

*MAT 345 Linear Algebra*  
*Course Syllabus*  
*Siena Heights University*  
*Fall 2015*

<b>Instructor:</b>	Dr. Jeff Kallenbach
<b>Phone:</b>	264-7641
<b>Office:</b>	SC29B
<b>Hrs:</b>	M-F 09:00-10:00, or whenever you see me in the office.
<b>Course Meets:</b>	MWF 12:00-12:50
<b>Prerequisites:</b>	Successful completion of MAT181 or other Calc I (Concurrent)
<b>Text:</b>	<i>Linear Algebra</i> by Jim Hefferon; <a href="http://joshua.smcvt.edu/linearalgebra/">http://joshua.smcvt.edu/linearalgebra/</a>
<b>Software:</b>	Maple will be the primary software for this course. It is available in the classroom, the Math Lab (SC26), and from the SHU VmWare portal
<b>Handheld:</b>	A TI-NSpire or CX will be the handheld model of choice. The CAS version is preferred.
<b>Course Management:</b>	<u>Engrade</u> will be used for this course


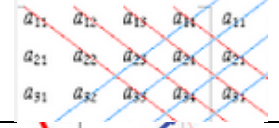

**Course Objectives:**

This course covers a complete introduction to the subject of Linear Algebra at the university level. It is intended for the math and science student who has completed one or two semesters of calculus and serves as a transition into higher mathematics. To that end the student will construct and write up rigorous proofs as we move through the class. As with all of our SHU math courses, liberal use will be made of technology to speed and enhance our learning. We will be covering the topics recommended by the Linear Algebra Curriculum Study Group (LACSG) as well as those required for state certification to teach mathematics as indicated by Michigan Department of Education. This will require that we maintain a pace of about 3 sections per week.

## Grades

Grading Scale		Grade Apportionment	
[90% - +)	A	Hour Exams	250
[80%, 90%)	B	Homework Quizzes	250
[70%, 80%)	C	Homework/Labs	100
[60%,70%)	D	Final Exam	200
[0%,60%)	E		

*Our topics include*

Linear Equations & Matrices	$A = \begin{bmatrix} 3 & -5 & 4 \\ 9 & 8 & -7 \\ -6 & 4 & 2 \end{bmatrix}$
Row Reduction & Echelon Forms	$\begin{bmatrix} 1 & 2 & 3 & 4 & 5 \\ 0 & 1 & 7 & 3 & 8 \\ 0 & 0 & 1 & 4 & 6 \\ 0 & 0 & 0 & 1 & 3 \end{bmatrix}$
Vectors, Vector & Matrix Equations	$\begin{bmatrix} a_{11} & \dots & a_{1n} \\ a_{21} & \dots & a_{2n} \\ \vdots & \ddots & \vdots \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ \vdots \end{bmatrix} = \begin{bmatrix} b_1 \\ b_2 \\ \vdots \end{bmatrix}$
Linear Independence & Transformations	
Determinants & Invertible Matrices	
Vector Spaces, Subspaces, Dimension, Rank, Null Spaces	
Eigenvalues, Eigenvectors, Eigenspaces	$\det(A - \lambda I) = \begin{vmatrix} -\lambda & 1 & 1 \\ 1 & -\lambda & 1 \\ 1 & 1 & -\lambda \end{vmatrix}$

Method of Evaluation

- **Hour Exams** – 3 or 4 of them, evenly spaced during the semester. 50 minutes in length. Together will constitute 250 points.
- **Homework quizzes** – Once or twice per week, we will have a quiz consisting of 2-3 problems directly from uncollected homework problems from the sections currently under discussion. All homework quizzes together will count the same as the hour exams (250 points). No makeup quizzes will be given. To allow for the bad day/missed class, the lowest HW quiz score will be dropped.
- **Homework/Maple/TI labs** – From time to time during the semester I will assign some homework to be collected, and we will have a computer assignment/lab in either Maple, the TI Calculator, or both. Each collected assignment will be graded on a scale of 1-10. Your percentage on these homework & labs together will make up the 100 points.

**Final Exam** – 200 points, time & location TBA

**Homework:** Homework problems will be assigned for each section that we cover. The problems will be listed on the master homework sheet for course. I'll plot the schedule about two weeks ahead, and update the assignment list on the web at that pace.

