# SYLLABUS – MAT 343 – APPLIED LINEAR ALGEBRA – SPRING 2017

## Prerequisites: MAT 267 with a grade of C or better.

## Faculty:

**Name:** Dr. Stefania Tracogna
**Email address:** tracogna@asu.edu
**Office:** ECA 211
**Office hours:** MWF: 12:00pm-1:00pm

## Catalog Description

Solving linear systems, matrices, determinants, vector spaces, bases, linear transformations, eigenvectors, norms, inner products, decompositions, applications. Problem solving using MATLAB.

## Course Overview

Linear Algebra is the study of vector spaces and linear transformations on vector spaces. Linear Algebra is central to both pure and applied mathematics. Techniques from Linear Algebra are also used in analytic geometry, engineering, physics, natural science, computer science, and the social sciences. Topics include the use and application of matrices in the solution of systems of linear equations, determinants, real n-dimensional vector spaces, abstract vector spaces and their axioms, linear independence, span and bases for vector spaces, linear transformations, eigenvalues and eigenvectors, matrix factorizations, and orthogonality. Computer explorations using MATLAB is an integral component of this course.

## Learning Outcomes

At the completion of this course, students will be able to:

- Use matrices to solve linear systems of equations
- Verify whether a given set is a vector space.
- Find bases of subspaces
- Find matrix representations of linear transformations and use them in applied problems.
- Determine eigenvalues and bases of eigenspaces.
- Determine and use matrix factorizations such as LU, QR and SVD.

## Grading

| Grade | Percentage | Points Range |
|---|---|---|
| **A** | 90 – 100% | 540 –600 |
| **B** | 80 – 89% | 480 – 539 |
| **C** | 70 – 79% | 420 – 479 |
| **D** | 60 – 69% | 360 – 419 |
| **E/F** | Below 60% | 359 and below |

| Assignment | Percentage | Date |
|---|---|---|
| Exam 1 | 10% | Mon. 1/23 |
| Exam 2 (proctored) | 25% | Fr. 2/10 |
| Exam 3 | 10% | Mon. 2/20 |
| FINAL (proctored) | 25% | Tu. 2/28 |
| WeBWorK | 20% | |
| MATLAB LABS | 10% | |

## Course Topics, Schedule, &Grading

Activities used for instruction and assessment of learning include: discussion/presentations; textbook and supplemental readings; video presentations; individual activities/assignments.

