

COMPSCI 240: Reasoning Under Uncertainty Spring 2019: January 22 – May 9



Contact us	Meet with us	Class location and time	Course materials
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Section 1: Nic Herndon	Drop-in hours: in LGRT	Integrative Learning Cen-	Introduction to
nherndon@umass.edu	223 F 10:30–11:30 AM, or	ter S131, MWF 9:05–9:55	Probability, 2nd Edition
	make an appointment	AM	by Dimitri P. Bertsekas
Section 2: Andrew Lan	Computer Science Build-	Hasbrouck Lab 124, MWF	and John N. Tsitsiklis
andrewlan@cs.umass.edu	ing 230, W 5–6 PM or by	9:05-9:55  AM	
	appointment		

# Table of Contents

1	Course Description   1.1 Prerequisites	<b>1</b> 2	
<b>2</b>	Who are we?	<b>2</b>	
3	Objectives	<b>2</b>	
4	How to succeed in this course4.1 Equality Statement4.2 Accommodations4.3 Office Hours4.4 Attendance and Participation4.5 Rules for Success (Student Responsibilities)4.6 Lateness Policy4.7 Homework Submission4.8 Course Staff Responsibilities	$egin{array}{c} 2 \\ 3 \\ 3 \\ 3 \\ 3 \\ 4 \\ 4 \\ 4 \\ 4 \end{array}$	
<b>5</b>	Grading and Course Assignments	4	
6	Final Grades	<b>5</b>	
7	Course Incompletes		
8	Academic Honesty	5	

## 1. Course Description

The goal of this course is to help students develop mathematical reasoning skills for problems that involve uncertainty. Each concept will be illustrated by real-world examples and demonstrated through in-class and homework exercises. Topics covered include counting and probability – basic counting problems, probability definitions, mean, variance, binomial distribution, discrete random variables, continuous random variables, Markov and Chebyshev bounds, laws of large numbers, and central limit theorem, as well as probabilistic reasoning – conditional probability and odds, Bayes' law, Markov chains, Bayesian network, and Markov decision processes.

### 1.1 Prerequisites

COMPSCI 187 (or E&C-ENG 242) and MATH 132 or consent of instructor.

## 2. Who are we?



My name is Nic Herndon. I'm originally from Romania, so English is my second language. I like sports, and I draw a lot of inspiration from them (soccer is my favorite, followed by college basketball). I have degrees in Civil Engineering (Associate of Science) and Computer Science (Associate of Science, Bachelor of Science, Master of Science, and Doctor of Philosophy).



I'm Andrew (Shiting) Lan, originally from Shenzhen, China. Prior to UMass, I spent time in Hong Kong, Atlanta, Houston, and New Jersey. My research focuses on developing machine learning methods to achieve personalized education. After work, I play football, watch american football, and sometimes follow DOTA2.

## 3. Objectives

Our aim is to help you master key concepts in probabilistic modeling and statistical inference, which are required for analyzing data and making scientifically sound predictions. We will emphasize the basic concepts and methodologies that are universally applicable, such as:

- The basic structure and elements of probabilistic models
- Random variables, their distributions, means, and variances
- Probabilistic calculations
- Inference methods
- Laws of large numbers and their applications
- Random processes

By the end of the course, you will understand these in some detail. As a result, you will be prepared to take any of the upper-level classes in Data Science and Artificial Intelligence. More importantly though, you will have learned skills and knowledge that will help you throughout your career.

### 4. How to succeed in this course

Your success in this class is important to us. We all learn differently and bring different strengths and needs to the class. If there are aspects of the course that prevent you from learning or make you feel excluded, please let us know as soon as possible. Together we'll develop strategies to meet both your needs and the requirements of the course. There are also a range of resources on campus, including:

- Learning Resource Center http://www.umass.edu/lrc
- Center for Counseling and Psychological Health (CCPH) http://www.umass.edu/counseling
- English as a Second Language (ESL) Program http://www.umass.edu/esl

#### 4.1 Equality Statement

The instructors are dedicated to establishing a learning environment that promotes diversity of the students including race, class, culture, religion, gender, sexual identity, and physical ability. It is important that this is a safe classroom environment. We will practice being generous and respectful members of our class and computer science community. Please let us know immediately if you notice discriminatory behavior in this class, or feel discriminated against.

#### 4.2 Accommodations

The University of Massachusetts Amherst is committed to making reasonable, effective and appropriate accommodations to meet the needs of students with disabilities and help create a barrier-free campus. If you have a documented disability on file with Disability Services (www.umass.edu/disability), you may be eligible for reasonable accommodations in this course. If your disability requires an accommodation, please notify your instructors as early as possible in the course so that we may make arrangements in a timely manner.

Students who believe they are eligible for accommodations but who have not yet obtained approval through Disability Services should contact the office immediately at (413) 545-0892. If you are a student with a documented disability and are registered with Disability Services, please contact us immediately to facilitate arranging academic accommodations. Reasonable arrangements will be made in accordance with your accommodations provided by Disability Services in the context of this course.

#### 4.3 Office Hours



Office hours are an important part in supporting you throughout this course. Even if you don't have specific questions, needs, and concerns, we would love to meet up with you at least once during this semester. There are a couple of options to meet up: stop by our office during the office hours, or, if these times don't work for you, please email us and we will find another day and/or time.

The TAs will host the discussion session, hold office hours, and help with course material and grade disputes.

