



**Math 340, Elementary Matrix and linear Algebra**  
**Number of Credits:** 3 credits

**Course URL:** <http://www.math.wisc.edu/~maxim/340F20.html>

**Canvas page:** <https://canvas.wisc.edu/courses/212498>

**Piazza Class Signup Link:** [piazza.com/wisc/fall2020/math340001math340003](https://piazza.com/wisc/fall2020/math340001math340003)

**Course Designation or Attributes**

Breadth – Natural Science

Level – Advanced

L&S Credit – Counts as Liberal Arts and Science credit in L&S

**Meeting Time and Location**

LEC 001: MoWeFr 1:20PM - 2:10PM

LEC 003: MoWeFr 11:00AM – 11:50AM

**Instructional Mode:** ONLINE, asynchronous

**Credit hours**

The three credit hours are met by three 50-minute meetings, one 50-minute discussion, and a minimum of four hours of out of class student work per week, for the entire semester.

**INSTRUCTOR**

Laurentiu Maxim, Professor

**Office hours and location:** Fr, ONLINE, during regular class time.

**Email:** maxim@math.wisc.edu

**OFFICIAL COURSE DESCRIPTION**

Matrix algebra, linear systems of equations, vector spaces, sub-spaces, linear dependence, rank of matrices, determinants, linear transformations, eigenvalues and eigenvectors, diagonalization, inner products and orthogonal vectors, symmetric matrices. Prospective math majors should instead consider MATH 341 for a proof based introductory linear algebra course.

**REQUISITES**

Math 222. Not open to students with credit for MATH 341 or 375.

**LECTURING, PROBLEM SESSIONS, OFFICE HOURS**

The first lecture (Wed, Sept 2) will meet online at the scheduled time: it will be an introductory lecture, in which I will discuss the course policies. Subsequent lecture times will be used for live problem-solving sessions and office hours.

**Recorded lectures** presenting theoretical aspects of the course will be posted online (on Canvas) a few hours before your regular class time, 3 times a week.

**Live problem-solving sessions** will be held every Wed during regular class time. To participate in the live problem-solving sessions, you'll need to watch the posted video lectures for the *previous* week and to read the respective sections from your textbook.

**Office hours** will be held online each Friday during regular class time.

## TEACHING ASSISTANTS

**Yida Ding** (DIS 301, 303, 304), [yding54@wisc.edu](mailto:yding54@wisc.edu)

office hours: Mo, Tue 12-1PM

**Jiwoong Jang** (DIS 302, 305, 306), [jjang57@wisc.edu](mailto:jjang57@wisc.edu)

office hours: Wed 2:30-5PM

**Di Chen** (DIS 331, 335, 336), [dchen263@wisc.edu](mailto:dchen263@wisc.edu)

office hours: Mo 9:50-11:50AM and by appointment

**Asvin Gothandaraman** (DIS 332, 333, 334), [gothandarama@wisc.edu](mailto:gothandarama@wisc.edu)

office hours: Thu 9-11AM

## LEARNING OUTCOMES

At the end of this course students should be able to:

- **Matrix Algebra**: Perform matrix addition, subtraction and multiplication and elementary row operations; solve linear systems of equations using row reduced echelon form of a matrix and invertible matrices; find the inverse of a matrix using row operations and understand properties of invertible matrices.
- **Determinants**: Find the determinant of a matrix using the definition, the properties of determinants and cofactor expansion; understand the relationship between the determinant and the invertibility of a matrix; and solve a system of linear equations using determinants.
- **Real Vector Spaces**: Understand the algebraic structure of a vector space over the real numbers and its subspaces and the span of a set of vectors; linear independence and linear dependence of vectors; find the basis and dimension of a finite dimensional vector space; find the null space, the nullity, the column space and the rank of a matrix; understand coordinates, isomorphisms and change of bases and compute transition matrices.
- **Linear Transformations**: Understand the definition and the properties of a linear transformation between two vector spaces; find the kernel and the range of a linear transformation and the relation between their dimensions; find the matrix of a linear transformation .
- **Eigenvalues and Eigenvectors**: Find eigenvalues and eigenvectors of a linear operator and of a square matrix; diagonalize a linear operator and a square matrix.

- *Inner Product Spaces*: Find the inner product of vectors and the angle between two vectors in an inner product space; and find an orthonormal basis for a finite dimensional inner product space using Gram-Schmidt process.

## TEXTBOOK

[\*Elementary Linear Algebra with Applications \(9th Edition\)\*](#), by B. Kolman and D. Hill.  
 Publisher: Pearson; ISBN: 9780132296540.