| WEEK | TOPICS | ACTIVITIES/ASSIGNMENTS<br><br>**All WeBWorK assignments are due at 11:59 pm MST. These assignments count for 20% of the grade. MATLAB labs count for 10% of the grade.** | POINTS |
|---|---|---|---|
| **WEEK 1**<br><br>**1/9-1/15** | • Systems of Linear Equations<br>• Row Echelon Form<br>• Matrix Arithmetic<br>• Matrix Algebra | • SYLLABUS QUIZ (due Th. 1/12)<br>• WeBWorK 1.1 & 1.2 (due Th. 1/12)<br>• WeBWorK 1.3 & 1.4 (due Sun. 1/15) | • 6 extra-credit pts<br>• 5 pts per section<br>• 5 pts per section |
| **WEEK 2**<br><br>**1/16-1/22** | • MATLAB LAB 1<br>• Elementary Matrices<br>• The Determinant of a matrix<br>• Properties of Determinants | • MATLAB LAB 1 (due Tu. 1/17)<br>• WeBWorK 1.5, 2.1 (due Th. 1/19)<br>• WeBWorK 2.2 (due Sat. 1/21) | • 12 pts<br>• 5 pts per section<br>• 5 pts |
| **WEEK 3**<br><br>**1/23-1/29** | • MATLAB LAB 2<br>• Vector Spaces<br>• Subspaces<br>• Linear Independence | • **Exam 1** (Mon. 1/23) Covers 1.1 to 2.2<br>• WeBWorK 3.1 (due Th. 1/26)<br>• MATLAB LAB 2 (due Th. 1/26)<br>• WeBWorK 3.2 & 3.3 (due Sun. 1/29) | • 60 pts (10%)<br>• 5 pts<br>• 12 pts<br>• 5 pts per section |
| **WEEK 4**<br><br>**1/30-2/5** | • MATLAB LAB 3<br>• Basis and dimension<br>• Change of Basis<br>• Row Space and Column Space<br>• Linear Transformations: Definition and Examples | • MATLAB LAB 3 (due Tu. 1/31)<br>• WeBWorK 3.4, 3.5 (due Th. 2/2)<br>• WeBWorK 3.6, 4.1 (due Sun. 2/5) | • 12 pts<br>• 5 pts per section<br>• 5 pts per section |
| **WEEK 5**<br><br>**2/6-2/12** | • Matrix representations of Linear Transformations<br>• MATLAB LAB 4<br>• The scalar product in Rn<br>• Orthogonal Subspaces | • WeBWorK 4.2 (due Tu. 2/7)<br>• MATLAB LAB 4 (due Wed. 2/8)<br>• **Exam 2** (Fr. 2/10) Covers 3.1-3.6, 4.1, 4.2<br>• WeBWorK 5.1, 5.2 (due Mon. 2/13) | • 5 pts<br>• 12 pts<br>• 150 pts (25%)<br>• 5 pts per section |
| **WEEK 6**<br><br>**2/13-2/19** | • Least Squares Problems<br>• MATLAB LAB 5<br>• Inner Product Spaces<br>• Orthonormal Sets<br>• The Gram-Schmidt Orthogonalization process | • WeBWorK 5.3, 5.4 (due Th. 2/16)<br>• MATLAB LAB 5 (due Fr. 2/17)<br>• WeBWorK 5.5, 5.6 (due Sun. 2/19) | • 5 pts per section<br>• 12 pts<br>• 5 pts per section |
| **WEEK 7**<br><br>**2/20-2/28** | • Eigenvalues and Eigenvectors<br>• Diagonalization<br>• The Singular Value Decomposition<br>• MATLAB LAB 6 | • **Exam 3** (Mon. 2/20) Covers 5.1-5.6<br>• WeBWorK 6.1 (due Th. 2/23)<br>• WeBWorK 6.3, 6.5 (due Sat. 2/25)<br>• MATLAB LAB 6 (due Sun. 2/26)<br>• **Final Exam** (Tu. 2/28) Comprehensive | • 60 pts (10%)<br>• 5 pts per section<br>• 5 pts per section<br>• 12 pts<br>• 150 pts (25 %) |

## Grading Procedures

Grades reflect your performance on assignments, tests, lab reports, and adherence to deadlines. Homework grades will be available within 48 hours of the due date via My Grades. Computer lab grades will be available within four days of the due date.

## Communicating With the Instructor - Piazza Class Discussion

This course uses a discussion board called "Piazza" for general questions about the course. Piazza is a forum site specifically created for math and science courses. It features a clean interface that makes following threads easier, the threads are sortable and searchable, and the ability to enter symbolic mathematics. It is a collaborative site in which students are encouraged to post questions and other students are encouraged to offer assistance. The instructor and any teaching assistants will also monitor Piazza regularly, offering feedback whenever necessary. Prior to posting a question, please check the syllabus, announcements and existing posts. If you do not find an answer, post your question.

Piazza is built into every online course shell and is a required aspect of the course. The instructor will also post messages to the class through this site. Thus, it is the student's responsibility to be properly signed up in Piazza as directed by the instructor. If you have any problems or feedback for the developers email team@piazza.com. Find our class page at: https://piazza.com/asu/spring2017/mat343a/home

Student Rules of Engagement (Piazza):

- All questions related to classwork should be posted to Piazza. Any homework or classwork questions emailed directly to the instructor will not be answered.
- Please include the section number and question number in the header (e.g. Section 1.2, #7).
- Please include a couple lines of your work. You may also photograph your written work and insert the image within the post. Please trim the image size if possible.
- Please be courteous at all times. No vulgar, demeaning, or aggressive language will be tolerated.
- Do not use Piazza to air grievances or to campaign.
- Do not use Piazza for personal messages. In such a case, email the instructor directly.
- Stay on topic. Do not use Piazza for discussions not related to this class.
- Keep a civil and friendly atmosphere. Piazza works best when we have a lot of students willing to engage the forum.
- Please do not expect immediate replies. Instructors usually check the forum daily. In the meantime, other students are encouraged to add feedback and commentary. Instructors may also deliberately stay in the background so as to promote student-led discussions.

