

# MATH 3323: Matrix Algebra

CRN: 11243

Fall 2022

Liberal Arts, room 103

Tuesdays, Thursdays, 1:30-2:50

3 credit hours

Instructor: Dr. Art Duval

Office: Bell Hall, room 303

Phone:

*(915)747-6846/office: 24 hours/day; if I'm not in, please leave a message.*

*(915)747-6502/fax: Include a cover sheet with my name, please.*

*(915)545-1788/home: 9am-9pm only, please.*

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Office hours:

- Mondays, 1:00-3:00
- Wednesdays, 1:00-3:00

Please feel free to come by my office any time during scheduled office hours. You are welcome to visit at other times, but in that case you might want to make an appointment, just to make sure that I will be there then. You can make an appointment simply by calling me, or by sending e-mail. You can just propose a time, and I will respond either by agreeing to that time, or, if I cannot make it then, I will propose different times.

Alternatively, you can talk with me by Zoom at [an address given during class or on Blackboard] during office hours or by appointment.

You may also ask any questions directly via phone or e-mail. If I'm not in when you call, please leave a message on the voice mail or answering machine with your name, number, and a good time for me to call you back. I will try to respond to your phone or e-mail message as soon as possible.

**Prerequisite:** Calculus II (MATH 1312)

This is entirely a mathematical maturity requirement, as we will use no calculus in this course.

## Course Objectives

This course is concerned with matrices and vectors. In one setting, matrices and vectors merely serve as efficient devices for storing the coefficients and solutions of systems of linear equations. The solutions of many such systems, though, are hard to even describe without the right language. This is the language of vector spaces, where matrices serve as functions turning vectors into other vectors. We will then spend

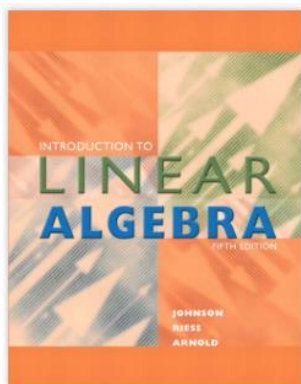


most of our time examining vector spaces, and especially various vector spaces we can naturally assign to a matrix. In this setting, eigenvalues and eigenvectors of a matrix arise naturally, and we end the course examining these.

Upon successful completion of this course, you will be able to solve and analyze systems of linear equations. You will be able to find and describe the various vector spaces associated to a matrix, and you will be prepared to study more abstract vector spaces. You will be able to compute eigenvalues and eigenvectors of a matrix, and know what they are good for. You will be able to do all of this equally well with the symbolic/numerical description of matrices and vectors as arrays of numbers, and with the geometrical description of matrices and vectors, using the powerful organizing concept of dimension, even in dimensions higher than 3.

## Required Materials

*Textbook: Introduction to Linear Algebra, 5<sup>th</sup> edition, by Johnson, Riess and Arnold (Pearson).* We will discuss Chapters 1-4, skipping some sections. All other material in the course will be aligned to the textbook.



## Technology Requirements

*Blackboard:* Announcements, assignments, and course grades are all delivered via the Internet through the Blackboard learning management system (LMS). Ensure your UTEP e-mail account is working and that you have access to the Web and a stable web browser. Mozilla Firefox and Google Chrome are the most supported browsers for Blackboard; other browsers may cause complications with the LMS. When having technical difficulties, update your browser, clear your cache, or try switching to another browser. Check for announcements on Blackboard, or via your UTEP e-mail account (where announcements will also be sent), at least once per day.

*Gradescope:* We will be using Gradescope on exams, which allows us to provide fast and accurate feedback on your work. Exam grades and feedback will be returned through Gradescope, which you will access via Blackboard. As soon as grades are posted, you will be notified immediately so that you can log in and see your feedback. Grades (but not feedback) will also be posted on Blackboard. More support for Gradescope can be found [here](#).

