Math 3070/6070 Introduction to Probability

Mon/Wed/Fri 9:00am - 9:50am

Instructor: Dr. Xiang Ji, xji4@tulane.edu

Lecture 1:Aug 19

Today

- Introduction
- Introduce yourself
- Course logistics

What is this course about?

This course will provide a calculus-based introduction to probability theory. Material covered will include fundamental axioms of probability, combinatorics, discrete and continuous random variables, multivariate distributions, expectation, and limit theorems, generally following Chapters 1-5 of the textbook. This course is a critical prerequisite for more advanced work in statistical theory and analysis.

Prerequisite

- Calculus

Why learn probability

- The subject of probability theory is the foundation upon which all of statistics is built.
- It provides you a tool to model
    - populations
    - experiments
    - almost anything else that could be considered a random phenomenon
    - example topics in Data Analysis course
- Through these models, statisticians are able to draw inferences about populations based on examination of only a part of the whole.
- A must have for any Data Scientists.

What this course WILL NOT do for you

It will not help you:

- Beat the casino at blackjack (although it may convince you that it is better not to gamble, or that a casino is a great business).

- Answer your friends' silly questions such as "What are the chances it will rain tomorrow?" (although it might make you think of ways that you might model and compute it).

Syllabus

Check course website frequently for updates and announcements.

https://tulane-math-3070-2024.github.io/

HW submission

Students are required to submit hand-written homework in recitations to the TA. Homework assignments are expected every two weeks with 4-5 problems at a time.

Year 2023 comments

Your experience in this course:

- Professor Ji is awesome

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- There were a few times where I felt like Professor Ji's comments were a bit condescending. There were times that he would expect more from us to show proofs etc. and he would give us more time because he would assume that we were not capable enough to finish these proofs. He would then chuckle to himself, which felt condescending and really unmotivated me to go to more classes. I think there were a few instances where we also called out specific students in the class, which definitely humiliated them, but also made me uncomfortable.

- Professor Ji is a good lecturer, in my opinion. I heard many complaints that he just reads off of a pdf, but I feel his pdf is well-organized, meaning that the lecture is both easy to understand and easy to review.

- Zoom option is nice.

- Classes consist of him reading out of a textbook that is already difficult to understand just by reading. Very little is added to help you learn the material.

- It was okay at best. I did just as well on the midterm by joining the Zoom in contrast to going to class as I left the class confused 99% of the time. I taught the material to myself because Professor Ji teaches on a pdf. Managed to get a good grade because I

was decent at memorizing and wrote the right things on my test cheat sheet. Ask me in a month, and I will be unable to recall anything from this class.

- Professor Ji, despite your best efforts to scare everyone away from taking this class you clearly do want us to succeeded, which I appriciate. However you could really improve the lecture time. I think that if you actually want people to come to class, you should not allow zoom. I think making attendance mandatory did not work, it just encouraged people to log into zoom. I think that if you would like people to engage more you should find a way to teach that is better than projecting a pdf. I understand that you loath writing, but reading a projected pdf is an incredibly dull way to be presented information. Even slides would be better. Writing would absolutely be the best. I think that if you want people to actually try the examples in class, you should provide clearer problems. The way you do it now is often confusing. You will show us about half of a proof or a theorem that isnt just an inequality and then say "finish this". On more than one occasion, I have found myself spending most of the two-three minutes you gave us to solve the problem just trying to figure out what you were asking. Finally, I think that you could foster a better learning enviroment. By this I mean activly encouraging questions and not laughing at your students when they ask you questions that are obvious to you. I know you are not doing this out of judgment but it does not feel great to be laughed for not understanding what you meant when you explained something the first time. Beyond this, I am a student who will ask questions no matter how to stupid I look because I think there is no other way to learn. However, I bet many other students would ask more questions if you responded in a more encouraging way.

- nice professor

- Teaching from pre-written notes rather than writing things out on the board is fine, especially since he said that was his style at the beginning of the semester. My only gripe would be that the tests were more about reciting definitions rather than applying what we learned to different problems.

- The topics in this course are pretty advanced, and I didn't understand the motivation behind a lot of it. However, the course really helped me understand where commonly used probability models come from, and that was interesting. I also really appreciated the zoom option that Dr. Ji provided for lecture, and he really seems to care about his performance as a professor. He often asked for feedback from students, and provided us the opportunity to vote on syllabus changes and class policies. He also wants his students to do well. The tests were reasonable given the course content and structure, and Dr. Ji is a lenient grader. That being said, I generally did not enjoy this course. There was so much material with extremely involved derivations and proofs that seemed unnecessarily difficult. Lectures were quite boring, and the homework assignments were really long and difficult. Sometimes it felt that Dr. Ji thought the material in this course was simple or easy, which it most definitely was not. That can be pretty discouraging for students who are feeling lost or stuck. Generally speaking though, this course was a good option to fulfill the elective requirement for my math minor and I am glad that I took it.

strongest aspects of this course

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- I really liked the way that the exams were organized because they were very straight-forward and directly linked to what we had previously learned through the homework, classwork, etc. I also really appreciated Professor Ji's understanding to bring a one page cheatsheet, because I personally feel like memorizing a bunch of formulas is not going to help someone internalize the learning and is futile in the long-run. I think the concept of applying what you learned was a key component throughout this course, and I really liked that.