Failure to adhere to these requirements may result in your posting privileges being revoked.

## MAT 343 Course Format and Homework Statement

This is an online course. There are no face-to-face meetings. Students are responsible for watching the video presentation(s) for the section(s) and for the MATLAB lab(s), and reading the Lecture Notes.

## WeBWorK

Online Homework will be submitted online via the internet using the online homework system WeBWorK. WeBWorK contains questions pertaining to each topic, the due dates for which are listed on the website and in this syllabus. **No extension of due dates will be given**. The homework will count for 20% of the grade. In order to log on to WeBWorK, go to https://webwork.asu.edu/ and login with your ASUrite ID and password. If you have trouble logging in into WeBWorK, email your instructor.

## MATLAB

There will be a total of six MATLAB computer labs. The lab reports will be submitted through the Assignment feature in pdf format. The lowest lab grade will be dropped. You are **not** required to purchase MATLAB. All students can download MATLAB through MyApps or can use MATLAB remotely through MyApps.
Instructions on how to submit the labs are included in the Course Tour Video under the Welcome and Start here! tab.

## Midterm and Final Exams Procedures

Students will take three mid-term exams and one final exam. All exams will be administered through WeBWorK.
**Exam 2 and the Final will be proctored and they will count for 50% of the grade.** These exams must be taken through RPNow by Software Secure. More information about this proctoring service is posted in the course home page.

The exams will be available for a period of 24 hours during which you can access it at any time. However, once you access it, you will have two hours to complete it **(provided you access the test before 9:59pm)**. The use of note sheets is prohibited during proctored exams.

**Exam 1**: Monday 1/23 (available from 12:00am MST to 11:59pm MST). Covers 1.1-1.5, 2.1, 2.2
**Exam 2** (proctored): Friday 2/10. Covers 3.1-3.6, 4.1, 4.2
**Exam 3**: Monday 2/20 (available from 12:00am MST to 11:59pm MST). Covers 5.1-5.6
**Final** (proctored): Tuesday 2/28. Comprehensive.

**NOTE:** Any photograph or screenshot taken during an exam is grounds for a 0 score on the test and academic dishonesty charges**. All students are required to have a laptop or desktop.** Tablets or hybrids are not sufficient. The acceptable operating systems are windows and MAC.

## Textbook

*Linear Algebra with Applications,* by Steven J. Leon, Pearson-Prentice Hall, 8th Edition. The textbook is recommended, but not required. Review problems will be assigned from the textbook, but they will not be collected.

## Calculators

A graphing calculator is recommended. Graphing calculators which perform symbolic manipulation (e.g. TI89, TI92, Casio FX2 or 9970G) are not allowed for proctored tests. The allowed calculators are TI83, TI83Plus, TI84, TI84Plus, TI85, TI86, TI36xPro, CASIO FX9750GII, TI-Inspire CX (note that TI-Inspire CX-CAS is **not** allowed).

## Email and Internet

ASU email is an official means of communication among students, faculty, and staff. Students are expected to read and act upon email in a timely fashion. Students bear the responsibility of missed messages and should check their ASU-assigned email regularly. ***All instructor correspondence will be sent to your ASU email account.***

## Course Time Commitment

This three-credit course requires approximately 135 hours of work. **Please expect to spend at least 20 hours each week** preparing for and actively participating in this course.

## Late or Missed Assignments

Published assignment due dates (Arizona Mountain Standard time) are firm and no extensions will be granted. Please follow the appropriate University policies to request an accommodation for religious practices or to accommodate a missed assignment due to University-sanctioned activities.

## Submitting Assignments

All MATLAB labs, unless otherwise announced, MUST be submitted to the designated area of BlackBoard. Do not submit an assignment via email.

## Drop and Add Dates/Withdrawals

This course adheres to a compressed schedule and may be part of a sequenced program, therefore, there is a limited timeline to drop or add the course. Consult with your advisor and notify your instructor to add or drop this course. If you are considering a withdrawal, review the following ASU policies: Withdrawal from Classes, Medical/Compassionate Withdrawal, and a Grade of Incomplete.

## Grade Appeals

Grade disputes must first be addressed by discussing the situation with the instructor. If the dispute is not resolved with the instructor, the student may appeal to the department chair per the University Policy for Student Appeal Procedures on Grades.

