CS 206; Introduction to Discrete Structures II

Fall Semester 2022

Sections 5,6, and 7: Wednesday10:20- 11:40 am& Friday3:50- 5:10 pm in TIL 25; Livingstone Campus

Instructor: Dr. Samaneh Hamidi
Office: #266 Hill Center
Office Hours: Monday 12:00 -1:00 pm & Friday 2:15-3:15 pm (preferably with appointment)
Telephone:
Email: sg1538@cs.rutgers.edu , sg1538@scarletmail.rutgers.edu

If my office hours don't work for you, send me an email and we will try to make another arrangement.

My Personal Zoom Room:

Invite Link: https://rutgers.zoom.us/my/sg1538?pwd=MXJ1bVluN0MxYllEcHhXNVI1VjNTdz09
Meeting ID: 899 606 3100
Passcode: 863079Hide

TA's & Recitation's info:

- **Section 5: joined by Tony & Ruosong**

  Recitation: Tuesday 7:45- 8:40 pm in TIL- 257 Livingston Campus

- **Section 6: Tony Liu**

  Email: ql236@scarletmail.rutgers.edu
  Recitations: Tuesday 10:35- 11:30 am in BE- 263 Livingston Campus
  Office hours: Wednesday 1:00- 2:00 pm in Rutcor 111

- **Section 7: Ruosong Ye**

  Email: ry233@scarletmail.rutgers.edu
  Recitation: Monday 5:55- 6:50 pm in TIL- 257 Livingston Campus
  Office hours: Tuesday 4:00- 5:00 pm at CORE 337

Note: *You **MUST** continue with the same TA recitation class for the entire semester.*

Textbook & Materials:

- Mathematical Ideas; 13th edition, By: Charles D. Miller, Heeren, Hornsby, and Heeren
- Statistics for Engineers and Scientists;4th edition, By: William Navidi
- Discrete Mathematics and Its Applications, 7th edition, By: K. Rosen

Other Recommended Books:

- Mathematics for Computer Science; 10th edition By Lehman, Leighton, and Meyer https://people.csail.mit.edu/meyer/mcs.pdf
- A First Course in Probability, 8th edition By S. Ross,

You don't need to buy books in order to do well in the course.

Prerequisite(s): 01:198:205 or 14:332:202; 01:640:152. Credit not given for this course and 01:640:477 or 14:32:226.

❖ A grade below a "C" in a prerequisite course will not satisfy that prerequisite requirement.

Calculator: A simple/scientific calculator.

Course Description: This is an introductory course in combinatorics and probability theory, two branches of mathematics that are of fundamental importance in computer science. Below is an outline of the topics covered during the course:

- Set Theory: Symbols and Terminology, Venn Diagrams and subsets, Set operations
- Counting: Binomial coefficients, Permutations, Combinations, Partitions
- Recurrence relations and generating functions
- Discrete probability:
  - Random experiments, sample spaces, events, probability measures
  - Conditional probability, Bayes' Theorem, Independence
  - Random Variables
  - Expectation, variance, standard deviation
  - Binomial, Bernoulli, Poisson and Geometric distributions; law of large numbers
- Some Topics from Graph Theory: Paths, Components, Connectivity, Euler Paths, Hamiltonian Paths, Planar Graphs, Trees

Learning Outcomes: Upon successful completion, Computer Science major's students should be able to:

- Will be prepared to contribute to a rapidly changing field by acquiring a thorough grounding in the core principles and foundations of computer science (e.g., techniques of program design, creation, and testing; key aspects of computer hardware; algorithmic principles).
- Will acquire a deeper understanding on (elective) topics of more specialized interest, and be able to critically review, assess, and communicate current developments in the field.
- Will be prepared for the next step in their careers, for example, by having done a research project (for those headed to graduate school), a programming project (for those going into the software industry), or some sort of business plan (for those going into startups).

Teaching Methods: Lecture and small group work

Presentation of Material: Each period will begin with questions over material previously covered and assigned. Once all questions are answered, the new material will be introduced, and several examples will be given. If you have questions, please ask them as they occur to you. If you don't understand, most likely there are others who don't understand. So, please ask questions during the class period. At the end of each class period, the problem assignment and the reading assignment for the next class period will be given.

Virtual Classes will also be recorded for later use.

Work outside the classroom: This course requires large amounts of work outside of the lecture. This includes extensive reading assignments and exercise sets. If you feel that you cannot devote around 6 hours outside the classroom to study/practice each week, then this course is not for you. The real time needed will vary, of course.

