

**The University of Iowa
The College of Liberal Arts and Sciences
Spring 2024**

Title of Course: MATH 2550:0091 Engineering Math III: Matrix Algebra

Course meeting time and place:

Lecture: 9:30A – 10:20A MW, 213 MLH

Department of Mathematics: <https://math.uiowa.edu/>

Course ICON site: To access the course site, log into [Iowa Courses Online \(ICON\)](https://icon.uiowa.edu/index.shtml) <https://icon.uiowa.edu/index.shtml> using your Hawk ID and password.

Course Home

The College of Liberal Arts and Sciences (CLAS) is the home of this course, and CLAS governs the add and drop deadlines, the “second-grade only” option (SGO), academic misconduct policies, and other undergraduate policies and procedures. Other UI colleges may have different policies.

Instructor: Rodica Curtu

Office location: **225F MLH**

Office hours:

**Mon 10:30-11:20 AM, Mon 12:30-1:20 PM, Wed 10:30 – 11:20 AM in 225F MLH
or by appointment.**

Phone: **(319) 335-0744**, E-mail: rodica-curtu@uiowa.edu

TA: None.

Course Coordinator: Raúl Curto, raul-curto@uiowa.edu ; 225H MLH, 467-0303

DEO: Professor Ryan Kinser, ryan-kinser@uiowa.edu , 14 MLH

Description of Course

Applications, computers for matrix calculations; matrix, vector arithmetic; linear independence, basis, subspace (in R^2 , R^3); systems of equations, matrix reduction; rank, dimension; determinants, applications; eigenvalues, eigenvectors; diagonalization, principal axis theorem.

This course is an abbreviated version of MATH:2700. Here, the emphasis is placed on matrices rather than on both linear transformations and matrices. Particular topics include operations on matrices, the use of matrices in solving systems of linear equations and evaluating determinants, eigenvalues and eigenvectors, the diagonalization of matrices and an introduction to subspaces of Euclidean space. Grades are based on homework, midterms, and a final exam. Although the course is

part of the engineering mathematics sequence, it is not restricted to engineering students. The course is taught by faculty.

Learning Objectives

The objectives of a student taking MATH:2550 are to gain an understanding of basic concepts and techniques of linear algebra and computation with matrices appropriate to an engineering curriculum.

The use of matrices in modeling is ubiquitous in the sciences and engineering. An understanding of the fundamental concepts and techniques of linear algebra involving vectors and matrices is essential to success in engineering. MATH:2550 is a linear algebra course that has been streamlined by placing less emphasis on linear transformations and more emphasis on matrices and matrix calculations. MATH:2550 begins with the study of systems of linear equations and techniques for solving them using matrix row and column operations. Following this, students will learn basic algebra and arithmetic operations of matrices, including matrix multiplication, inverses, and the determinant function. Determinants lead to the next topic, eigenvalues and eigenvectors, which are very important in a variety of ways for engineers. The course finishes with the topic of geometry and orthogonality in vector spaces, including a discussion of quadratic forms and symmetric matrices.

Textbook/Materials

Linear Algebra & Its Applications by Lay, Lay, and McDonald, 6th Edition with MyLab

We will be teaching this class with electronic content. Your course material is available on your ICON course site; this is called ICON DIRECT. Please read the additional files on ICON.

Material to be covered.

Chapter 1. Linear Equations in Linear Algebra: Systems of Linear Equations, Row Reduction and Echelon Forms, Vector Equations, The Matrix Equation $Ax = b$, Solution Sets of Linear Systems, Linear Independence

Chapter 2. Matrix Algebra: Matrix Operations, The Inverse of a Matrix, Characterizations of Invertible Matrices, Matrix Factorizations, Subspaces of R^n , Dimension and Rank

Chapter 3. Determinants: Introduction to Determinants, Properties of Determinants, Cramer's Rule, Volume and Linear Transformations

Chapter 5. Eigenvalues and Eigenvectors: Eigenvectors and Eigenvalues, The Characteristic Equation, Diagonalization, Eigenvectors, and Linear Transformations

Chapter 6. Orthogonality and Least Squares: Inner Product, Length, and Orthogonality, Orthogonal Sets, Orthogonal Projections, The Gram–Schmidt Process

Chapter 7. Symmetric Matrices and Quadratic Forms: Diagonalization of Symmetric Matrices, Quadratic Forms

TENTATIVE TIMETABLE (Subject to change, and all changes will be announced in class, posted on the course webpage, or e-mailed to your UI e-mail.)

Week 1: 1.1, 1.2

Week 2: 1.3, 1.4

Week 3: 1.5

Week 4: 1.7, 2.1

Week 5: 2.2, 2.3,

Week 6: 2.8, Review

Exam 1 (Wed of Week 6)

Week 7: 2.9, 3.1

Week 8: 3.2, 3.3

Week 9: 5.1

Week 10: 5.2, 5.3

Week 11: 5.3, Review

Exam 2 (Wed of Week 11)

Week 12: 6.1, 6.2

Week 13: 6.3, 6.4

Week 14: 7.1, 7.2

Week 15: 7.2, Review

Academic Honesty and Misconduct

All students in CLAS courses are expected to abide by the [CLAS Code of Academic Honesty](#).

