MATHEMATICS
TEXAS A&M UNIVERSITY

MATH 411 - Syllabus

Course title and number:	**MATH 411-200** and **MATH 411-501**
Term:	Fall 2019
Class times and location:	T-R 9:35am-10:50am in BLOC 160

Instructor Information

Name:	**Patricia Alonso Ruiz**
e-mail address:	**use eCampus** (if not course-related use paruiz@math.tamu.edu)
Office hours:	Tue. 11:00am - 12:30pm in BLOC 221D
	Wed. noon - 1:00pm in BLOC 221D (or by appointment)

Course description and Prerequisites

Description: Probability has become key to develop mathematical models in artificial intelligence, economics, engineering and biology. In this course we will learn the basic concepts of this theory. Topics covered include: combinatorial analysis, discrete and continuous random variables, distributions, expectation, independence, conditional probability, law of large number, central limit theorem. This course covers most of chapters 1 through 10 of the textbook. It is designed to introduce rigorous theoretic concepts, while emphasizing the computational aspects of the theory.

Prerequisites: MATH 221 or MATH 251 or MATH 253. Please notice: this assumes that you are familiar with calculus of functions of several variables, in particular limits, series, derivatives and integrals.

Learning Objectives

As a student in this course you will:

- Recognize and recall the main definitions and results explained in the course.
- Develop quantitative, mathematical-modeling and problem-solving skills.
- Recognize situations in which probability concepts and results can be applied to other areas in mathematics and related fields.
- Identify and reproduce the theoretical framework underlying the definition of integrals, the concept of Riemann sums and how it relates to definite integrals.
- Be able to set up and calculate probabilities and expectations; use techniques of combinatorial calculus, series and integrals; solve problems involving special distributions.
- Be able to apply Bayes' rule and limit theorems to solve problems.
- Be expected to understand simple proofs, definitions and statement of theorems.

Textbook and/or Resource Material

The course will use as reference the following:

- *Introduction to Probability*, by D. P. Bertsekas and John N. Tsitsiklis, Athena Scientific, 2nd ed.
- Further resources available at the course website in eCampus.

Please note that the lectures will NOT follow any text verbatim.

Grading Policies

The final grade will be based on the results of weekly homework, quizzes, 2 midterms and 1 final exam.

- **Homework:** Homework will be collected **every Tuesday** (starting 09/02) at the beginning of class. No late homework will be accepted, but your lowest score will be dropped. The assigned homework will appear in the Assignments section of the eCampus page. All assigned problems are subject to appear in the quizzes and/or the exams. Solutions to the corresponding homework will appear each Wednesday after collection.
- **Quizzes:** A quiz will be given **every Thursday** (except during the midterm exam weeks). It will start at 9:35 am sharp, take about 10 minutes, and cover the assignment posted the previous week.
- **Excused absences:** Attendance is expected and may affect your grade. For excused absences your are referred to the Student Rule 7, see https://student-rules.tamu.edu/rule07/. Excuses for absences must be substantiated by appropriate documentation. As far as possible, you should inform me and provide the pertinent documentation before a quiz, an exam or a class period is missed.
- **Make-up exams:** Will only be allowed due to documented excused absences and the timeline discussed following the Student Rules.
- **Exams Timeline:**

Exam	Date	Points
Midterm 1	Oct. 10	250
Midterm 2	Nov. 7	250
Homework	Weekly	100
Quizzes	Weekly	100
Final Exam	Dec. 6 (12:30pm - 2:30pm)	300
TOTAL		**1000**

- **Grading Scale**

Range	Grade
$900 \leq$ pts	A
$800 \leq$ pts < 900	B
$700 \leq$ pts < 800	C
$600 \leq$ pts < 700	D
pts < 600	F

Course Topics

- **Tentative approximate schedule:** Combinatorial analysis and set theory (1 week); Kolmogorov's axioms of probability and combinatorial probability (1 week); independence (1 week); conditional probability and Bayes' formula (2 weeks); discrete random variables (2.5 weeks); continuous random variables (2 weeks); joint distributions, independence, sums of independent random variables and transformations (2 weeks); conditional distribution, conditional expectation, covariance, correlation, moment generating function (1.5 week); limit theorems (1 week).
- A weekly updated schedule will be maintained in eCampus.

Americans with Disabilities Act (ADA)

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation

requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities.

- If you believe you have a disability requiring an accommodation, please contact Disability Services.
- Please, inform me in case you need any accommodations so we can make the best possible arrangements in a timely manner.

Academic Integrity

For additional information please visit: http://aggiehonor.tamu.edu.

"An Aggie does not lie, cheat, or steal, or tolerate those who do."

In this course students can discuss homework assignments and solutions. However, it is NOT permissible to copy homework solutions from another student. It is NOT permissible to use any electronic device during quizzes or exams. It is NOT permissible to discuss any aspect of any quiz or examination until ALL students have completed the quiz or the exam. The penalties for violating this policy will range from an F on an assignment or test, to failing in the course.

Title IX and Statement on Limits to Confidentiality

Texas A&M University and the College of Science are committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws provide guidance for achieving such an environment. Although class materials are generally considered confidential pursuant to student record policies and laws, University employees - including instructors - cannot maintain confidentiality when it conflicts with their responsibility to report certain issues that jeopardize the health and safety of our community. As the instructor, I must report (per Texas A&M System Regulation 08.01.01) the following information to other University offices if you share it with me, even if you do not want the disclosed information to be shared:

- Allegations of sexual assault, sexual discrimination, or sexual harassment when they involve TAMU students, faculty, or staff, or third parties visiting campus.

These reports may trigger contact from a campus official who will want to talk with you about the incident that you have shared. In many cases, it will be your decision whether or not you wish to speak with that individual. If you would like to talk about these events in a more confidential setting, you are encouraged to make an appointment with the Student Counseling Service. Students and faculty can report non-emergency behavior that causes them to be concerned at http://tellsomebody.tamu.edu.

Additional course information and policies

- **Honors section:** Honors students are expected to deepen their understanding of the standard topics by treating the material at a more theoretical level than usual. Homework assignments for honors will contain exercises focusing on this aspect. These will be subject to appear in the honors exams. In addition, honors students will be required to find connections to another discipline of their choice and develop a probabilistic model to a problem in that discipline.
- **Exam guidelines:** You are allowed to bring n pages of handwritten notes (one-sided 8 x 11 paper) to the nth exam held. These and your writing utensils will be the only items allowed on the exam. NO calculator is allowed. The final exam will be cumulative (comprehensive) and is required for all students. If your final exam grade is higher than your lowest taken midterm exam score, then the grade on your final will replace your lowest midterm grade in the course grade computation.
- **Grade Appeals:** If you believe an error has been made in grading, you have until the next class period after the exam, quiz, or assignment has been handed back to let me know. Otherwise, you must accept the grade you received.

- **Copyright:** All printed handouts and web-materials are protected by US Copyright Laws. No multiple copies can be made without written permission.
- **HW questions:** If you encounter difficulties or have questions concerning HW, there are many options to solve them: ask me (in class or during office hours), post your question on or ask your mates. I will NOT respond to HW problems via e-mail.