Math 253: Discrete Mathematical Structures (Spring 2018)

Course number: MAT 253

Course title: Discrete Mathematical Structures

Credits: 3

Meetings: MWF 10:00–10:50 am, Petty Building 303

Prerequisites: Grade of at least C in MAT 151 or MAT 191.

Instructor information:

Instructor: Dr. Dan Yasaki d_yasaki@uncg.edu
Homepage: http://www.uncg.edu/math/faculty/d_yasaki/
Office Hours (146 Petty): MW 9:00–9:50 am, 1:00–1:50 pm, and by appointment.

For whom planned: This is a core course designed for mathematics majors as an early introduction to discrete mathematical structures, rigorous proof techniques, and mathematical programming.

Catalog description: A rigorous introduction to discrete mathematical structures, proof techniques, and programming. Topics include sets, functions, sequences, relations, induction, propositional and predicate logic, modular arithmetic, and mathematical programming.

Student learning outcomes: Upon successful completion of this course, students will be able to:

- define the fundamental discrete mathematical structures.
- identify and describe various types of relations.
- explain how RSA encryption allows for secure message transcription.
- translate pseudocode algorithms into Python scripts.
- compute the number of solutions to several arrangement problems.
- analyze simple algorithms and identify values of variables at various stages of completion.
- combine definitions and results produced in class to create rigorous proofs of basic statements about discrete mathematical structures.
- evaluate an argument for logical validity.

Teaching methods and assignments for achieving learning outcomes: The course material will be presented via traditional lectures. Achievement of learning outcomes will be facilitated via homework assignments, programming projects, and exams.

Evaluation and grading: Semester averages are computed according to the syllabus, and letter grades are assigned to the following point scale.

A : 90–100 B : 80–89.9 C : 70–79.9 D : 60–69.9 F : 0–59.9

- Participation (5%): This includes attendance, answering questions, working the assigned exercises, and staying involved in the class. This will be self-assessed on a sign-in sheet.
- Programming projects (10%): All projects are weighted equally. Scripts must be uploaded to Canvas.
- Weekly homework assignments (5%): A subset of the assigned exercises will be collected and graded. All assignments are weighted equally and collected at the beginning of class.

- Tests (50%): The four tests are weighted equally at count 12.5% each. The test dates are 2/09, 2/28, 4/02, and 4/23.
- Final exam (30%): The final exam is cumulative. It is Monday, 4/30 at noon.

Required materials:

- Lecture notes (pdf) available on my website.

  https://www.uncg.edu/mat/faculty/d_yasaki/
- Software: *Python 3.X* You can use Python on the central Linux server of UNCG. It is also installed on the computers in all ITS computer labs. You can download it for free at

  http://www.python.org/download/
- We will cover most of the sections 1–5 of the *Python Tutorial* available at

  http://docs.python.org/py3k/tutorial/

Recommended materials:

- *Book of Proof* by Richard Hammock: This book is an introduction to the standard methods of proving mathematical theorems.

  http://www.people.vcu.edu/~rhammack/BookOfProof/

  It has been approved by the American Institute of Mathematics' Open Textbook Initiative.
- *The Art of Proof* by Matthias Beck and Ross Geoghegan: This book is an excellent introduction to writing good proofs. This book is not open source, but our library has a Springer subscription that includes this book. Go to the UNCG Library Catalog to find this book. You can download a free copy by entering your UNCG iSpartan credentials.

Tentative Schedule: A more detailed calendar is in Canvas. The section numbers refer to the lecture notes, and P refers to the programming assignments in the Appendix of the notes. You are expected to read and be prepare *before* class so that we can discuss the material during class meeting.

Week of 1/08: Python Introduction, P0, 1.1; [Notes: Last day to adjust schedule is Friday 1/12.]
Week of 1/15: P1, 1.2; [Notes: No class Monday 1/15 (Dr. Martin Luther King Jr. holiday).]
Week of 1/22: 1.3, 1.4.
Week of 1/29: 2.1, 2.2, P2, 2.3.
Week of 2/05: 2.4, P3, Test 1; [Notes: Test 1 is Friday 2/09.]
Week of 2/12: P4, 3.1, 3.2.
Week of 2/19: P5, 3.3.
Week of 2/26: Test 2, Popt; [Notes: Test 2 is Wednesday 2/28. Friday 3/2 is last day to withdraw.]
Week of 3/5: [Notes: No class this week (Spring break).]
Week of 3/12: 3.4, P6.
Week of 3/19: 3.5, RSA.
Week of 3/26: 4.1, 4.2; [Notes: No class Friday 3/30 (Spring holiday).]
Week of 4/02: Test 3, 5.1, P7; [Notes: Test 3 is Monday 4/02.]

Week of 4/09: 5.2, 5.3, P8.
Week of 4/16: 6.1, 6.2.
Week of 4/23: Test 4; [Notes: Test 4 is Monday, 4/23. Last day of class is Wednesday 4/25.]
Week of 4/30: Final exam; [Notes: Final exam is Monday 4/30 at noon.]

Academic Integrity Policy: Each student is required to sign the Academic Integrity Policy on all major work submitted for the course.

I have abided by the UNCG Academic Integrity Policy on this assignment.
Signature _____ Date _____

More information can be found at https://osrr.uncg.edu/academic-integrity/ .

Attendance Policy: The student is responsible for all material covered, whether in attendance or not. Students with four consecutive absences or eight total absences may receive a failing grade, regardless of semester average. Attendance will be measured using a sign-in sheet.

Final examination: The final exam is 3 hours and will be given on Monday, April 30, 2018 at noon. It is a cumulative exam. The material in the modules is a good indicator of the content and level of difficulty of the exam.

Additional information:

(1) UNCG seeks to comply fully with the Americans with Disabilities Act (ADA). Students requesting accommodations based on a disability must be registered with the Office of Accessibility Resources and Services (OARS) in 215 Elliott University Center, 334-5440, http://oars.uncg.edu .
(2) Assignments Policy: Assignments are due in class on the due date, and late after 5 pm that day. Late assignments will be accepted until the following lecture period for half credit.
(3) Absence Policy: You are responsible for all missed material. Any missed assignment, test, or final exam will result in a score of 0. Make-up tests and final exam will be given only if you receive prior approval for a valid excuse by contacting me at least one week in advance.
(4) Copyright Policy: Selling or purchasing notes from classes for commercial gain is a violation of the UNCG Copyright Policy.

    http://policy.uncg.edu/copyright/

    Any student who sells notes taken in class for commercial gain, or who purchases notes taken by another student for commercial gain, is in violation of this policy and, by extension, is committing a violation of the Student Code of Conduct.
(5) Email Policy: All email correspondence should be made using your UNCG email account. You must check your email regularly for updates and announcements.
(6) Calculator Policy: Calculators are allowed for arithmetic.