## APPROXIMATE COURSE SCHEDULE (by week)

1. Sections 1.1 – 1.3
2. Sections 1.4 – 1.6
3. Sections 2.1 – 2.2
4. Sections 2.3 – 2.4
5. Sections 3.1 – 3.3
6. Sections 3.4 – 3.5
7. Sections 4.1 – 4.3
8. Sections 4.4 – 4.6
9. Sections 4.7 – 4.9
10. Sections 5.1 – 5.3
11. Sections 5.4 – 5.5
12. Sections 6.1 – 6.3
13. Sections 6.4 – 6.5
14. Sections 7.1 – 7.3
15. Final review

## GRADING

The course grade is based on quizzes, 2 midterm exams and 1 final exam.

- Quizzes                      25%
- Midterm I                    25%
- Midterm II                  25%
- Final Exam                 25%

There will be 6 quizzes, 30-minute each. The worst quiz will be dropped, the remaining 5 quizzes will count 5% each towards your quiz grade.

## GRADE CUTOFFS

≥92 A	≥88 AB
≥80 B	≥74 BC
≥62 C	≥50 D

I reserve the right to lower the cutoffs listed above, to benefit your grade (but I will not raise the cutoffs). The historical average GPA for the course is around 2.85. If necessary, I will adjust the cutoffs at the end of the semester so that the class average is not lower than a 2.75.

## **EXAMS. QUIZZES**

The dates for Midterm I and II are Wednesday October 7 and Wednesday November 11. The midterms will be given over a time window using *Honorlock*. The final exam is scheduled on Friday, December 18, 10:05AM – 12:05PM, using *Honorlock*.

Use of phones, calculators or other inspirational resources will not be allowed during exams.

If you are eligible for special consideration on exams, please let me know as soon as possible, so that I can ensure that your needs are accommodated.

Make-up midterm exams will be considered only if there is a conflict with another university-related event (in which case you need to contact me as soon as possible), or a last-minute medical/family emergency (you need to show proof of such emergency, e.g., doctor's notes).

Quizzes will be given during the weeks 2, 4, 7, 10, 12, 14. Quizzes will be given on **Thursdays**, over a time window, and they will be proctored by Honorlock.

## **HOMEWORK & OTHER ASSIGNMENTS**

Homework will be assigned weekly, and it will be posted on Canvas and at the url: <http://www.math.wisc.edu/~maxim/340F20.html>

Homework will not be collected or graded. However, the quizzes in discussion and the exams will be based on these assignments, so completing the assignments is essential for learning the class material.

## **PIAZZA**

This term we will be using Piazza for class discussion. The system is highly catered to getting you help fast and efficiently from classmates, the TAs, and myself. Rather than emailing questions to the teaching staff, I encourage you to post your questions on Piazza. If you have any problems or feedback for the developers, email [team@piazza.com](mailto:team@piazza.com).

Find our class signup link at: <https://piazza.com/wisc/fall2020/math340001math340003>

## **EXAM PROCTORING WITH HONORLOCK**

Honorlock will proctor your exams and quizzes this semester. Honorlock is an online proctoring service that allows you to take your exam from the comfort of your home. You DO NOT need to create an account, download software or schedule an appointment in advance. Honorlock is available 24/7, and all that is needed is a computer, a working webcam/microphone, your ID, and a stable internet connection.

To get started, you will need Google Chrome and download the [Honorlock Chrome Extension](#). When you are ready to complete your assessment, log into Canvas, go to your course, and click on your exam. Clicking "Launch Proctoring" will begin the Honorlock authentication process, where you will take a picture of yourself, show your ID, and complete a scan of your room. Honorlock will be recording your exam session through your webcam, microphone, and recording your screen. Honorlock also has an integrity algorithm that can detect search-engine use, so please do not attempt to search for answers, even if it's on a secondary device.

Honorlock support is available 24/7/365. If you encounter any issues, you may contact them through live chat on the [support page](#) or within the exam itself. Some guides you should review are [Honorlock MSRs](#), [Student FAQ](#), [Honorlock Knowledge Base](#), and [How to Use Honorlock](#).

**Failure to use the proctoring service will result in a zero score on the respective exam/quiz.**

## **HONORLOCK – DIGITAL PRIVACY STATEMENT**

The privacy and security of faculty, staff and students' personal information is a top priority for UW-Madison. The university carefully reviews and vets all campus-supported teaching and learning tools, including proctoring tools and takes necessary steps to ensure that tool providers prioritize proper handling of sensitive data in alignment with FERPA, industry standards and best practices.

Under the Family Educational Rights and Privacy Act (FERPA – which protects the privacy of student education records), student consent is not required for the university to share with Honorlock those student education records necessary for carrying out the proctoring service. 34 CFR 99.31(a)(1)(i)(B). FERPA specifically allows universities to treat vendors as school officials and to share student education records with them where they perform services for the university and are subject to FERPA requirements governing the use and redisclosure of personally identifiable information from education records. Honorlock is FERPA compliant and is bound by the terms of its agreement with the university to comply with FERPA's restrictions on the use of student education records.