- I thought that the homework was very helpful, and I actually really liked the lecture style - I don't need the lecturer to write out each theorem or definition; it's definitely enough that Dr. Ji writes out the details of proofs and works out examples on the board.

- Exams very representative

- He went through the proofs in class. Didn't understand them but at least we were exposed to them. He also was super up-to-date with posting and updating class notes which was very convenient.

- I think the way that I truly learned the content of this class was sitting down by myself in the library with the lecture note. They did provide a comprehensive list of everything that we covered. Additionally, the exams reflected what we learned in class and while they were difficult, professor Ji was incredibly forgiving while grading. Thank you for being a kind grader.

- This is the best course I have ever taken. Textbook is awesome. Prof. Ji illustrate examples on the whiteboard very clearly. In particular, I enjoy it on zoom very much!

- He gives a clear roadmap of how to perform well in the class.

- The tests, especially the take home final, and the virtual option for lecture were the strongest aspects of this course.

RateMyProfessor

- (5.0 Quality / 3.0 Difficulty) Very nice and caring professor. Course material is not easy but he grades tests generously.

- (5.0 Quality / 3.0 Difficulty) Great professor. Very easy grader. Thinks he's really funny (he is funny, but his humor isn't for everyone). I learned a little in this class, but it was a manageable course.

Year 2022 comments

Your experience in this course:

- Exactly what I was looking for in a probability course - I got a really good grasp on the theory and this math has already come in useful in other areas and fields that I'm studying. Glad I took this class, and I appreciate the tests being more accessible and spaced out to provide less pressure - highly recommend.

- I really appreciate the lecture shift that Prof. Xiang Ji had after our midterm survey. He took suggestions seriously and dramatically improved how the content was presented to our class's needs. Having the opportunity to present and listen to classmates on related statistical topics was also fun and rewarding.

- Absolutely stupendous course. Fabulous structure, even more fabulous professor.

- Lectures were pretty disengaging. I would've rather had lecture notes written out to us rather than being read to us. Presentation extra credit opportunities were nice. Would've liked more communication and collaboration between TA and teacher.

- Once the lecture structure changed after midterms, I felt I learned much more during lectures. I think that the concepts and theories were explained clearly in class. I appreciate the generosity Professor Ji showed when grading exams, but I think that receiving more detailed feedback would have helped me learn the material better. The exams felt more like a test of our ability to make a formula sheet than a test of our understanding of course material. While this was nice in terms of my grade, I don't think this helped me with my understanding of the material. The recitations often felt disconnected from the course material because we did practice with numerical applications and calculations instead of theory. Overall I feel prepared for the second half of this course next semester.

- I felt the course provided me with very little context for why we were learning about the things we were learning. For example, now I know about a lot of different distributions and their moment generating functions, but I have no idea when I might need to use a Gamma distribution or Poisson. Additionally, I did not find the textbook to be a particularly helpful resource. There also seemed to be little communication between the professor and TA, so the activities we did in recitation weren't always relevant to what we were doing in the class.

- This course and professor were great. I got introduced to an entirely new facet of mathematics and it excited me for my major. Professor X was great and fostered a great learning environment in the classroom.

- I appreciate the professor's willingness to adjust his teaching style to include more written-out derivations. I would have preferred not to have the 10-minute presentations in class on Fridays. I felt like especially at the beginning of the semester most of the content in the presentations was more complex than what we had learned and took class time away from the material. I think it would have been helpful for the TA and Professor to communicate about the level of instruction of the course. It was hard to

understand where I stood from a knowledge perspective when the level of difficulty ranged so greatly from homework, quizzes, worksheets, and lectures. I understand that this class is a probability theory class, however, I think it would be helpful for math majors interested in applied math to have some way to learn more about the applications of probability since the Stats for scientists does not count toward the major.

- Wonderful experience! I learned a tremendous amount, and always left class wanting to know more. This course did not shy away from difficulty and I could not have appreciated it more. Far too often professors dumb down the material in order to cater to the students. Not this class, we learned intense probability theory and I could not be happier with it. I look forward to continuing my studies next semester with Statistical Inference. The rigor and complexity of the course demanded respect and, if given, the knowledge learned is powerful.

- Professor was good, but I think the subject matter was oftentimes too confusing

- The only reasons why I personally did not like the course is firstly because I do not like the subject matter and secondly, I do not like how the material was organized. I do not learn math the best when it is purely based off lecture notes. I did notice that the professor was trying to write more on the board during lectures which I did appreciate.