*WeBWork:* For homework we will be using WeBWork, a system that puts homework problems on the web and allows you to solve these problems online. Using WeBWork, you may try to answer homework problems more than once. After each try, a message appears telling you whether the answer is correct or not. This allows you to find out what you did wrong and to understand the topic of the question better. Each WeBWork problem set is individualized; each student has a different version of each problem (for example, the numerical values in the formulas may be slightly different).

More support for WeBWork can be found [here](#). Note especially the directions for [logging in](#), and for [changing your password](#). Your password will initially be your UTEP ID number, but you should change your password the first time you log in. The link to the login page will be on Blackboard.

## GRADES

### Homework (10%)

Most weeks, homework will be posted on WeBWork, and due Sunday evenings. Your lowest homework score of the semester will be dropped.

### Exams

There will be three exams during the semester, and a comprehensive final exam. All exams are closed-book and closed-note, with no calculators allowed.

Once you begin an exam, you will not be allowed to leave the classroom until you have finished the exam. There will be no bathroom breaks. If you have a medical reason for needing more frequent bathroom breaks, please provide documentation in advance.

### In-class Exams (18% each)

- Exam 1, Chapter 1, **Thursday, September 22**
- Exam 2, Chapter 2 and Sections 3.1-3.5, **Thursday, October 20**
- Exam 3, Sections 3.6-3.7 and Chapter 4, **Tuesday, November 22**

### Final Exam (36%)

**Thursday, December 8, 1:00 – 3:45 p.m.**

### Grading scale

All grades will be converted to a scale where 4 is the minimum score for an A, 3 is the minimum score for a B, 2 is the minimum score for a C, and 1 is the minimum score for a D.

### Late work

*Homework:* Extensions on homework deadlines will only be given under unusual circumstances, and with an explanation. (Too much work in other classes is not a sufficient explanation.) It is generally better to submit an incomplete assignment than a late assignment. Remember, too, that the lowest homework score of the semester will be dropped, and this is usually the best solution for that one week in the semester when everything in your life goes wrong.

*Exams:* Make-up exams will only be given under extraordinary and unavoidable circumstances, and with advance notice if possible. You will need to provide written documentation. If you anticipate a conflict with any exam date, please contact me as soon as possible. Otherwise, please make space on your calendar right now for all exams.

## POLICIES

### Attendance

I strongly encourage you to attend every class you can (but stay home if you are sick), though there is no particular grade penalty for absences. You are responsible to find out any assignment that must be made up if you are absent. My goal is for class meetings and activities to complement, rather than echo, the textbook, and thus for every class to be worth attending.

## Courtesy

We all have to show courtesy to each other, and the class as a whole, during class time. Please arrive to class on time (or let me know when you have to be late, and why); do not engage in side conversations when one person (me, or another student) is talking to the whole class; turn off your cell phone (or, for emergencies, at least set it to not ring out loud), and do not engage in phone, email, or text conversations during class.

## Scholastic Integrity

Academic dishonesty is prohibited and is considered a violation of the UTEP Handbook of Operating Procedures. It includes, but is not limited to, cheating, plagiarism, and collusion. Cheating may involve copying from or providing information to another student, possessing unauthorized materials during a test, or falsifying research data on laboratory reports. Plagiarism occurs when someone intentionally or knowingly represents the words or ideas of another as one's own. Collusion involves collaborating with another person to commit any academically dishonest act. Any act of academic dishonesty attempted by a UTEP student is unacceptable and will not be tolerated. I report all suspected violations of academic integrity to the [Office of Student Conduct and Conflict Resolution \(OSCCR\)](#) for investigation and possible disciplinary action. To learn more, see [HOOP: Student Conduct and Discipline](#).

## Copyright Statement for Course Materials

All materials used in this course are protected by copyright law. The course materials are only for the use of students currently enrolled in this course and only for the purpose of this course. They may not be further disseminated.