## **PRIVACY OF STUDENT RECORDS and USAGE of AUDIO RECORDED LECTURES**

See information about [privacy of student records and the usage of audio-recorded lectures](#).

### ***Usage of Audio Recorded Lectures Statement***

Lecture materials and recordings for MATH 340 are protected intellectual property at UW-Madison. Students in this course may use the materials and recordings for their personal use related to participation in this class. Students may also take notes solely for their personal use. If a lecture is not already recorded, you are not authorized to record my lectures without my permission unless you are considered by the university to be a qualified student with a disability requiring accommodation. [Regent Policy Document 4-1] Students may not copy or share lecture materials and recordings outside of class, including posting on internet sites or selling commercial entities. Students are also prohibited from providing or selling their personal notes to anyone else or being paid for taking notes by any person or commercial firm without the instructor's express written permission. Unauthorized use of these copyrighted lecture materials and recordings constitutes copyright infringement and may be addressed under the university's policies, UWS Chapters 14 and 17, governing student academic and non-academic misconduct.

## **STUDENT'S RULES, RIGHTS & RESPONSIBILITIES**

- See the Guide's to [Rules, Rights and Responsibilities](#).

During the global COVID-10 pandemic, we must prioritize our collective health and safety to keep ourselves, our campus, and our community safe. As a university community, we must work together to prevent the spread of the virus and to promote the collective health and welfare

of our campus and surrounding community. Please consult the [UW-Madison Badger Pledge](#) and the [UW-Madison Face Covering Guidelines](#).

### **QUARANTINE OR ISOLATION DUE TO COVID-19**

Student should continually monitor themselves for COVID-19 [symptoms](#) and get [tested](#) for the virus if they have symptoms or have been in close contact with someone with COVID-19. Student should reach out to instructors as soon as possible if they become ill or need to isolate or quarantine, in order to make alternate plans for how to proceed with the course. Students are strongly encouraged to communicate with their instructor concerning their illness and the anticipated extent of their absence from the course (either in-person or remote). The instructor will work with the student to provide alternative ways to complete the course work.

### **COURSE EVALUATIONS**

UW-Madison uses an online course evaluation survey tool, [AEFIS](#). In most instances, you will receive an official email two weeks prior to the end of the semester when your course evaluation is available. You will receive a link to log into the course evaluation with your NetID where you can complete the evaluation and submit it, anonymously. Your participation is an integral component of this course, and your feedback is important to me. I strongly encourage you to participate in the course evaluation.

### **ACADEMIC CALENDAR & RELIGIOUS OBSERVANCES**

- See: <https://secfac.wisc.edu/academic-calendar/#religious-observances>

### **ACADEMIC INTEGRITY**

By enrolling in this course, each student assumes the responsibilities of an active participant in UW-Madison's community of scholars in which everyone's academic work and behavior are held to the highest academic integrity standards. Academic misconduct compromises the integrity of the university. Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these acts are examples of academic misconduct, which can result in disciplinary action. This includes but is not limited to failure on the assignment/course, disciplinary probation, or suspension. Substantial or repeated cases of misconduct will be forwarded to the Office of Student Conduct & Community Standards for additional review. For more information, refer to <https://conduct.students.wisc.edu/academic-integrity/>.

### **ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES**

**McBurney Disability Resource Center syllabus statement:** "The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (Faculty Document 1071) require that students with disabilities be reasonably accommodated in instruction and campus life. Reasonable accommodations for students with disabilities is a shared faculty and student responsibility. Students are expected to inform faculty [me] of their need for instructional accommodations by the end of the third week of the semester, or as soon as possible after a disability has been incurred or recognized. Faculty [],

will work either directly with the student [you] or in coordination with the McBurney Center to identify and provide reasonable instructional accommodations. Disability information, including instructional accommodations as part of a student's educational record, is confidential and protected under FERPA." <http://mcburney.wisc.edu/facstaffother/faculty/syllabus.php>

## **DIVERSITY & INCLUSION**

**Institutional statement on diversity:** "Diversity is a source of strength, creativity, and innovation for UW-Madison. We value the contributions of each person and respect the profound ways their identity, culture, background, experience, status, abilities, and opinion enrich the university community. We commit ourselves to the pursuit of excellence in teaching, research, outreach, and diversity as inextricably linked goals.

The University of Wisconsin-Madison fulfills its public mission by creating a welcoming and inclusive community for people from every background – people who as students, faculty, and staff serve Wisconsin and the world." <https://diversity.wisc.edu/>