what percentage of your final grade each assignment represents, it may be quite different than the number of "points" assigned.

Students' course grades will be posted within 7 days of the end of class. Official grades will continue to be issued by the University on the grade report form. Instructors have 7 days from the end of the semester to submit their grades to the University.

Please see the [Student Handbook](#) to reference the University's [grading scale](#).

Grading:

Name	Grade %
Biweekly Tests	32.00 %
Weeks 5-6 Quiz Rev 1	16.00 %
Weeks 1-2 Quiz Rev 1	16.00 %
Midterm Exam	19.00 %
Weeks 3-4 Midterm Rev 1	19.00 %
Final Exam	25.00 %
Weeks 7-8 Final Exam Rev 1	25.00 %
Forums	20.00 %
Week 1 Forum	2.50 %
Week 2 Forum	2.50 %
Week 3 Forum	2.50 %
Week 4 Forum	2.50 %
Week 5 Forum	2.50 %
Week 6 Forum	2.50 %
Week 7 Forum	2.50 %
Week 8 Forum	2.50 %
Assignments	4.00 %
Week 8 Writing Project	4.00 %
Honor Code	0.00 %
APUS Honor Code and Pledge	0.00 %

Materials

Book Title: A First Course in Probability, 9th ed - The VitalSource e-book is provided via the APUS Bookstore

Author: Ross

Publication Info: Pearson

ISBN: 9781269571005

Book Title: You must validate your cart to get access to your VitalSource e-book(s). If needed, instructions are available here - <http://apus.libguides.com/bookstore/undergraduate>

Author: N/A

Publication Info: N/A

ISBN: N/A

Students will also benefit from having a calculator (either a physical calculator or an online calculator) to successfully complete this course. The calculator should include a memory, a square root function and a power function x^n (generally these are labeled “scientific calculators”). Students may make use of calculators for all graded assignments and exams during the course.

Web Sites

In addition to the required course texts, the following public domain web sites are useful. Please abide by the university’s academic honesty policy when using Internet sources as well. Note web site addresses are subject to change.

Site Name	Web Site URL/Address
Mathematics Videos	http://www.apus.edu/media/mathWV/index.htm Note: Choose the “Contemporary Math” option.
Calculator Website	http://www.calculator.com
Khan Academy	http://www.khanacademy.org/ Note: Type “Probability” into the search box in the upper right hand corner of the screen, to see a lengthy list of videos on probability that are available. “Basic probability” is another good keyword to search on.
Carnegie Mellon Open Learning Initiative	Enter course Note: You may have to “search the site” in the upper right. Search on “Probability”, then choose from the results list the course called “Probability and Statistics”. Note you can enter the course without an account, the option is provided on the right. Unit 3 on Probability is especially useful.
Video Tutorials by APUS	Video Tutorials Note: Selected topics on probability may be useful.

Course Guidelines

Citation and Reference Style

- Attention Please: Students will follow the APA Format as the sole citation and reference style used in written work submitted as part of coursework to the University. Assignments completed in a narrative essay or composition format must follow the citation style cited in the APA Format.

Tutoring

- [Tutor.com](https://www.tutor.com) offers online homework help and learning resources by connecting students to certified tutors for one-on-one help. AMU and APU students are eligible for 10 free hours* of tutoring provided by APUS. Tutors are available 24/7 unless otherwise noted. Tutor.com also has a SkillCenter Resource Library offering educational resources, worksheets, videos, websites and career help. Accessing these resources does not count against tutoring hours and is also available 24/7. Please visit the APUS Library and search for 'Tutor' to create an account.

Late Assignments

- Students are expected to submit classroom assignments by the posted due date and to complete the course according to the published class schedule. The due date for each assignment is listed under each Assignment.
- Generally speaking, late work may result in a deduction up to 15% of the grade for each day late, not to exceed 5 days.
- As a working adult I know your time is limited and often out of your control. Faculty may be more flexible if they know ahead of time of any potential late assignments.

Turn It In

- Faculty may require assignments be submitted to Turnitin.com. Turnitin.com will analyze a paper and report instances of potential plagiarism for the student to edit before submitting it for a grade. In some cases professors may require students to use Turnitin.com. This is automatically processed through the Assignments area of the course.

Academic Dishonesty

- Academic Dishonesty incorporates more than plagiarism, which is using the work of others without citation. Academic dishonesty includes any use of content purchased or retrieved from web services such as CourseHero.com. Additionally, allowing your work to be placed on such web services is academic dishonesty, as it is enabling the dishonesty of others. The copy and pasting of content from any web page, without citation as a direct quote, is academic dishonesty. When in doubt, do not copy/paste, and always cite.

Submission Guidelines

- Some assignments may have very specific requirements for formatting (such as font, margins, etc) and submission file type (such as .docx, .pdf, etc) See the assignment instructions for details. In general, standard file types such as those associated with Microsoft Office are preferred, unless otherwise specified.

Disclaimer Statement

- Course content may vary from the outline to meet the needs of this particular group.

Communicating on the Forum

- Forums are the heart of the interaction in this course. The more engaged and lively the exchanges, the more interesting and fun the course will be. Only substantive comments will receive credit. Although there is a final posting time after which the instructor will grade comments, it is not sufficient to wait until the last day to contribute your comments/questions on the forum. The purpose of the forums is to actively participate in an on-going discussion about the assigned content.
- “Substantive” means comments that contribute something new and hopefully important to the

discussion. Thus a message that simply says “I agree” is not substantive. A substantive comment contributes a new idea or perspective, a good follow-up question to a point made, offers a response to a question, provides an example or illustration of a key point, points out an inconsistency in an argument, etc.

- As a class, if we run into conflicting view points, we must respect each individual's own opinion. Hateful and hurtful comments towards other individuals, students, groups, peoples, and/or societies will not be tolerated.

University Policies

[Student Handbook](#)

- [Drop/Withdrawal policy](#)
- [Extension Requests](#)
- [Academic Probation](#)
- [Appeals](#)
- [Disability Accommodations](#)

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