Student Complaints

Students with a complaint about a grade or a related matter should first discuss the situation with the instructor and/or the course supervisor (if applicable), and finally with the Director or Chair of the school, department, or program offering the course.

Undergraduate students should contact [CLAS Undergraduate Programs](#) for support when the matter is not resolved at the previous level. Graduate students should contact the CLAS [Associate Dean for Graduate Education and Outreach and Engagement](#) when additional support is needed.

Drop Deadline for this Course

You may drop an individual course before the deadline; after this deadline you will need collegiate approval. You can look up the [drop deadline for this course](#) here. When you drop a course, a “W” will appear on your transcript. The mark of “W” is a neutral mark that does not affect your GPA. Directions for adding or dropping a course and other registration changes can be found on the [Registrar’s website](#). Undergraduate students can find policies on dropping and withdrawing [here](#).

Grading System and the Use of +/-

With **criterion-reference grading**, students receive grades based on the quality of their work in relation to the criteria defined by the instructor and by the rubrics or models specifying the qualities of each grade. The cut scores (e.g. 90 for A-) will never go up, but they may go down for some exams, and each exam will be treated separately. We will start with:

Final grades will be awarded based on the following ranges:

A	B	C	D	F
A+ 97-100	B+ 87-90	C+ 76-79	D+ 61-64	F < 50
A 93-96	B 83-86	C 71-75	D 56-60	
A- 90-92	B- 80-82	C- 65-70	D- 50-55	

Grading System: Plus/minus grading will be used.

50% 2 Evening midterms (see below; the room you need to go to will be announced later)

30% Final exam (date, time and place to be announced)

10% About 6 Online Quizzes, assigned on about every other week. The Quiz with the lowest score will be dropped.

10% About 12 Online Homework, assigned weekly, and usually due Wednesday at 4:00 pm. The two lowest scores will be dropped.

Attendance and class participation are strongly recommended.

All exams are comprehensive unless specified otherwise.

Midterm Exams

Start and end times: 6:30PM - 8:30PM 02/21/2024 Wed, location TBD

Start and end times: 6:30PM - 8:30PM 04/03/2024 Wed, location TBD

Date and Time of the Final Exam

The final examination date and time will be announced by the Registrar generally by the fifth week of classes and it will be announced on the course ICON site once it is known. **Do not plan your end of the semester travel plans until the final exam schedule is made public. It is your responsibility to know the date, time, and place of the final exam.** According to the Registrar's final exam policy, students **have a maximum of two weeks after the announced final exam schedule** to request a change if an exam conflict exists or if a student has more than two exams in one day (see the [policy](#) here).

Attendance and Absences

University regulations require that students be allowed to make up examinations which have been missed due to illness or other unavoidable circumstances. Students with mandatory religious obligations or UI-authorized activities must discuss their absences with me as soon as possible. Religious obligations must be communicated within the first three weeks of classes.

Communication: UI Email

Students are responsible for all official correspondences sent to their UI email address (uiowa.edu) and must use this address for any communication with instructors or staff in the UI community. For the privacy and the protection of student records, UI faculty and staff can only correspond with UI email addresses.

Calculator Use: The use of a calculator or any other electronic device in the midterms and final exam is not allowed. When you are doing your HW (to prepare you for your exams), keep in mind that you will not have a calculator in the exams.

Student Collaboration: Student collaboration is NOT permitted on the quizzes, midterms, and final exam. Any attempt to collaborate during these exams will result in a score of 0 on that test.

Late Homework will not be accepted; however, the two lowest scores will be dropped.

Students are encouraged to be mindful of their mental health and seek help as a preventive measure or if feeling overwhelmed and/or struggling to meet course expectations. Students are encouraged to talk to their instructor for assistance with specific class-related concerns. For additional support and counseling, students are encouraged to contact University Counseling Service (UCS). Information about UCS, including resources and how to schedule an appointment, can be found at counseling.uiowa.edu. Find out more about UI mental health services at mentalhealth.uiowa.edu.

Student Care and Assistance provides assistance to University of Iowa students who are experiencing a variety of crisis and emergency situations, including but not limited to medical issues, family emergencies, unexpected challenges, and sourcing basic needs such as food and shelter. More information on the resources related to basic needs can be found at basicneeds.uiowa.edu/resources/. Students are encouraged to contact Student Care & Assistance in the Office of the Dean of Students (Room 135 IMU, dos-assistance@uiowa.edu, or 319-335-1162) for support and assistance with resources.

Accommodations for Students with Disabilities

The University is committed to providing an educational experience that is accessible to all. If a student has a diagnosed disability or other disabling condition that may impact the student's ability to complete the course requirements as stated in the syllabus, the student may seek accommodations through [Student Disability Services](#) (SDS). SDS is responsible for making Letters of Accommodation (LOA) available. The student must provide an LOA to the instructor as early in the semester as possible, but requests not made at least two weeks prior to the scheduled activity for which an accommodation is sought may not be accommodated. The LOA will specify what reasonable course accommodations the student is eligible for and those the instructor should provide. Additional information can be found on the [SDS website](#).

University Policies[Classroom Expectations](#)[Free Speech and Expression](#)[Non-discrimination](#)[Absences for Religious Holy Days](#)[Sexual Harassment/Misconduct and Supportive Measures](#)[Sharing of Class Recordings](#)