

MATH 335: INTRODUCTION TO MATHEMATICS

Course outline

COURSE GOALS

There are two main goals in this course: *competence* and *confidence*. By *competence*, I mean the ability to perform basic calculations in arithmetic, geometry and algebra successfully and efficiently. By *confidence*, I mean a few things. First, you should be able to perform those calculations comfortably. Second, you should have gained some confidence that, with time and effort, you can learn just about any mathematics. And third, you should have gained confidence in your own ability to teach mathematics.

In other words, at the end of this course, you should be better at mathematics and better at teaching it. Hopefully, you will also like it just a little bit more.

Think back to your own schooling: do you remember how easy it was to learn from teachers who liked what they taught? Conversely, do you remember how hard it was to learn from teachers who hated what they taught? The purpose of this course is to do something like unclogging a spring near the head of a river. The effect may be modest at first; but downstream, where your students drink the water, it may be transformative.

TIPS FOR SUCCESS

Put in the time and effort. Mathematics is not easy, but it is doable, and it is transparent: you learn by doing, and the more you do, the better you will get. The expectation is that you spend at least six hours per week (one hour per day, with one day off) outside the classroom on this course. No matter who you are, or what your prior abilities are, this time will pay off.

Keep up. For six days a week, schedule some time to work on math. Don't fall behind. If you are struggling with some material, make sure to seek help, either from your classmates or from me. However...

Don't be too hard on yourself. ...realize that some struggle is good and necessary. Learning mathematics, like learning anything else worthwhile, can be frustrating. Failing to get something on the first, or second, or even the third try is completely normal! Your aim should be progress, not attainment.

Work together. You are encouraged to work on all assignments together. However, you must write your solutions independently. In-class work, including some portion of the tests, will also be done in groups.

OFFICE HOURS

Office hours provide you with opportunities to ask questions about course material, other mathematics, or life in general. Office hours will take place 10:30-11:30 on Wednesdays in MATH 114. You are also welcome to book an appointment with me over email.

SCHEDULE AND ASSESSMENTS

Important information is contained in the course calendar, which is available on the Canvas course page. This is a very important document. Download a copy and display it prominently.

This course contains the following components.

Modules. There are three modules, and each module will take roughly three weeks. The structure of each module is as follows:

1. *Introduction.* Teaching mathematics is about telling stories. Each module will begin with an interactive story that introduces the main ideas of the module. This will be followed by a review of the main concepts and calculation techniques in the module.
2. *Exercises.* You will learn the main concepts and calculation techniques by completing a worksheet of exercises. These are divided into three levels. Level 1 exercises are directly related to the material covered in class. Level 2 exercises extend that material. Level 3 exercises are related, but will require extra perseverance and creativity.
3. *Skills tests.* Your grasp of the worksheet exercises will be assessed through skills tests. These will be written in two stages. The first stage, which you will do on your own, will assess the material covered in Level 1 exercises. The second stage, which you will do in groups, will assess the material covered in Level 2 exercises.
4. *Group presentation.* In each module, a group of students will be assigned to give a presentation. The presentation should be structured like the introduction to a module: an interactive story that introduces mathematical ideas. Think of this as a practice run for your own teaching. A template will be provided, and you will have the opportunity to meet with me beforehand to discuss your presentation. Topics will also be provided, though bonus marks are available if you choose a suitable original topic, or if you present the given topic in a particularly creative way.
5. *Extended topic.* At the end of each module, I will introduce an extended topic that takes the material in a completely different direction. This is meant to reveal some of the “deep” mathematics that lies beneath ‘school’ mathematics.

Solo presentations. You are responsible for building something (a physical object, a piece of music, a “bundle” of collected materials — be creative!) that can be used to teach mathematics. Toward the end of the term, you will be asked to present what you have built, and to teach a 15-minute lesson on it. You will have the opportunity to meet with me beforehand to discuss your presentation. I will also participate in this exercise.

Test on extended topics. After the modules and solo presentations have concluded, you will have the opportunity to be assessed on the three extended topics (see the module description, above). *This test has no negative consequences: your grade will be counted only if you do better on this test than on your skills tests; otherwise, it will be ignored.*

Oral exams. The term concludes with oral exams. *These are formative assessments.* Your grade will be assigned entirely on participation. The oral exams provide you the opportunity to discuss the term, your work, and your relationship with mathematics. In them, you will do some mathematics, and also present your “philosophy of teaching and learning mathematics”.

YOUR GRADE

Grade summary. Your final grade is based on module exercises (10% each), skills tests (10% each), test on extended topics (10%), your group presentation (10%), solo presentation (10%), and oral exam (10%). Participation marks will be included in the group presentation, solo presentation and oral exam grades — *being present and active is a big part of success.*

What does your grade mean? You will receive a number grade for this course. UBC assigns corresponding letter grades: A (80% or higher), B (68% to 79%), C (55% to 68%), D (50% to 54%) and F (below 50%). For this course, here is a rough description of what the grades mean.

- A. A grade of *A* means that you have mastered the core goals of this course. You have demonstrated competency and confidence, and are able to engage with unfamiliar mathematics, in both oral and written form, in an effective and creative way.
- B. A grade of *B* means that you have achieved the core goals of this course. You have demonstrated competency and confidence, but need to spend more time and effort to achieve mastery. You are able to engage with familiar mathematics, but may struggle with engaging with unfamiliar mathematics.
- C. A grade of *C* means that you have achieved at least one of the core goals of this course. You are basically competent with the mathematical concepts and techniques covered in the course, but often make computational errors, and struggle to see how the concepts and techniques fit together.
- D. A grade of *D* means that you have achieved at least one of the core goals of this course, but that you required extra support to do so. There are multiple areas where you need to shore up your competency, and you are working at a level where teaching basic mathematics will likely be difficult.
- E. A grade of *F* means that you have not achieved the core goals of this course. This grade often indicates a lack of engagement. You are encouraged to retake the course; but more importantly, to have a serious discussion with me or your academic advisor about your perception of mathematics, what went wrong in the course, where you can improve, and what steps to take before attempting to retake it.

Regardless of your grade, I encourage you to follow up with me following the course to discuss your future with mathematics. As the course will emphasize, mathematical learning is lifelong, and there are many ways to make that continuing project more productive and empowering.