Time and place  M W Th 9-9:50 AM, Goldsmith 317

Instructor
Shaunak Deo (shaunak@brandeis.edu)
Office Hours: To Be Announced,
Office : Goldsmith 111

TA
To be determined

What is this course about?
By this point in your mathematical development, you’ve seen a lot of different pieces
of mathematics. In elementary arithmetic: fractions, decimals and so on; in calculus:
functions, polynomials, etc.; and in multivariable calculus and perhaps elsewhere: vec-
tors and vector spaces. Each of these concepts can be thought of as an abstraction
which helps us understand some feature of the world better. But each course studies
just a few of these concepts by itself.

In this class, we will start to look at these concepts not individually, one at a time,
but together. We will look for analogies amongst these concepts, and discover these
analogies in what might seem surprising places (for instance, we will see that the integers
are more closely analogous to polynomials over the real numbers than to real numbers
themselves). Since this draws in so much of the mathematics already studied, this can
be quite a satisfying experience, as we see new connections where before we saw none.

Just as the inventory of mathematical concepts we talked about above can be thought
of as abstracted from commonalities and analogies amongst real world situations (for
instance, just as one sheep and another sheep make two sheep, and one goat and another
goat make two goats, we see one carrot and another carrot makes two carrots; and from
this analogy, we might glimpse that the abstraction of the numbers one and two), so we
can abstract from the mathematical concepts listed above, and the analogies between
them, new and deeper mathematical concepts. This is called the study of abstract
algebra, and this will be the major task which occupies us in this class. This will
allow us to understand ‘once and for all’ certain recurring concepts that arise in each of
the contexts mentioned above, and even to see how to solve problems that had vexed
mathematicians since the ancient Greeks.

Probable list of topics to be covered, time permitting
  Review of Concrete Algebra: numbers, functions, polynomials, etc.
  Rings and Fields
  Integral domains, Euclidean domains
  Polynomial rings
  Vector spaces
  Field extensions
  The great problems of antiquity
  Some additional topics like Finite Fields, Ideals, Quotient Rings depending on time
Learning goals for Math 28b: Students in Math 28b will study the abstract notions of ring, field, subring, subfield and vector spaces (over arbitrary fields) followed by their properties. They will also be generalising and using the theory and techniques of polynomials along with basic properties of integers (such as gcd) in the settings of rings and fields to study phenomena such as Euclidean domains, field extensions, etc. At the end they will learn how to use the abstract theory to solve the great problems of antiquity, classical problems in number theory and other things.


Grades will be based on

- Homeworks 50%
- Midterm 20%
- Final Exam 30%

There will be regular homeworks approximately every week and a half, a midterm, and a final exam, date and time of both TBD.

Homework policy: You are encouraged to discuss the homework problems with other students in the class; however, if you do, you should mention on your homework submission the students with whom you discussed the assignment. (You do not need to mention any help you received from the TA or instructor.) You may not copy the written work of another student or allow another student to copy your written work. Doing so will get you into trouble. What you submit must be your own work. Late homeworks will not be accepted.

Disabilities: If you are a student who needs academic accommodations because of a documented disability, please contact me and present your letter of accommodation as soon as possible. If you have questions about documenting a disability or requesting academic accommodations, you should contact Beth Rodgers-Kay in Academic Services (x6-3470 or brodgers@brandeis.edu.) Letters of accommodation should be presented at the start of the semester to ensure provision of accommodations. Accommodations cannot be granted retroactively.

Academic Integrity: You are expected to follow the University’s policy on academic integrity, which is distributed annually as section 4 of the Rights and Responsibilities Handbook. Instances of alleged dishonesty will be forwarded to the Department of Student Development and Conduct for possible referral to the Student Judicial System. Potential sanctions include failure in the course and suspension from the University. If you have any questions about how these policies apply to your conduct in this course, please ask.

Four-Credit Course (with three hours of class-time per week): Success in this 4 credit hour course is based on the expectation that students will spend a minimum of 9 hours of study time per week in preparation for class (readings, papers, discussion sections, preparation for exams, etc.).