You can get help from any of the various sources available to you: these include your instructor, your TA, your fellow students, the learning center and the tutoring center. If you have any questions or concerns about this, then please speak to me.

During the semester, please let me know if there is any topic that you do not understand. I will be happy to explain it in more detail, either during lecture or office hour. Also, please let me know if there are exercises problems with which you need help.

Attendance: You must attend all lectures unless you have a valid excuse which must be communicated to me in advance if possible. The same policy applies to lateness. Missing class for 5-14 minutes at any session/class will be counted as 50% attendance for that session and missing class for more than 15 minutes at any session/class is equivalent to be recorded absence. Period. No discussion. Unexcused absences or lateness may result in a deduction from your final score for the course.

In virtual mode, your camera must be on during each class (unless you have waiver) and being face to you such that lecturer be able to see you. Same policy as attendance (5-14 minutes and more than 15 minutes) will apply for if your camera be off or lecturer is not able to see you. I will record zoom session/class which you should have access through cloud.

Phones must be shut off and be in your bag during the entire class time. If I see your phone around you, you get 0.5-point deduction, for each time, from your final grade.

Full details of grading for this class, attendance and other policies, are in the appendix at the end of this document. And this document is the final source for all policies in this course. Please make sure you understand my policies. You are responsible for learning the material that you missed. I am happy to assist you during office hour, but I cannot repeat the lecture that you missed. Since mathematics is an important subject and hard to learn by yourself, please**, DON'T MISS CLASS!**

I will utilize the "reports" feature in Zoom to produce a "usage report" of everyone who logged into a particular Zoom session/class. It will be used to monitor attendance. If you are facing technical issues, it is your responsibility to inform instructor and IT department. Extensive numbers of absences may require you to withdraw from the course or will affect your final grade. This policy also applies to examinations. You must have a valid medical or personal emergency to miss an examination, and you must inform me as soon as possible about the reason. All doctor reports, accident reports, or related material for an excuse must be submitted to the Dean of Student Office. After Dean of Student Affairs confirmed your medical paperwork is valid, I will be notified by them, and I will decide if you're eligible to take make-up exam or no. Please do not bring any material to my attention for an excuse. (Apart from the privacy concern, there is a practical advantage in centralizing this decision: it makes it harder for the student to make up contradictory excuses for various classes, whose instructors are not otherwise communicating with each other.) Except for the reasons explained above, there are no makeups or incompletes.

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Keeping up with the material will help you enjoy the class. If you start falling behind for any reason, please come and see the instructor as soon as possible.

Homework: Homework/suggested practice problems will be assigned for each section. It's very important to work on homework problems by yourself as that could be a good practice for exams. Homework will not be collected/graded. I will try uploading the correct answers to the homework problems (mostly even numbers) during the semester. You can find the solutions to the odd numbers in the back of the book or use online sources to find the complete solution to all problems.

Class work/participation: One important aspect of my teaching style is to have my students actively participating in class. I believe that classroom learning is not a one-way communication. It should be more of a dialogue between my students and me. It is important to me that students be constantly involved in the process of their own learning. That is why I try to make the classroom an environment where all students feel safe to ask questions, make comments, or give responses. To arrive at this state, I constantly pose questions to my students in order to hear their opinion and get to know how they're thinking about the problem and topic. If the student doesn't know, or if the response is not quite right, I'd ask for other students' opinion. In this way, my students build confidence in learning, and problem solving. I want to get them to think deeply about the questions I ask during class, and feel comfortable enough to respond. Sometimes, I will ask for a volunteer to come to the board and show how to solve the problem. If there is a mistake, the other students or I will help the student to complete the solution. All these together help you get 5 points quite easily out of your final 100 points.
The most active students throughout the semester get the complete points. All other students get points compared to them.
In virtual mode, you can collaborate through speaking, or through chat.

Learning Mathematics/Statistics: Learning mathematics is somewhat different than other disciplines. You learn mathematics/statistics by reading the text, by doing exercises, and by emulating the instructor. All three components: reading, exercises, and learning from the instructor are necessary. No one or two will do.

If you were taking a course in carpentry, then you would never master the craft merely by watching a master carpenter at work. You would need to handle wood and tools, make mistakes, correct them, start over and keep at it in order to learn carpentry.

The same is true in mathematics/statistics. You cannot merely watch the instructor and take notes. You must also do assigned exercises and read the textbook until you master the concepts. When you do exercises you must check that they are right and if not, you should try them again, or seek help from the instructor or a tutor.

