

MA 103 – Topics in Contemporary Mathematics (Summer II 2021) Syllabus

David White

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1 Instructor information

- Name: David White
- Email: dgwhite2@ncsu.edu
- Office hours: Thu. 15:00–17:00 and by appointment in the [Class Zoom meeting](#)

2 Course logistics

- Time: MTWRF 8:00–9:30
- Place: [Class Zoom meeting](#)
- Materials: The textbook is provided as a downloadable PDF through [WebAssign](#), where students will also access homework assignments.

Students may need to create an account with Cengage upon navigating to WebAssign via the prior link. A code with which to register for this course in WebAssign will be provided to students by the instructor.

All other course materials will be posted to Moodle, which students can access by logging into [Wolfware](#).

- Communications: all course communications are to be sent to and received from NCSU Unity email accounts.

All course content upon which students will be evaluated will be presented in lecture. Additionally, it is intended that a significant portion of class time be used to explore introductory-level applications of the ideas covered in a collaborative fashion. Students are therefore expected to attend lecture as consistently as possible and are encouraged to participate in discussion.

The lectures will not be recorded.

3 Course contents

3.1 Summary

This course will introduce mathematical techniques of interest in fields of decision and social science, such as economics, operations research and political science. The content will be accessible to students with knowledge of arithmetic and basic algebra. Areas to which students will gain exposure include the following:

- combinatorics — the principles of counting finite quantities of objects, arrangements or possible outcomes of events.
- logic and axiomatic systems — deducing the consequences of a set of assumptions;
- algorithms — rule-based processes which yield an output based on a prescribed set of inputs in a deterministic way;
- sets and relations — formal tools for grouping and comparing things.

3.2 Itinerary

The following is subject to change over the course of the term.

Date	Lecture	Topic/Activity
		Unit 1 – Graph theory
Mon. 28 Jun.	1	Intro to graphs, Euler circuits.
Tue. 29 Jun.	2	Examples and applications.
Wed. 30 Jun.	3	Hamilton circuits, the traveling salesperson problem.
Thu. 1 Jul.	4	Further examples and applications.
Fri. 2 Jul.	5	Graph coloring
Mon. 5 Jul.	-	Independence Day observed; NO CLASS
Tue. 6 Jul.	6	Trees and networks
Wed. 7 Jul.	7	Applications
Thu. 8 Jul.	8	Digraphs and scheduling
Fri. 9 Jul.	9	Midterm exam 1
		Unit 2 – Social choice theory
Mon. 12 Jul.	10	Intro to ranked-choice voting: preference ballots and winner selection methods
Tue. 13 Jul.	11	Fairness criteria
Wed. 14 Jul.	12	Examples and analysis
Thu. 15 Jul.	13	Additional criteria and methods
Fri. 16 Jul.	14	Impossibility theorems
Mon. 19 Jul.	15	Division
Tue. 20 Jul.	16	Examples
Wed. 21 Jul.	17	Apportionment
Thu. 22 Jul.	18	Examples and review
Fri. 23 Jul.	19	Midterm exam 2
		Unit 3 – Game theory
Mon. 26 Jul.	20	Zero-sum games
Tue. 27 Jul.	21	Other non-cooperative games
Wed. 28 Jul.	22	Cooperative games
Thu. 29 Jul.	23	Further topics in individual strategy
Fri. 30 Jul.	24	Final exam review

4 Graded components

4.1 Homework

Homework assignments will be provided and completed via [WebAssign](#). To afford students a maximum of flexibility in completing this work, all assignments will be due at 23:59 on Tue. 3 Aug. (the day of the final exam). No extensions will be granted except in the most extreme circumstances.

The due date notwithstanding, students shall be informed frequently in lecture of what homework exercises correspond to the most recently covered material and are expected to complete them generally in a timely manner.

4.2 Exams

All exams (midterms and final) will be administered as Moodle Quizzes. Each will be made accessible at the start of the class period devoted to it and is to be submitted by the regularly scheduled end of that period. Students are asked to be logged into the class Zoom meeting for the duration of their work on an exam in order to facilitate communication from and with the instructor (though they need not appear on camera).

Students must not consult anyone other than the instructor in completing their exam, but are free to use any textual resources, on paper or in digital form, and any computational device.

4.2.1 Midterm exams

There will be two midterm exams. The first on Fri. 9 Jul. will cover the material of the first unit, on graph theory. The second on Fri. 23 Jul. will cover that of the second unit, on social choice theory.

4.2.2 Final exam

A cumulative final exam will be given 7:30–8:55 Tue. 3 Aug.

4.3 Grading rubric

Grades for the course components listed above will be aggregated to give a final grade according to the following:

Component	Weight
Homework	30%
Midterms (2)	20% each
Final exam	30%

4.4 Grading scale

This course uses the 10 pt. standard NCSU grading scale. A final numerical grade G is assigned a letter grade according to the following:

A+ : $100 \geq G \geq 97$	A : $97 > G \geq 93$	A- : $93 > G \geq 90$
B+ : $90 \geq G \geq 87$	B : $87 > G \geq 83$	B- : $83 > G \geq 80$
C+ : $80 \geq G \geq 77$	C : $77 > G \geq 73$	C- : $73 > G \geq 70$
D+ : $70 \geq G \geq 67$	D : $67 > G \geq 63$	D- : $63 > G \geq 60$
	F : $60 > G \geq 0$	

5 Course policies

5.1 Absences and missed work

5.1.1 Missed exams

Students shall inform the instructor of their inability to sit for an exam as soon as they are able. As long as the cause for this absence is reasonable, the instructor and student shall agree upon a time for a make-up exam as close to the original as practicable.

Failure to take the final exam at the appointed time may result in an Incomplete grade.

5.1.2 Missed lectures

Should a student be absent from a lecture due to unplanned and unavoidable circumstances, the instructor shall provide the student with a written record of the lecture.

In the event of planned or avoidable absences, it is the sole responsibility of the student to acquire notes on the missed materials. The instructor may facilitate communications between students and their classmates to that end if warranted.

5.2 Academic Integrity

Students are required to comply with the university policy on academic integrity found in the [Code of Student Conduct](#). This policy covers all work done in this course. Any suspected violations will be promptly reported. Academic dishonesty will result in an automatic failing grade for the course.

5.3 Course Evaluations

A formal evaluation is conducted by the University at the end of the semester and the goal is to achieve 100% class participation in this survey. Online class evaluations will be available for students to complete during the last two weeks of class. Students will receive an email message directing them to a website where they can login using their Unity ID and complete evaluations. All evaluations are confidential; instructors will never know how any one student responded to any question, and students will never know the ratings for any particular instructor.

5.4 Accommodations for Disabilities

Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, student must register with the [Disability Resources Office](#) (919-515-7653). For more information on NC State's policy on working with students with disabilities, please see the [Academic Accommodations for Students with Disabilities Regulation](#).

5.5 Additional Policies

Students are responsible for reviewing the [NC State University Policies, Rules and Regulations](#) that pertain to their course rights and responsibilities.