This syllabus will receive small updates during the first 2 weeks, including midterm dates and office hours

Lecturer: Matteo Paganin
e-mail: matteo.paganin@sabanciuniv.edu
Office: UC 1089
Office Hour: TBA or by appointment.

Lecture Hours: Tuesdays 14:40 - 15:30 (SBS 1099)
Thursday 10:40 - 12:30 (FENS G077).

You are responsible for every announcement made in the lecture or in SUcourse. Not attending the lecture or not following SUcourse regularly is not an excuse, in case you miss something.

Recitation Hours: Sections A1-A3: Thursdays 17:40 - 18:30
Sections B1-B3: Fridays 15:40 - 16:30
Sections C1-C2: Fridays 16:40 - 17:30
Sections D1-D2: Fridays 17:40 - 18:30

Objectives: This course aims to introduce basic ideas of discrete mathematics such as formal mathematical reasoning techniques, algorithms and analysis of time complexity, elementary number theory and its applications, basic and advanced counting techniques, recurrences, solving recurrences, relations and graphs. The course gives students training to develop their mathematical skills, analytical and critical thinking abilities, their ability to apply these capabilities to practical problems, and to communicate their knowledge of these areas.

Course Support Materials:
- Ronald L. Graham, Donald E. Knuth, Oren Patashnik, Concrete Mathematics, Addison-Wesley.
- Alan Tucker, Applied Combinatorics, John Wiley Sons.

Tentative Course Outline:
- Week 1 - 3: Foundations and basic structures (Ch 1, Ch 2)
- Week 3 - 4: Algorithms, Growth of Functions (Ch 3)
- Week 5 - 7: Number Theory and Cryptography (Ch 4)
- Week 8 - 9: Sequences, Summation, Induction, Recursion (Ch 5)
- Week 10: Counting, solving recurrence relations (Ch 6, Ch 8)
- Week 11 - 12: Relations (Ch 9)
- Week 12 - 13: Graphs (Ch 10)
- Week 14: Categories (if time permits)

Learning Outcomes
On completion of this course the student should be able to:
- Understand the notion of mathematical thinking, mathematical proofs, algorithmic thinking, and able to apply them in problem solving.
- Present simple proofs in a precise and formally correct way.
- Apply various methods of proof like mathematical induction, direct, indirect proofs.
• Understand the basic concept of an algorithm and apply appropriate algorithms to solve problems in combinatorial mathematics.

• Understand asymptotic notation, its significance, and be able to use it to analyze asymptotic performance for some basic algorithmic examples.

• Use definitions to solve problems and prove statements in elementary number theory.

• Understand the principle of recursion and apply it to the study of sequences and sets.

• Understand the basic properties of relations and graphs.

• Understand the principles of counting.

Grading:
Your grade exclusively depends on the following listed items. Each item is discussed after the table. There will be no other extra-credit opportunities.

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<tbody>
<tr>
<td>Midterm (date: TBA)</td>
<td>35%</td>
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<tr>
<td>Final (date: TBA)</td>
<td>50%</td>
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<tr>
<td>Lecture Attendance</td>
<td>5%</td>
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<td>Recitation Grade</td>
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The passing grade will be determined after the last exam. Be aware that this passing grade may not match the overall average of the students.

Midterm:
The midterm will be announced as soon as the date will be finalized. More detailed information will be available in due course.

Final Exam:
The university will later announce the final exam date. The final may be given on any day between January 6th - January 19th, 2024. Student resources will determine the dates and times for all final exams, and instructors cannot change it. The last day for grade submissions is January 25th, so do not plan to leave Istanbul before January 25th, 2024. (See also the make up policy.)

Lecture Attendance:
There will be attendance checks in the form of pop-up quizzes during lecture times. There will be no make up for any of these quizzes. In order to be valid, each quiz must bear name, surname, student ID number, signature, and some effort to solve the given quiz. Students found having a behavior in contrast with Academic Integrity times, will receive 0 from Lecture Attendance.

Recitation Grade:
This consists of quiz scores. There will be 5 or 6 quizzes. The best 4 of your quiz scores will determine the quiz grade. There will be no make-up for missed quizzes. Thus, no additional medical reports or official permission notices from the university will be taken into account. You are required to attend your registered recitation section; otherwise your recitation score will not be counted. In order to be valid, each quiz must bear name, surname, student ID number, and signature. During quizzes and exams, students are NOT allowed to have any books, notes, electronic devices (including cell phones, smart watches, calculators, earphones, computers, etc.), or any other kind of supporting learning material. A student violating this rule will receive 0 points for that exam.

Supplementary Exercises:
There will be supplementary exercises assigned each week via SUCourse. You are not expected to return the solutions but you are strongly advised to solve them (even if not in full detail) before the recitation. It will be given in two parts, the ones that will be solved in the recitation and the ones whose written solutions will be shared via SUCourse later on.
Make Up Policy

Make-ups are only allowed for the midterm exam and the final exam to those with an official report and to those with an official permission notice from the university on the date of the exam in question. Students must submit their reports/notices to the instructor before the exam in question. The ones having other excuses should contact the instructor within the day of the exam to be missed and then it will be decided whether these students are allowed to take the make-up exam. Any excuses to be brought to the attention of the instructor after the exam will not be considered. No exceptions to these rules. Makeup for the midterm exam and the final exam will be held towards the end of the semester and will cover all the topics. Only students who got permission for the makeup will be able to take it. If the student does not contact the instructor and does not take either the exams or the make-up, then (s)he gets NA.

Academic Integrity

All university policies on academic integrity apply to our course, and they will be enforced (more information on http://www.sabanciuniv.edu/en/academic-integrity-statement).

In general, to ensure Academic Integrity, any student might be asked to validate any activity contributing to their grade in an interview (recorded, with audio and video). A student failing to explain the submitted work, or refusing/missing the interview, will receive zero from that work.

In particular, no form of cheating is welcome in the exams, quizzes or any assignment, such as copying whole or part of each other’s answers, using cheat-sheets etc. The action against such violations could range from getting a zero on the particular assignment to explaining the case in front of the Disciplinary Committee.

Suggestions:

- Feel free to ask me and your TA questions in and out of class, especially during office hours.
- Math 204 is a combination of computational mathematics and theoretical mathematics (that is abstract definitions and theorems). The computational aspects of the course will feel more familiar and easier to grasp, but we will also focus on the theoretical aspects of the subject. Whenever you encounter an abstract concept in the lecture, take a pause and give yourself some time to think about it.
- In discrete mathematics, definitions and theorems build on each other quickly. If you fall behind, it will be difficult to catch up. Work hard from the beginning, and come to office hours immediately if you do not understand something.
- Studying out of class for this course should become a routine. Key to success in mathematics is practice.
- Students are expected to follow the announcements made during the lectures or in SUCourse. Not attending the class or not following SUCourse regularly is not an excuse, in case you miss something.

Registration Overrides

Time conflict requests for lecture hours will be accepted. However, any and all negative outcomes that may result are solely the student’s responsibility.