- I appreciate that Professor Ji mid-semester began to workout problems in class on the whiteboard as that kept me more engaged. Sometimes it was hard to follow the work on the board however as the steps didn't seem to be organized (they looked like they were written all over the place). I think it would be more easy to follow if the notes on the whiteboard were more organized linearly. Also, we only did this like once, but I think it could be a good idea to also give students problems and have them come up to the whiteboard and solve them (maybe for bonus points, doesn't have to be) as that is another way to make class more interactive. I also liked having a practice test as it always nice to get more practice.

- Class sessions were a little slow paced and repetitive for me. However, towards the end as the Professor took some feedback from students and started writing out equations on the board it was easier to follow along and I was more actively learning. I think the weekly presentations were nice but took away a chunk of class time that could've prevented us from getting behind. The weekly reviews were really helpful and I think those are great for Fridays. Our Professor, Dr. Ji, was super accommodating and very adaptive towards creating the best learning environment for students. I appreciated the mid-semester surveys and his changes based off that immensely, and his efforts to supplement our grades with bonus presentations (I just think they could be shorter or maybe uploaded on a discussion post, rather than take up 1 of every 3 classes). I liked that we had a class notes document, rather than a textbook, and this also made the class very accessible when I couldn't be there in person.

- Teaching improved significantly through the semester, he was open to feedback so that helped some. Lectures were still almost entirely him reading off of a pdf though, which did not teach me much

strongest aspects of this course

- Very good in-depth class, useful theory knowledge and strong lectures.

- The strongest aspect of this course is how it provides a very good background which is needed for future statistics courses.

- Loved the professor, absolutely no complaints. Promote Xiang Ji

- Lecture notes helpful. Loved the TA and our lab sessions.

- I really appreciated that Professor Ji asked for student feedback in the middle of the semester and adjusted the lectures based on the results. Once we started doing more derivations on the board, I was able to understand them better.

- I love you as a person, but it is seriously hard to digest anything you say in class. Reading directly from the textbook is not teaching, it is just reading. The tests do not test us on our knowledge of the material AT ALL. They simply did you write down the right thing on your cheat sheet.

- The professor and TA were very flexible when it was clear that the class didn't understand something, and were always open for feedback.

- I really enjoyed having the lecture notes typed and uploaded ahead of class. This allowed me to add to these notes and not have to get a notetaker. I also enjoyed having a notes sheet for the exams especially since there are so many formulas and distributions.

- The rigor and complexity of the course is the strongest aspect. Both Professor Zhao and Professor Ji made the material approachable and were always happy to explain and explain again the difficult concepts and proofs. I am excited to take Statistical Inference for the following semester. Additionally, the course has changed my way of thinking when assessing probabilities in all aspects of life, and there have been many instances over the semester when the knowledge imparted to me has been of service.

- The professor made himself available which I noticed and appreciated. I liked him as a person a lot and I noticed his deep knowledge on the topic.

- Switching to writing on the whiteboard vs pure lecture from typed notes. Enjoyed our bonus presentations on various math topics as it opened my eyes to how versatile statistics can be.

- I listed those above. But the professors attitude and flexibility, and use of technology to sum it up.

- professor was open to student feedback which was helpful

- I liked the presentations a lot. They were a good change of pace and way to understand how this is all applied

RateMyProfessor

- (4.0 Quality / 2.0 Difficulty) Dr Ji has a dry wit and is receptive to student feedback. He is a generous grader and offered an opportunity for generous extra credit. For the tests, he allowed a cheat sheet, and the final was take-home. I also think the tests were easy compared to how complicated they could have been. Beware the class is super theory-based similar to analysis.

- (4.0 Quality / 3.0 Difficulty) At the start of the semester I struggled with Dr. Ji's lecturing style, but after the midterm he asked for our feedback and made adjustments to his class so it was easier to follow his lessons. He didn't always explain things in great detail the first time, but if you ask questions he is always willing to clarify. Exams are also graded generously.

- (3.0 Quality / 3.0 Difficulty) Lectures are based off a pdf document which helps when you need to study, but can be terribly difficult to pay attention to in class. Tests account for about 65% of your grade but he goes pretty easy on the grading.

- (2.0 Quality / 2.0 Difficulty) Don't take this class if you're actually trying to learn the class content. I've been in here a whole semester and genuinely cannot tell you one thing I have retained. Does not communicate with the TA so recitation is not helpful either. Although, homework is graded for completion and quizzes are easy so at least its not a hard grade.

- (4.0 Quality / 5.0 Difficulty) Prof. Xi is hardcore. 3070 is definitely a theory-heavy class for people who really want to get into the underlying technical parts of probability, but if you go into it with that mindset it's really well structured and informative. Book is useful, but you have to be serious and commit time/effort into this class to do well.