

# Math 312: Linear Algebra

## Winter Semester, 2021

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v1.0 (January 11, 2021)

Course Website	<a href="http://www.math.ubc.ca/~lior/teaching/2021/312_W21/">http://www.math.ubc.ca/~lior/teaching/2021/312_W21/</a>
Contact me at	[MATX 1112 — 604-827-3031] – <a href="mailto:lior@math.ubc.ca">lior@math.ubc.ca</a>
My Website	<a href="http://www.math.ubc.ca/~lior/">http://www.math.ubc.ca/~lior/</a>
Class	MWF 9:00-9:50, on Zoom (access through Canvas)
Office Hours	MWF 11:15-12:00 and T 21:30-23:00, on Zoom.
Textbook	None required; see below.
Course Prerequisites	(one of MATH 220, MATH 226, CPSC 121) and (9 additional credits of mathematics courses)

### About the course

We will begin the study of the integers, one of the oldest parts of mathematics. Starting from ancient ideas like divisibility, primes and unique factorization we will reach modern ideas like the number-theoretic cryptography that underlies everyday communications technology. We will focus primarily on computation but work on improving our rigorous skills as well.

The material is standard; any textbook titled “introduction to number theory” or “elementary number theory” will be ok. There are several recommendations on the course website, including two sets of notes (one by the instructor and one by Freitas and Gherga).

### Teaching and learning

#### When and where

- We will meet on Zoom MWF 9:00–9:50. I am teaching another course 10:00-10:50 so we will have to end promptly. The Zoom link is accessible through Canvas. Classes will be recorded and the video made available to everyone.
- There will be office hours right after my second class, 11:15-12:00, and also on Tuesday evenings. Zoom links will be posted on Canvas, and information will also be available on the course website.
- There will be a Piazza discussion board accessible through Canvas. Use it to ask *and* answer questions about the course.

#### Learning goals

A lecture-by-lecture table of the material of will be posted to the course website. A list of learning goals is attached to the end of this document, divided into four groups: *computational skills*, *rigorous skills*, and *metamathematical skills*.

## Expectations

You can expect from me:

- To come prepared for class: knowing what we want to achieve, and how we will achieve it.
- Responses to your questions and concerns: continuously in class and during my office hours, within reasonable time on Piazza and by e-mail outside class.
- Demanding homework and examinations.
- Clear explanations of what is correct in your work and what is not, and help in improving.

You are expected:

- To be prepared for the course. You need to be comfortable with rigorous mathematics through some experience beyond MATH 220 (or its equivalent).
- To come prepared to class, having read relevant material and done problem sets.
  - Working on the problem sets is *absolutely essential* for learning the material. **It is extremely rare for students who skip problem sets to do well on exams.**
- Actively participate in the course: read ahead of class, think about the material, and ask questions.
  - Asking questions when you don't understand, or want to learn more, ensures that you get what you want out of the course. Ask me questions in class, on Piazza, by email, and during office hours. Also, ask your colleagues questions outside of class – you will both benefit from the discussion!
- To submit written work that is readable and communicates your ideas.

## Official Policies

### General policies

- **Late or missed exams and assignments will not be accepted for credit and will be given a grade of zero.** In exceptional circumstances the missed work will be registered if you finish it and hand it in when you can.
  - Registered homework will not count when the homework average is computed. The weight of a registered midterm will be transferred to the final exam.
  - If you need to miss work / have missed work please let me know as soon as possible. Sometimes this means letting me know well in advance (example: you are scheduled to represent UBC in an athletic competition later in the term), but sometimes after the fact (example: you fall and break your arm, and write to me only after you are ready to resume schoolwork).
  - In common situations (medical / conflicting responsibilities / compassionate grounds) no documentation is required for the **first request** for a concession. Instead, the student must submit the department's *Academic Concession Form*, available at [https://www.math.ubc.ca/Ugrad/ugradForm/Student\\_Declaration\\_Academic\\_Concession\\_MATH.pdf](https://www.math.ubc.ca/Ugrad/ugradForm/Student_Declaration_Academic_Concession_MATH.pdf).
  - First requests for concessions on other grounds, and subsequent requests for concessions must include documentation.
  - Full details may be found in Senate Policy 135.

- All assertions in your written work require *proof* unless the problem states otherwise. Regardless of the problem’s operative word (“find”, “solve”, “establish”, “calculate”, “determine” ...), you must rigorously justify your answer.
- Written work should be presented carefully, with sufficient detail in complete English sentences. A “correct sequence of formulas” will only merit partial credit.
- I may designate material (e.g. definitions) for self-study, in which case you are responsible for learning this material before it is used in class and in problem sets.
- You may not post homework or exam problems or *any other course material* to any website or discussion forum without coordinating with the instructor first. This includes without limitation Chegg, CourseHero, math.SE, r/math, Facebook, and the like.
  - You will be asked to pledge to not post information or consult external sources for help. This is absolutely essential: the problems are difficult, but are chosen for pedagogical reasons. Evading the difficulty harms the students who do their best without cheating.

## Assessment

- There will be six not for submission problem sets posted to the course website. These are intended for *self-study* and practice. Material from the problem sets will be examined in the midterm tests and the final exams.
- There will be five *ComPair* problem sets posted to the course website. Background on ComPair may be found here; detailed procedures for this course will be posted separately. The key learning goals for this component are your ability to write and recognize correct proofs.
  - For the sanity of the your fellow comparison-makers, homework submissions must be *typeset* (not hand-written). The instructor uses the LyX “Document processor” but any form of typesetting is acceptable. Some suggestions may be found on the course website.
  - You are encouraged to work on solving the problems together. However, each of you must write your solutions independently, in your own words. You may (and should) share your ideas but you may not share your written work. Comparisons must be done privately.
  - You may not post homework problems or other course material to any website or discussion forum, including but not limited to Chegg, CourseHero, math.SE, r/math, and the like.
  - Solutions will be posted on the secure (Canvas) website.
- There will be four in-class midterm tests and one final exam in the course.
  - If you need special accommodations when taking written exams, please contact the Centre for Accessibility.
  - If a midterm (or final) exam conflicts with a religious observance, or if you have any other legitimate conflict, please contact me *at least two weeks ahead of time* so we can make appropriate arrangements.
- You will be asked to upload your exams to Canvas in similar fashion to the homework.

## Final grade

- The final grade will be calculated as follows:

ComPair: 20%
Tests: $4 \times 15\%$
Final exam: 20%

## **UBC boilerplate**

UBC provides resources to support student learning and to maintain healthy lifestyles but recognizes that sometimes crises arise and so there are additional resources to access including those for survivors of sexual violence. UBC values respect for the person and ideas of all members of the academic community. Harassment and discrimination are not tolerated nor is suppression of academic freedom. UBC provides appropriate accommodation for students with disabilities and for religious, spiritual and cultural observances. UBC values academic honesty and students are expected to acknowledge the ideas generated by others and to uphold the highest academic standards in all of their actions. Details of the policies and how to access support are available [here](#).