Many problems will be done during lecture, with full solutions posted in the lecture notes. A great way of learning mathematics or statistics is to, after lecture, cover up the solution, then work as much of the problem as possible on your own, only glancing at the solution when you get stuck of complete it. If you get stuck, then redo the solution until you get it right.

Exams and Final Exam: During the semester there will be three in-class examinations which will be given during the regular lecture hour and several quizzes. After classes end there will be a two-hour final comprehensive examination. Tests will be closed-book and closed-notes.

- **Mark the exam dates in your calendar to do not plan anything on these dates**
- No make-up exams will be given
- All electronic devices as well as mobile phones should be turned off during class time, recitation meetings, quizzes, mid-term exams and final exam
- You're not allowed to use second device during exams/quizzes in any virtual examinations
- **If I catch cheating during the exam/quiz,** you lose the point of that question(s) and any other questions that you have some notes about them on your cheat sheet. In addition, you get the half of the score you get on exam

The **final exam for this class is on Tuesday; December 20, 8:00-11:00 am.** Failure to take the final exam will result in a grade of 0 for final, regardless of other grades. It is school policy that no one will be permitted to take a final exam early.

Examinations:

Exam 1	On Wednesday; September 28th, includes Set Theory
Exam 2	On Wednesday; November 2nd, includes Counting & Probability up to Distributions
Exam 3	On Wednesday; December 14th, Starting Distributions- End of December 9's Lecture
Final Examination	On Tuesday; December 20, 8:00-11:00 am- Comprehensive, includes all chapters

Quizzes: There will be several announced and unannounced quizzes during the semester. Each quiz will be about ten to twenty minutes long. Be ready for quizzes at any time, especially after covering each chapter. I try to announce it at least one lecture in advance but no promise. No make-up quizzes will be given.

Grading Policies: Your final grade will be determined as follows:

Attendance (Lecture & Recitation): 7%
Class work/participation: 5%
Exams I, II, and III: 39%
Quizzes: 14%
Final: 35%

Missing a test will result in an automatic zero for that test. Show your work on all tests; otherwise, it is impossible to give partial credit if the final answer is wrong. There is no point for just writing final answer.
Please notice your class work/participation is completely based on my opinion which comes from your engagement with class throughout the semester. No complains on that will be accepted by the end of the semester. If their semester scores end on a 9, e.g., 59, 69, 79 or 89, I will round it up one point.

Grading Scale: The final course grade is determined using the following scale:

89.5-100% = A	79.5-84.49% = B	69.5-74.49% = C	0-59.49 % = F
84.5-89.49% = B+	74.5-79.49% = C+	59.5-69.49% = D	

Grading Questions: Questions regarding the grading of exams or of homework must be brought to me at outside of class. No such issues will be addressed during the regular lecture hour. If you have a question or concern, please come during (virtual) office hours or email me to make an appointment.

*I do **NOT** curve grades at the end of the semester. However, in order to help you improve your grade throughout the semester, I am providing you with the following offers/opportunities:*

- If you have:
  - 90% or above out of all quizzes and exams during the semester by the last day of the classes,
  - No more than 2 absences during the semester, and
  - 90% or above on class precipitation

  No need to take the final exam, you will have earned your "A".

OTHERWISE

- You can qualify for each of the following bonuses by
  - **Extra Credit:** Students who attend either mine or TA regular office hours will be able to obtain extra credit (up to 4%). You will receive 0.04% extra credit for each time you attend tutoring: up to 2% credit per 5 weeks and up to 4% per semester. No other extra credit will be available at the end of the semester.
  - For those students who work very well:
    1. I will substitute your lowest grade quiz with the average of your other quizzes. (If you miss a quiz and receive a "0", the "0" will NOT count as your lowest grade)
    2. To improve your grade, the lowest exam's grade, let say Exam X, will be substituted with the percentage you get in Final on the problems of the same Chapters as Exam X, IF AND ONLY IF **"You get 80% or above on other two exams and get 75% or above on Final Exam."**

*Offered help opportunities are **NOT** combinable.*

General Comments: Please make sure you understand the material as it is presented. As the course progresses, we will build upon the concepts covered earlier. If you fall behind, it will be nearly impossible to catch up. It is valuable to read the material to be covered before attending class. Having an idea of the material to be covered will facilitate a more thorough knowledge of the material when it is presented in class. If you need help during the semester, please see me during office hours or make an appointment.

Academic Integrity: Please be aware of our Departmental Academic Integrity Policy.

Students are expected to maintain the highest level of academic integrity. You should be familiar with the university policy on academic integrity. Violations will be reported and enforced according to this policy.