## Student Resources

UTEP provides a variety of student services and support:

- [Math Tutoring Center \(MaRCS\)](#): Ask a tutor for help and explore other available math resources.
- [UTEP Library](#): Access a wide range of resources including online, full-text access to thousands of journals and eBooks plus reference service and librarian assistance for enrolled students.
- [Help Desk](#): Students experiencing technological challenges (email, Blackboard, software, etc.) can submit a ticket to the UTEP Helpdesk for assistance. Contact the Helpdesk via phone, email, chat, website, or in person if on campus.
- [University Writing Center \(UWC\)](#): Submit papers here for assistance with writing style and formatting, ask a tutor for help and explore other writing resources.
- [Military Student Success Center](#): UTEP welcomes military-affiliated students to its degree programs, and the Military Student Success Center and its dedicated staff (many of whom are veterans and students themselves) are here to help personnel in any branch of service to reach their educational goals.

## Drop Policy

To drop this class, please contact the [Registrar's Office](#) to initiate the drop process, by the deadline of Friday, October 28, 2021. After this date, you will not be able to drop the class (as per the Dean's office). Furthermore, a grade of incomplete is only for extraordinary circumstances, such as a missed exam.

I hope everyone will complete the course successfully, but if you are having doubts about your progress, I will be happy to discuss your standing in the course to help you decide whether or not to drop. You are only allowed three enrollments in this course, and only six withdrawals in your entire academic career, so please exercise the drop option judiciously.

#### Accommodations Policy

[The University is committed to providing reasonable accommodations](#) and auxiliary services to students, staff, faculty, job applicants, applicants for admissions, and other beneficiaries of University programs, services and activities with documented disabilities in order to provide them with equal opportunities to participate in programs, services, and activities in compliance with sections 503 and 504 of the Rehabilitation Act of 1973, as amended, and the Americans with Disabilities Act (ADA) of 1990 and the Americans with Disabilities Act Amendments Act (ADAAA) of 2008. Reasonable accommodations will be made unless it is determined that doing so would cause undue hardship on the University. If you have, or suspect you have, a disability and need an accommodation, you should contact [UTEP Center for Accommodations and Support Services \(CASS\)](#) at (915)747-5148 or [cass@utep.edu](mailto:cass@utep.edu), or apply for accommodations online via the [CASS portal](#). You are responsible for presenting to me any CASS accommodation letters and instructions.

#### Exceptional Circumstances

If you anticipate the possibility of not being able to participate in the course due to exceptional circumstances such as military service and/or training, childbirth, etc., please let me know as soon as possible.

#### COVID-19 Precautions

*If you are sick, stay home!* Please stay home if you have been diagnosed with COVID-19 or are experiencing COVID-19 symptoms. If you are feeling unwell, please let me know as soon as possible, so that we can work on appropriate accommodations. If you have tested positive for COVID-19, you are encouraged to report your results to [covidaction@utep.edu](mailto:covidaction@utep.edu), so that the Dean of Students Office can provide you with support and help with communication with your professors. The Student Health Center is equipped to provide COVID-19 testing (see below).

*Vaccines.* The best way that Miners can take care of Miners is to get the vaccine, which is now widely available for free in the El Paso area. Learn more at [epcovidvaccine.com](http://epcovidvaccine.com).

*Masks.* At our current level of disease and hospitalization in El Paso, the Centers for Disease Control and Prevention (CDC) [recommends](#) wearing masks while indoors in a public setting.

*Testing.* UTEP is offering two convenient options for free COVID-19 testing on campus. For more details, see <https://www.utep.edu/ehs/covid/>.

Current UTEP students have access to **free on-campus testing in the UTEP Student Health and Wellness Center** located in Union Building East, first floor.

Students, employees and the general public can pull up to the City of El Paso's COVID-19 Mega-Testing Site on UTEP property at **3333 N. Mesa at Kern Drive**. This public site includes a dedicated priority lane for Miners and their household members, as well as lanes for the general public.