

Math 474-01 Theory of Probability, Fall 08
TR 4:20 - 6 PM, SH C 241

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Office Hours: Monday 11-12; Tuesday 3-4 & 6-6:30; Wednesday 10 – 12; Thursday 1-2
and by appointment outside these hours.

Text: Fundamentals of Probability, 3rd Edition, by Saeed Ghahramani (parts of Chapters 1 through 11). We will start with the basic axioms of probability and briefly review counting. You will learn about both discrete and continuous random variables and their distribution functions. Expectations and variances, important measures of random variables, will be defined for both types of random variables and for functions of these. We will extend these concepts to a set of two random variables "acting" together and define independence. Finally, you will learn about the Central Limit Theorem, which is main reason for the importance of the Normal distribution.

Prerequisite: Math 209 - Calculus IV

Course Grade:

- **Homework** will be assigned every class period and is "due" the next period. It will not be collected, but we will go over questions in class (~10 minutes in the beginning). The assignments give the absolute minimum of problems you should work. If you find that you have trouble with certain topics, work additional problems (odd numbered exercises have answers in the back of the text, and even-numbered problems can be checked in the solution manual which will be placed in the library on reserve). You can also discuss problems with classmates or come to my office hours where I have more time to answer your specific questions.
- We will have four **quizzes** (25 minutes) **on September 30, October 9, November 6, and November 20**. I will count the best three out of four. There will be **no make-ups** for exams!!!
- There will be a midterm on **October 23**.
- The **final** will be comprehensive, and will be held on **Tuesday, December 2, 4:30 - 7 pm**.

Your final grade will be computed as follows:

| | | | | | |
|------------------------------|-----------------|----------------|------------|--------------|------------|
| Quizzes (3 best of 4) | 10% each | Midterm | 30% | Final | 40% |
|------------------------------|-----------------|----------------|------------|--------------|------------|

Attendance (I expect you to be on time and to stay until the end of class!) and class participation will be taken into account in borderline cases. The following grades will be guaranteed:

| | | | |
|------------------|-------------------|-------------------|--------------------|
| 90 - 100% : A/A- | 80 – 89%: B+/B/B- | 70 – 79%: C+/C/C- | 60 - 69%: D+/D/ D- |
|------------------|-------------------|-------------------|--------------------|

My role in this course is to help you learn and understand the material. **Please come and see me in my office hours immediately if you have trouble with the material**, so we can intervene early.

Your part consists of

- doing the homework (math is learned by doing, not by watching). It has been shown that Time-on-Task (TOT) (which consists of taking notes, re-reading the material after class, doing homework and studying) has the highest correlation with the final grade!!
- to ask if you do not understand. Asking does not mean that you are stupid, but rather that you are smart enough to realize that clarifying what bothers you is an important step in doing well in this (or any) class. For the majority of questions there will be many grateful classmates who had the same question, but did not have the guts to ask.
- to take advantage of my office hours – think of it as personalized question and answer session. You can make the most of this time by coming prepared – bring your notes with marks on where you have questions, and show me where you get stuck in solving a particular problem. I can assist you best when you have specific questions.

In terms of studying, I urge you to work with other students. I will assemble a list of student names with potential meeting times from the questionnaire to assist you in establishing a study group. Even if your schedule is such that you cannot meet with somebody else, identify somebody whom you can call. Often hours of frustration can be avoided by talking to somebody else. Think about the problems by yourself first, and then ask about the ones you had trouble with.

In preparation for the class, you should read ahead in the material (I will put a tentative schedule on the website). This way you can pay particular attention to anything that did not make sense to you. In addition, it is a good idea keep a note book in which you record definitions, theorems and formulas (this will be a good summary for review before exams and will come in handy in any course in which you may need this material). You may also want to summarize the sections/chapters to help in studying for exams. Another use of this notebook is to record which parts of the material/ homework questions you had trouble with. Often when writing down your difficulties they may clear up. I will **not** collect/check this notebook, but that should not keep you from making entries.

One more note: Many students encounter some difficulty with counting (permutations, combinations, and the like) which we will review only briefly as counting is covered in Math 248. If you feel fuzzy on this material, or have not taken Math 248 or an equivalent course, then you should let me know, so I can point you to some good review problems. Another area that I have seen students struggle with is double integration over non-rectangular domains. If you feel that your knowledge in this area is a bit rusty, you should bring out the good old Calculus book and review this type of question. In general, when dealing

with continuous random variables, integration is the key to answer questions, so you may have to review some of the integration techniques (substitution and integration by parts).

Cell phones and beepers should be switched off or turned to vibrate. It is a major annoyance when cell phones ring in the middle of class. I will take points of your short exams if you violate this rule!

Homework Assignments:

- | | | | |
|--------------|--|-------------|-------------------------------|
| 1.2 | 1 – 5, 8, 10 (use Venn Diagrams), 13, 15, 20 | 6.1 | 1, 2, 4, 7 b (use part a), 9 |
| 1.4 | 3, 5, 8, 11, 12 (for counter examples use roll of a single die), read 14 & 15, do 18, 19, 23, 30, 31 | 6.2 | 1, 2, 4, 8 |
| 1.7 | 1 - 4 | 6.3 | 1, 2, 4, 13ab |
| 2.2 | 1, 3, 5, 6, 7, 9, 11, 15, 18 | 7.1 | 1, 2, 5 |
| 2.3 | 1, 2, 5, 10, 11, 17, 18 | 7.2 | 1, 2, 4, 6, 8, 10, 12, 15, 17 |
| 2.4 | 3, 4, 8, 16, 17, 23, 39, 41 | 7.3 | 2, 4, 5, 6 |
| 3.1 | 1, 2, 4, 7, 8, 15 | 8.1 | 1, 3, 4, 6, 7, 9, 11 - 13 |
| 3.2 | 2, 4, 7, 8 | 8.2 | 1, 3, 6, 8, 10, 12, 15 |
| 3.3 | 1, 5, 8 - 10, 18 | 8.3 | 1, 2, 4, 6, 7 |
| 3.4 | 1, 4, 5, 7, 10, 12 | 10.1 | 1, 3, 7 |
| 3.5 | 4, 6, 9, 10, 12, 13b, 14, 15, 17, 25, 28, 29 | 10.2 | 2, 5, 6, 9, 16, 18 |
| 3.6 | read | 10.3 | 1, 5 |
| 4.1/2 | 1 - 3, 5, 7, 10, 11 | 11.1 | 1, 2, 5, 11, 13 |
| 4.3 | 1, 2, 4, 5, 7 b c d, 9 | 11.2 | 1, 3, 11, 15 |
| 4.4 | 2, 3, 5, 9 | 11.3 | 2, 3, 5, 6 |
| 4.5 | 1, 3, 7, 9 | 11.4 | 1, 3 |
| 5.1 | 1, 2, 6, 7, 9, 13 | 11.5 | 1, 2, 5, 7 |
| 5.2 | 2, 5, 10, 11, 16 | 9.1 | 3, 4, 13, 14 |
| 5.3 | 2, 5, 7, 8, 15, 22 a-c | 8.4 | 1, 7 |