Cheating: Use of external website resources such as Chegg.com or others to obtain solutions to homework assignments, quizzes, or exams is cheating and a violation of the University Academic Integrity policy. Cheating in the course may result in grade penalties, disciplinary sanctions or educational sanctions. Posting homework assignments, or exams, to external sites without the instructor's permission may be a violation of copyright and may constitute the facilitation of dishonesty, which may result in the same penalties as plain cheating. Students will need to acknowledge the Rutgers Honor Pledge on every major exam assignment as follows: On my honor, I have neither received nor given any unauthorized assistance on this examination/assignment. Any cheating on any quiz, mid-term or final exam will, at minimum, result in failure on that test, at maximum, in failure for the course. The incident will be reported to Dean of Academic Affairs. Cheating includes, but is not limited to, receiving aid from another student, giving aid to another student, or use of unauthorized materials. Your video must be on during lectures and exams. If you want a waiver to turn off your video during lecture hours, please refer to document at Canvas. Note that such waiver is just for regular lectures, not for quizzes or tests.

Policy on Honesty: It is the instructor's intent to enforce the University policy on honesty. Copying from prohibited sources including from other students during a test will result in a zero for both the person who copies and the person who allows it. It also could result in an automatic F for the course or a more severe penalty. Signing another's name to the attendance list is improper conduct and will be dealt with harshly. We shall have an implied code of honor. If you see another student cheating, let me know confidentially of that fact. In the past, it has been through student vigilance that those who abuse the system have been stopped. It is very unfair to the others for any student or students to cheat on final exams, tests, quizzes, or homework and we shall not tolerate it.

Attention Students with Disabilities: Students who need accommodations because of a disability may contact the Office of Disability Service (ODS), located at Lucy Stone Hall, Suite A 145, Livingston Campus. To schedule an appointment or to speak with a counselor, call at 848-445-6800. Website: https://ods.rutgers.edu/

Travel during the final exam period: This course has a final exam during the period May 3-9, 2021. The exact time of the final is determined by the Registrar's Office and will be posted around the middle of the semester. Students must not make travel arrangements which might conflict with their responsibility to take the final exam at the appointed time. A purchased airline ticket does not constitute a valid excuse to miss the final, and no makeup exam will be granted under these circumstances.

Helpful Hints

- Attend class, do your work regularly and do not fall behind. Falling behind is dangerous. All of the material is interconnected, and it is very difficult to catch up once behind.
- Calculus is not difficult but requires work and dedication.
- If you do not understand something in class, then speak up. Chances are that you are not the only one who is confused. I am always willing go over something again.
- Studying with other students is a great way to learn, but there are some pitfalls. It is easy to think that because someone in your study group knows how to do a problem then you know how to do it. When you study in a group be sure that in the end you know how to do the problems. Also, copying solutions from your friend is cheating. Not only is it cheating, but it

is self-destructive with respect to the exams. On the exams you must be able to do the problems by yourself in a reasonable amount of time.

- If you are not doing well, do not hesitate to come and talk to me. Do not wait until the last minute.
- I cannot give you points for how much you worked or even how much you know. Grades will be given based on what is written on your work. You must provide complete, correct solutions in order to get full credit. You will have many examples of complete and correct solutions in class and there are more in the book. The same level of detail is expected of you in your written work.
- You will be able to participate more effectively in classroom discussions if you read the text in advance and review your notes from the previous class.
- It is often helpful to do more problems than those assigned.
- Another good way to learn mathematics is to "teach" it. Try explaining a concept to another student or show someone in your study group how to solve a particular problem. If you can do so, you most likely have a good, solid understanding of the material.
- Keeping up with the material will help you to enjoy the class. If you start to fall behind, for any reason, please come and see me or TA as soon as possible.
- If you start to have difficulty, get help from me or TA, or by studying with other students, or by meeting with a tutor.
- Before working problems in an assignment, study the text and your notes as if you were taking an exam. Then work through the problems without the aid of your text and notes. You may struggle and it may take more time, but what you figure out on your own will stick with you much better than if you just look it up in your notes or book. Remember, you won't have your notes or text available during an exam, so this is excellent practice. Of course, use your notes and the text when necessary.
- Strive to understand the concepts that are developed and recognize the patterns that arise. Do not think of math as simply memorizing formulas.

Syllabus is subject to change. It is your responsibility to be aware of any changes the instructor may make to the syllabus and to know what is always in this syllabus. Students are responsible for all information given when they are absent.