

# Math 307 (Section 101) Applied Linear Algebra

2018W September-December

## INSTRUCTOR INFORMATION

---

Instructor: Ozgur Yilmaz

Email : oyilmaz-at-math.ubc.ca

Office: Math Annex 1113

Office Hours: Mon 2-3pm, Wed 2-3pm (and by appointment).

## COURSE INFORMATION

---

### Class times and location:

Day	Start Time	End Time	Building	Room
-----	------------	----------	----------	------

MWF	1:00 PM	2:00 PM	MATX	1100
-----	---------	---------	------	------

**Course web page:** [http://www.math.ubc.ca/~oyilmaz/courses/m307/m307\\_101.html](http://www.math.ubc.ca/~oyilmaz/courses/m307/m307_101.html) will be updated throughout the term.

**Pre-requisite:** One of MATH 152, MATH 221, MATH 223 and one of MATH 200, MATH 217, MATH 226, MATH 253, MATH 263.

## COURSE OUTLINE

---

This course is organized around a collection of interesting applications. Examples from past years are:

Interpolation

Finite difference approximations

Formula matrix of a chemical system

Least Squares

Fourier series

Graphs and Networks

Fourier series, DFT, and FFT

JPEG compression

Power method

Recursion relations

The Anderson tight binding model

Markov chains

Google PageRank

We will study a selection of these in this class. Each application will be preceded by discussion of the relevant concepts from Linear Algebra. These will be partly review from your previous linear algebra course and partly new material. You will also learn how to do Linear Algebra on a computer using MATLAB or Octave.

**Learning Goals:** For a detailed list of prerequisites and learning goals of Math 307, see:

<http://www.math.ubc.ca/%7Eoyilmaz/courses/m307/notes/learninggoals.pdf>

**Text:** There is no required textbook for this course. Instead there is a set of typed notes designed for this course.

**Computational aspects:** To complete the work for this course, you will need access to MATLAB software. MATLAB is a widely used program for numerical computations with matrices. Since September 2016, **MATLAB is available to all active UBC students at no cost.** For instructions on how to download and activate MATLAB, see:

<https://it.ubc.ca/services/desktop-print-services/software-licensing/matlab#getMATLAB>.

You can also access MATLAB in the math department computer labs. These are located in LSK 310. The lab hours are posted. You may use any free terminal in the labs during these times. Your username and password will be given out in class. Please contact me if you have difficulty logging in. If you prefer, you may also use GNU Octave instead of MATLAB, which is an open source MATLAB clone that is available for free. It is included in most Linux distributions. Windows and Mac versions are available for free download. However, the professor will only be able to answer questions regarding MATLAB.

## Grades

---

**Homework:** There will be weekly written homework assignments. These assignments will be posted.

**Quizzes:** There will be 4 quizzes over the term: Sep 19, Oct 3, Nov 7, and Nov 23.

**Late homework** will not be accepted. However, your lowest (written) homework score will be dropped (so you can miss one homework if necessary). Nevertheless, even if you miss a deadline, it's a good idea to do the problems, since this is the best way to prepare for the tests and exam. You are welcome to discuss the homework problems with your friends, but you are expected to hand in your own work.

There will one **midterm** exam on **Friday, October 19** in class. Note that the final exam date is currently

unavailable, but will be released during the term. Do not make end-of-term travel plans until this date has been fixed.

You will not be permitted to bring calculators to the test and exam.

**Missing a homework, quiz, or midterm** normally results in a mark of 0. Exceptions may be granted in two cases: prior consent of the instructor or a medical emergency. In the latter case, the instructor must be notified within 48 hours of the missed test, and presented with a doctor's note immediately upon the student's return to UBC. Failure to comply results in a 0 mark. If a midterm was missed for legitimate reasons, the weight of the missed midterm will be transferred to the final. Make-up midterms will, in general, not be provided.

**Your grade** for the course will be computed roughly as follows:

Homework: 10%

Quizzes: 10%

Midterm: 30%

Final exam: 50%

## Resources

---

- **Piazza:** You may find Piazza a useful resource for all class-related questions and discussion. Piazza is a question-and-answer platform specifically designed to expedite answers to your questions, using the collective knowledge of your classmates and instructor. It has several features that facilitate discussion of mathematics, most notably support of mathematical typesetting (LaTeX). You are encouraged to answer your classmates' questions, or to brainstorm towards answers, every bit as much as you are encouraged to ask questions. Here are the links:
  - [Piazza Signup link](#).
  - [Piazza Class link](#).

You will need a UBC email address to sign up for Piazza.

- **Math Learning Center:** The Math Learning Centre (MLC) is a space for undergraduate students to study math together, with support from math tutors, who are graduate students in the math department. Please note that while students are encouraged to seek help with homework, the MLC is not a place to check answers or receive solutions, rather, its aim is aid students in becoming expert learners; to develop critical thinking and skills in a mathematical setting.

If you need help, or would like to discuss any aspect of this course, please make an appointment to see me in my office.