Math 307 (Section 103) Applied Linear Algebra

INSTRUCTOR INFORMATION

Instructor: Elina Robeva
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Office: ESB 4128
Office Hours: Th 11-12pm or by appointment.

COURSE INFORMATION

Section 103

Class times and location:

Day	Start Time	End Time	Building	Room
TTh	8:00 AM	9:30 AM	MATX	1100

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
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: See here for a detailed list of prerequisites and learning goals of Math 307.

Text: There is no required textbook for this course. Instead there is a set of typed notes designed for this course, which is available here:

Chapter 1 : Linear Equations
Chapter 2 : Subspaces, bases, and dimension
Chapter 3 : Orthogonality
Chapter 4 : Eigenvalues and Eigenvectors

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 labs hours are posted here. 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 below.

Quizzes: There will be 4 quizzes over the term: Sep 19, Oct 3, Nov 7, and Nov 21.

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, its 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 be one **midterm** exam on **Friday, October 18 6:30pm-7:30pm in MATH 100 (Section 103).** 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.

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

Homework: 10%
Quizzes: 10%

Midterm: 30%
Final exam: 50%

Missing a homework, quiz, or midterm:

If you miss an assesment (homework, quiz, or midterm) for a valid reason -- see UBC Vancouver Senate's Academic Concession Policy V-135, please fill out an academic request form and bring it to me. In this case, for a missed homework, the weight will be transferred onto the remaining homework assignment. For a missed quiz, the weight will be transferred to the remaining quizzes, If you miss the midterm, the weight will be transferred onto the final exam. **Note that in accordance with UBC policy for academic concessions, this form may be used ONCE per course. On a second instance, students will be expected to provide documentation.**

Any student who misses an assessment is to present to their instructor a self-declaration form (or relevant documentation if this is not the first time they miss an assessment) within 72 hours of the assessment date or their mark in the missed assesment will be 0. This policy conforms with the UBC Vancouver Senate's Academic Concession Policy V-135 and students are advised to read this policy carefully.

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 is the 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.

FINAL EXAM INFORMATION

The final exam will be on Saturday, December 7, 8:30AM in CIRS 1250.

It will cover the following sections:

Chapter 1: everything except for I.2.4 and I.2.5
Chapter 2: all of II.1; all of II.2 except II.2.3; all of II.3
Chapter 3: all of III.1 except for III.1.5; all of III.2; all of III.3
Chapter 4: all of IV.1 except IV.1.10, IV.2.1-4 (to the extent to which it was covered in class), all of IV.3, IV.4, IV.6.1-2.

Also, check out this link to UBC Wiki for some more past exams (possibly with solutions).

Calendar

Thursday, Sep 5	First lecture
Thursday, Sep 19	Quiz 1
Thursday, Oct 3	Quiz 2
Monday, Oct 14	Thanksgiving Day -- university closed.
Friday, Oct 18	**Midterm (6:30PM in MATH 100)**
Thursday, Nov 7	Quiz 3
Monday, Nov 11	Remembrance Day -- university closed.
Thursday, Nov 21	Quiz 4
Friday, Nov 29	Last day of classes
Tuesday, Dec 3	Examinations begin...
Saturday, Dec 7	**Final exam (8:30AM in CIRS 1250)**