### Standards for graded homework:

- Work should be neat, organized, and legible
- Use filler paper or remove ragged edges
- Use pencil and eraser (not pen)
- Number each problem
- Use only one column (don't move sideways for the next problem)
- Show work so that I can follow your steps and so that you don't need to recreate your work when studying homework for the exam
- Leave space for my comments
- **STAPLE** your papers together
- Collected assignments are to be submitted at the beginning of the class session on the due date (unless otherwise specified). No late assignments will be accepted unless prior arrangements are made with the instructor.

### Proofs:

For many students this will be the first course in which the reading and writing of proofs is an integral part. Read the proofs in the text, and those from the instructor, and try your best on the assigned proofs. As the semester your technique and ability will improve markedly.

### Course Methods:

- The focus of this class is on learning through daily activities. In this pursuit, we'll use technology: calculators (e.g., TI-NSpire) and computers (e.g., Maple software) to enhance your understanding of the concepts being developed. We will review and discuss daily assignments to provide instant and interactive feedback on your learning. Students will keep a notebook of worked examples and written homework assignments. Students are expected to be active participants in class discussions. *Successful completion of this course requires a substantial amount of out of class study (2-3 hours outside of class for every hour in class).* Students are encouraged to form study groups and visit the Math Lab (Science 26). **Homework is assigned for every section, and you should plan to complete it once that section is covered in class unless otherwise stated. We will be discussing the assignment at the beginning of the next class, before proceeding to the next topic.** Mainly odd-numbered problems will be assigned, so you will be able to check to see if you've gotten to the correct answer.
- Visit the text companion website at: [www.laylinalgebra.com](http://www.laylinalgebra.com). The resources there can be an important part of understanding linear algebra from another perspective. You are encouraged to visit the site as needed to enhance your understanding of the course material. This site does contain including review sheets and practice exams.

## On Getting Through the Course

- Come to class prepared: review notes, read book, do problems.
- **USE YOUR GRAPHING CALCULATOR & COMPUTER** whenever possible (even if not assigned). Graphs & Numerical tables provide concrete visual representations of important concepts, patterns & abstract relationships. Technology gives you the freedom to explore realistic problems & examples, and to spend your time learning concepts, w/o getting bogged down by difficult and/or tedious hand calculations.
- **Ask** questions **DURING** class: if you're confused, seek clarification. Everyone struggles with this subject the first time through. The ones who get help are the ones who will progress.
- **Answer** questions **DURING** class. Most of my questions and those presented by the class, will be offered to members for answers. Feel free to show off your knowledge when the opportunity arises.
- Form study groups and set aside fixed study times as **SOON** after class as possible: help -- but don't copy from each other ...we call that plagiarism.
- Complete honesty is expected in written work with proper acknowledgements to sources. Any student engaged in any act of academic dishonesty may receive a failing grade and reported to the appropriate university authorities. For a complete explanation of the **Academic Dishonesty Policy**, refer to page 169 of the SHU Undergraduate Catalog 2004-2006.

## Learning Outcomes

The **Mathematics Department** has identified the following five learning outcomes to be achieved by majors and minors in its program.

1. Students will read and understand mathematics, differentiating between correct and incorrect mathematical reasoning.
2. Students will effectively communicate mathematics to others, both in writing and speaking.
3. Students will demonstrate abilities to work independently and in-groups to develop mathematical models using appropriate technologies.
4. Students will demonstrate mastery of the content of the course.

## Academic Honesty:

The search for truth and dissemination of knowledge are the central missions of a university. Siena Heights University pursues these missions in an environment guided by our Roman Catholic tradition and our Dominican heritage. Integrity and honesty are therefore expected of all members of the University community, including students, faculty members, administration, and staff. Actions such as cheating, plagiarism, collusion, fabrication, forgery, falsification, destruction, multiple submission, solicitation, and misrepresentation, are violations of these expectations and constitute unacceptable behavior in the University community. The penalties for such actions range from verbal warning, all the way to expulsion from the University.

Students are responsible for their own work and accomplishments. You are encouraged to discuss problems with others, but the actual written work submitted should be your own. The first occurrence of cheating on any assignment will result in a grade of zero on that

assignment. The second time the same student is observed cheating will result in that student being given an E for the course. All cases of academic dishonesty will be documented and reported to the appropriate authorities on campus. for a complete explanation of the Academic Dishonesty Policy, refer to the most recent SHU catalog.