#### 4.4 Attendance and Participation

It is important for you to read the assigned readings before class, and attend every class to participate in class discussions and activities. Your participation will be evaluated using a weekly checklist available on the course web page, https://www-edlab.cs.umass.edu/cs240/. The weekly checklist will help guide you in the material you are expected to cover, assignments you are expected to complete, and lectures you are expected to attend.

#### 4.5 Rules for Success (Student Responsibilities)

This course has six important rules. If you choose to follow these rules, your odds of learning the material and achieving a good grade in this course will improve greatly.

- 1. Do the assigned reading from the book.
- 2. Read the assignments early.
- 3. Do your work on time, submit your work on time, make sure you submitted the correct work. For more details about deadlines please review the Lateness Policy in section 4.6, below. Details on how to upload homework to Gradescope are provided in section 4.7.
- 4. Get help during the office hours.

- 5. Be honest in the work you do and the submissions you make.
- 6. Communicate with us and others in the course with respect and understanding.

### 4.6 Lateness Policy

You should make every effort to submit your homework, quizzes, and exams by the assigned due date. Late work will not be accepted.

### 4.7 Homework Submission

All homework assignments will be submitted as PDF files on Gradescope. You can scan your homework and convert it to PDF with the Evernote Scannable app available for iOS and Android devices, or by using a scanner on campus. When submitting on Gradescope, be sure to select the pages where the answers to the questions are, and save the selection. Otherwise, we will have to search through your homework for the answer and may end up deducting points or not viewing your solution. Also, be sure to submit to Gradescope early (not at 11:54PM if due at 11:55PM), because there may be issues with uploading. For more details on using these apps with Gradescope, please read the Gradescope guide. The gradescope course site is at https://www.gradescope.com/courses/37854/ and the entry code is MVD8KX.

### 4.8 Course Staff Responsibilities

You can expect from us:

- 1. Timely release of course assignments.
- 2. Timely release of scores achieved on course assignments.
- 3. Be respectful of your ideas and value the diversity you bring to the class.
- 4. Be open to dialogue that challenges us.
- 5. Be present during out stated office hours.
- 6. Ensure the proper running of the course.

## 5. Grading and Course Assignments



This course has 10 quizzes, with each quiz testing the material covered in class since the previous quiz. There will also be four homework assignments, with the best 3 out of 4 counting towards the final grade (you can miss one homework, for medical reason, personal loss etc.). Homework must be submitted at the drop box in CS main office by 4 pm of the deadline. Late submissions will not be accepted. Graded homework will be returned during the discussion sessions on Thursdays. There will be two inclass midterms and one final exam. For all assignments, once returned, students have one week to submit a regrade request. No change in grades will be recorded after one week.

#### 6. Final Grades

To evaluate your understanding of the course content we will use scores achieved on each of the above assessment components. Your final grade will convey *what you know* from the course and *how well* you know it. Missing assignments can have a dramatic impact on your final grade so it is important that you are attentive to submission deadlines and avoid any missing work. The typical breakdown of percentages and final grades for this course are A (93-100), A- (90-92), B+ (87-89), B (83-86), B- (80-82), C+ (77-79), C (73-76), C- (70-72), D+ (67-69), D (60-66), F (0-59). This grading scheme may be adjusted based on the overall performance of students in the course.

#### 7. Course Incompletes

Students who are unable to complete course requirements within the allotted time because of <u>severe</u> medical or personal problems may request a grade of Incomplete from the instructor of the course. Incomplete grades are warranted only if a student is passing the course at the time of the request and if the course requirements can be completed by the end of the following semester. Furthermore, an incomplete will be granted if at least 75% of the work has been completed for the course. Otherwise, the recommended course of action is to withdraw and retake the course in the future. Please see the Academic Regulations Section IV Grading System and Credit Guidelines for further details.

**Note:** an incomplete means you are on your own to complete the material agreed upon by the instructor of this course. Do not expect additional help or one-on-one teaching of the material past the course completion date. It is your responsibility to complete the remaining material.

#### 8. Academic Honesty

It is very important in all courses that you are honest in all the work that you complete. You **may** discuss assignments with other students, in fact we encourage this as a learning experience. But again, the writeup must be your work. Copying is not allowed, and collaboration so close that it **looks like** copying is not allowed. Remember to **tell us who you worked with** as well.

If you copy on assignments or exams you are doing a disservice to yourself, the instructors for the course, the College of Information and Computer Sciences, the University of Massachusetts, and your future. We design our courses to provide you the necessary understanding and skill that will make you an excellent computer scientist. Assignments are designed to apply and test your knowledge and understanding of the material. Plagiarism and academic honesty of any sort may seem like an easy way to solve an immediate problem (which it is not), however, it can have a substantial negative impact on your career as a computer science student. There are many computing jobs out there and many more people working hard to get those positions. If you do not know your stuff you will have a very difficult time finding a job. Please take this seriously.

We will carefully review your submissions automatically and manually to verify that "cheating" has not taken place. If you are suspected of plagiarism, we will follow an informal path to determine if academic dishonesty has taken place, and you may receive an F for the course and have a mark on your permanent record at UMass. This will disrupt your schedule for completing courses and may lead to you not completing your degree in a timely fashion. Please review carefully the Academic Honesty Policy, Avoiding Plagiarism, and the Academic Honesty Flowchart to understand what academic honesty is, how you can avoid it, and the procedure we will follow if you are under suspicion. If you have questions or unsure if something constitutes plagiarism, please reach out to us.

Every assignment implicitly includes a "contract" that you sign virtually by submitting your assignment. By "signing" this contract you indicate that you have read all the documents on this website and any links to academic honesty associated with the university. Your signature indicates that you completely understand the policies in place and that you have not plagiarized.