## Student Conduct and Academic Integrity

ASU expects and requires its students to act with honesty, integrity, and respect. Required behavior standards are listed in the Student Code of Conduct and Student Disciplinary Procedures, Computer, Internet, and Electronic Communications policy, ASU Student Academic Integrity Policy, and outlined by the Office of Student Rights & Responsibilities. Anyone in violation of these policies is subject to sanctions.

Students are entitled to receive instruction free from interference by other members of the class. An instructor may withdraw a student from the course when the student's behavior disrupts the educational process per Instructor Withdrawal of a Student for Disruptive Classroom Behavior.

Appropriate online behavior (also knows as *netiquette*) is defined by the instructor and includes keeping course discussion posts focused on the assigned topics. Students must maintain a cordial atmosphere and use tact in expressing differences of opinion. Inappropriate discussion board posts may be deleted by the instructor.

The Office of Student Rights and Responsibilities accepts incident reports from students, faculty, staff, or other persons who believe that a student or a student organization may have violated the Student Code of Conduct.

## Prohibition of Commercial Note Taking Services

In accordance with ACD 304-06 Commercial Note Taking Services, written permission must be secured from the official instructor of the class in order to sell the instructor's oral communication in the form of notes. Notes must have the notetaker's name as well as the instructor's name, the course number, and the date.

## Course Evaluation

Students are expected to complete the course evaluation. The feedback provides valuable information to the instructor and the college and is used to improve student learning. Students are notified when the online evaluation form is available.

## Syllabus Disclaimer

The syllabus is a statement of intent and serves as an implicit agreement between the instructor and the student. Every effort will be made to avoid changing the course schedule but the possibility exists that unforeseen events will make syllabus changes necessary. Please remember to check your ASU email and the course site often.

## Accessibility Statement

In compliance with the Rehabilitation Act of 1973, Section 504, and the Americans with Disabilities Act of 1990, professional disability specialists and support staff at the Disability Resource Center (DRC) facilitate a comprehensive range of academic support services and accommodations for qualified students with disabilities.

Qualified students with disabilities may be eligible to receive academic support services and accommodations. Eligibility is based on qualifying disability documentation and assessment of individual need. Students who believe they have a current and essential need for disability accommodations are responsible for requesting accommodations and providing qualifying documentation to the DRC. Every effort is made to provide reasonable accommodations for qualified students with disabilities.

Qualified students who wish to request an accommodation for a disability should contact their campus DRC.

**Tempe Campus**
http://www.asu.edu/studentaffairs/ed/drc/
480-965-1234 (Voice)
480-965-9000 (TTY)

**Polytechnic Campus**
http://www.asu.edu/studentaffairs/ed/drc/
480-727-1165 (Voice)
480-727-1009 (TTY)

**West Campus**
http://www.west.asu.edu/drc/
University Center Building (UCB), Room 130
602-543-8145 (Voice)

**Downtown Phoenix Campus and ASU Online**
http://campus.asu.edu/downtown/DRC
University Center Building, Suite 160
602-496-4321 (Voice)
602-496-0378 (TTY)

## Computer Requirements

This course requires a computer with Internet access and the following:

- A web browser (Chrome, Internet Explorer, Mozilla Firefox, or Safari)
- Adobe Acrobat Reader (free)
- Adobe Flash Player (free)
- Microphone and speaker

## Technical Support

This course uses Blackboard to deliver content. It can be accessed through MyASU at http://my.asu.edu.

To monitor the status of campus networks and services, visit the System Health Portal at http://syshealth.asu.edu/.

Visit contact.asu.edu for frequently visited links, frequently requested information, or to call ASU directly for assistance. Or click the Service tab within My ASU for IT and HR support. Here you may search ASU's IT Knowledge Base to get answers to your technology questions, report and track outages and technical issues within an ASU application, system, website, or technology device, or Live Chat 24/7 with an agent for more immediate support. For assistance with Blackboard, click on the Blackboard tab and then click on Help.

## Student Success

This is an online course. To be successful:

- check the course daily
- read announcements
- read and respond to course email messages as needed
- complete assignments by the due dates specified
- communicate regularly with your instructor and peers
- participate regularly in Piazza discussions
- create a study and/or assignment schedule to stay on track