
Course goals:

Basic knowledge of many areas of discrete mathematics, including

- Permutations and their connection to rotations of the five Platonic solids.
- Axioms for groups, rings, fields and quaternions.
- Groups of matrices with elements from finite fields.
- Propositional logic, using Boolean algebra and finite fields.
- Graph theory, spanning trees, and Cayley graphs for groups.
- Finite topology
- (If time permits) Finite affine and projective geometry.

(Optional but recommended) Skill in modifying and writing interactive R shiny dashboard apps like the ones that will be used for in-class presentations. Here are a few examples:

Cosets, conjugate subgroups, generators

<https://bamberg.shinyapps.io/GroupA5/>

Finite Fields

<https://bamberg.shinyapps.io/FFCalc/>

Groups of Matrices

<https://bamberg.shinyapps.io/SL2F4/>

Graphs, Spanning Trees

<https://bamberg.shinyapps.io/SpanningTree/>

Experience in presenting mathematics at the blackboard -- great practice for job interviews!

Course format:

Classes are devoted to presentations, some by the course staff but most by students.

Typical enrollees:

Sophomores who are considering mathematics as a concentration.

Students meeting the algebra requirement for concentration in applied mathematics

Computer science students who want to gain experience with software that has mathematical content.

Ambitious first-year students who already know linear algebra or who will be concurrently enrolled in Math 21b, 22a, 25a, or 55a.

Students from any concentration who want to learn entertaining mathematics that is totally different from calculus. Pass-fail is a viable option as long as you participate in class

When is course typically offered?

Fall term only

What can students expect from you as an instructor?

Classes are informal and interactive. I am willing to do the hardest topics myself.

Assignments and grading:

Your course grade will be determined as follows:

• required homework, 50 points. Your worst score will be converted to a perfect score before totaling.

• class presentations, 20 points

• exploratory homework and computer projects, 50 points

• midterm exam, 50 points

â€¢ final exam, 78 points

The total points available are thus 248. The grading scheme is as follows:

Percentage Minimum Grade

93% A

87% A-

81% B+

75% B

69% B-

63% C+

57% C

51% C-

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Sample reading list:

Discrete Mathematics, Norman L. Biggs, second edition

A scan of the book is available for three hours at a time via the Library

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Past syllabus:

Here is the [syllabus from Fall 2023](#)

Absence and late work policies:

Regular attendance at class is expected. To receive full credit for class participation, students must be well prepared for all presentations that are assigned to them. Late work will be given a grade of 50% if it looks fairly complete.