MATH 303-01: ADVANCED LINEAR ALGEBRA (3 cr.)

SYLLABUS & COURSE POLICIES

DORDT UNIVERSITY

SPRING 2024

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Instructor:	Dr. Mike Janssen, Professor of Mathematics
Email:	`Mike.Janssen@dordt.edu`; I will endeavor to reply to every email within one school day.
Classroom:	CL 92
Class time:	8:00–8:50 AM MWF
Office:	SB 1612
Office Phone:	(712) 722-6398
Student Hours:	By appointment: `https://fantastical.app/mkjanssen/student-hours`
Required Resources:	Access to *An Inquiry-Based Introduction to Linear Algebra and Applications*, by Alayont and Schlicker Edfinity access code

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Catalog course description: An advanced study of vector spaces including matrices, linear transformations, orthogonality, the singular value decomposition, and applications. Prerequisite: Mathematics 203; or permission of instructor.

LEARNING OBJECTIVES

In this course, we will focus on becoming EXPLORERS and CONNECTORS of mathematics. In particular, we will:

plumb the depths of the theory of vector spaces (bases, orthogonality, diagonalization, inner product spaces, etc.) by building on the introductory content from Math 203. Students will solve problems requiring an understanding of this theory as well as mathematical reasoning. (CS, CD, CR)

employ the theory of orthogonality and diagonalization to model and solve problems requiring the methods of least squares and singular value decomposition. (CD)

connect the methods of linear algebra with "real world" problems in various contexts e.g., image processing. (CR)

TENTATIVE SCHEDULE

The schedule in Table 1 may be modified based on progress, student interest, etc. Any modifications will be communicated ahead of time in class and posted to Canvas.

Topic	Sections	Dates
Intro and Diagonalization	16–21	Jan 12–Jan 29
Vector Spaces	22–26	Jan 31–March 1
Inner Product Spaces	27–30	March 13–April 10
Orthogonality	31–34	April 12–May 3

Table 1: Tentative semester schedule.

COURSE LITURGIES

The best way to learn mathematics is to *do* mathematics. This course was designed with that philosophy in mind.

BEFORE CLASS: PREVIEW ACTIVITIES

Prior to most classes, one or more **preview activities** will be assigned. These will be discussed early in the next class to help set up new material. Volunteers will be solicited to share their thinking. You should plan to play an active role in this process.

DURING CLASS: LECTURE AND EXPLORATION

Class time will be a mix of lecture and hands-on small-group exploration of the in-class activities. The activities are intended to both introduce new material as well as push the limits of your understanding. It is expected that you will be actively engaged in attempting the activities, even if you aren't quite sure what to do! Please ask your classmates, me, etc. I will never ask you to do something I haven't already done, nor anything that I think is a waste of your time.

ASSESSMENT

Several types of work will guide your learning in this class and be used to determine your final grade.

HOMEWORK

Homework will be completed on Edfinity, and will be due according to the schedule on Canvas. Each homework assignment covers one of the textbook sections. You will typically have at least one week to complete each assignment, though be aware that multiple assignments may be due in a given week.

LABS

You will also be assigned regular labs in the form of the end-of-section projects. Tentative due dates for labs are **Feb. 2; Mar. 2; Apr. 5; May 3**.

QUIZZES

Each week will conclude with a short quiz over the notes and activities from the past few days. These questions will largely be conceptual in nature.

EXAMS

There will be two exams in this course: a midterm exam, given in class on February 28, and a cumulative final exam, which is scheduled for **8:00am on Thursday, May 9**.

PROJECT

A substantial project will be assigned, with the goal of exploring key course ideas in more depth than is possible in other forms of assessment. The project will be due on the last day of class, and may include a presentation component. More details will be available on Canvas.

NOTE ON THE USE OF GENERATIVE AI

ChatGPT, and other generative AI models, is a useful tool for facilitating thinking. In this class, you *may* use these models to generate code to perform calculations, but any other uses of this technology without explicit permission constitutes plagiarism and will be reported to the Student Life Committee.

GRADING POLICY

Course assignments will be weighted as shown in Table 2.

Activity	Weight
Homework	30%
Quizzes	10%
Labs/Project	25%
Midterm	15%
Final	20%

Table 2: Assignment weights.

Your final percentage, G, will be assigned a letter grade as shown in Table 3.

Grade	Interval
A	$95\% \leqslant G \leqslant 100\%$
A–	$90\% \leqslant G < 95\%$
B+	$87\% \leqslant G < 90\%$
B	$83\% \leqslant G < 87\%$
B–	$80\% \leqslant G < 83\%$
C+	$77\% \leqslant G < 80\%$
C	$73\% \leqslant G < 77\%$
C–	$70\% \leqslant G < 73\%$
D+	$67\% \leqslant G < 70\%$
D	$60\% \leqslant G < 67\%$

Table 3: Final grade cutoffs.

OTHER POLICIES AND ADVICE

I am generally fairly accepting of late work, with a built-in 24-hour grace period for any non-classroom activities. Additional time beyond the 24-hour grace period *must* be approved ahead of time, and is not guaranteed. Any assignments submitted after the 24-hour grace period may earn no credit.

Student hours are your time to ask questions about all aspects of the class and college life. Please check online for an appointment. If you can't find one, send me an email! I will do my very best to accommodate your you.

Email Policy: I check my email twice per school day: once in the morning, where I'll deal with any emergencies, and once in the afternoon, when I'll respond to other emails (including any that have come in since the morning). If you require a more immediate response, you're welcome to come find me in my office.

INSTITUTIONAL POLICIES

DORDT UNIVERSITY STUDENT'S RIGHT TO ACCOMODATIONS POLICY

Dordt University is committed to providing reasonable accommodations for students with documented qualifying disabilities in accordance with federal laws and university policy. Any student who needs access to accommodations based on the impact of a documented disability should contact the Coordinator for Service for Students with Disabilities: Sharon Rosenboom, Academic Enrichment Center, 712-722-6490, Email: Sharon.Rosenboom@dordt.edu.

DORDT UNIVERSITY ACADEMIC HONESTY POLICY

Dordt University is committed to developing a community of Christian scholars where all members accept the responsibility of practicing personal and academic integrity in obedience to biblical teaching. For students, this means not lying, cheating, or stealing others' work to gain academic advantage; it also means opposing academic dishonesty.

Students found to be academically dishonest will receive academic sanctions from their professor (from a failing grade on the particular academic task to a failing grade in the course) and will be reported to the Student Life Committee for possible institutional sanctions (from a warning to dismissal from the university). Appeals in such matters will be handled by the student disciplinary process. For more information, see the Student Handbook section concerning Academic Integrity.

DORDT UNIVERSITY ATTENDANCE POLICY

Class attendance policies and procedures as outlined in the Student Handbook are in place. To paraphrase the Student Handbook, Dordt University as an institution remains committed to in person instruction for face-to-face courses. As a result, you are expected to be present for every class period and laboratory period. Should you need to miss class for any reason, contact your instructor as soon as possible (either prior to the absence or immediately following). If the absence is the result of a documented disability, academic accommodations will be handled by the Coordinator for Service for Students with Disabilities. Absences for Dordt-sponsored curricular or co-curricular activities will be communicated by the activity sponsor and are considered excused. You are responsible to contact your instructor to make arrangements for missed work. Your instructor is not required to provide real time (synchronous) learning for you should you be absent for class for any reason (e.g., Zooming into your real time class). Your instructor is also not required to provide asynchronous virtual learning materials for you (e.g., recordings of missed classes, slide decks, other materials on Canvas). While some instructors might utilize some of the synchronous/asynchronous methods of making up work on occasion, you should not expect all instructors to provide these experiences automatically. Methods of making up missed work might include: contacting a fellow student to get notes from class, extensions on assignments or labs, or other methods as determined by your instructor. Making arrangements for missed class work is your responsibility! Please see your instructor's specific attendance policy.

I reserve the right to make changes to this document as the need arises.