Math 140 Syllabus

Semester:	Fall 2015
Course title:	Introductory Linear Algebra and Geometry
Instructor:	Dr. Matt Klassen
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Phone:	(425) 895-4423
Office hours:	T,Th 11:00-1:00 or by appointment
Class times:	M,W 2:00-3:20, Th 3:30-5:20, Von Neumann
Course Web Page:	http://azrael.digipen.edu/MAT140

REQUIRED TEXT:

None

BACKGROUND MATHEMATICS:

Precalculus: high school algebra and trigonometry.

COURSE DESCRIPTION: This course develops introductory linear algebra with an eye toward applications in computer graphics and signal processing. Topics include: vectors and geometry, linear systems, Gaussian elimination, functions as vectors, trigonometric functions and identities, orthogonality and dot product, complex numbers, transformations of two and three dimensional space, matrix operations, affine space and affine transformations.

COURSE CONTENT:

In this course we will work many examples, especially in vector geometry with an emphasis on orthogonality. Topics begin with 2 and 3 dimensional Euclidean space, and progress toward discrete function spaces and complex number spaces. The interpretation of functions, and sampled functions, as vectors is also stressed, especially in the discrete case.

WEB PAGES AND MOODLE:

The Moodle page for MAT140 will contain a link to the course web page. The web page is the central repository for all course documents, including homework assignments. Updates to homework will be posted on the web page only. Scores for quizzes, homework, exams, and projects, will be posted through perl scripts on the course web page.

COURSE GOALS AND OBJECTIVES:

1) Students will learn to work with the vector operations and linear transformations which are essential to computer graphics.

2) Students will be familiar with the terms of linear algebra and linear systems, and be able to discuss applications using these terms.

3) Students will develop a working knowledge of complex numbers and discrete and sampled functions as vectors.

4) Students will have the ability to work with linear systems and Gaussian elimination, including applied problems such as interpolation.

These goals and objectives will be tested through homework, quizzes, exams, and structured labs.

QUIZZES AND EXAMS:

For multiplie choice quizzes and exams, please follow these procedures: Work out the quiz problems and circle your answers on the question sheet. When you are finished, transfer the answers to the answer sheet. Go to a web browser and enter the answers online. Under no circumstances are you allowed to discuss the quiz questions with any other student during the quiz or the data entry process. You should turn in the answer sheet at the front of the room, and keep the question sheet for reference. Your scores will be posted online by your student ID.

There will be a midterm exam given during regular class hours, and a final exam. There are *NO* make up exams unless you have a *compelling and well documented reason* for missing a test.

Calculators are allowed on quizzes and exams. The lowest two quiz grades will be dropped, but there are no make-up quizzes for any reason.

GRADING:

Midterm Exam	20%
Final Exam	20%
Homework	20%
Quiz	20%
Project/Lab	20%

Grades will be determined based on total course percentage. Percentage scores will determine letter grades according to the scale: (in the worst case)

A	$93 - 100$
A-	$90 - 92.9$
B+	$87 - 89.9$
B	$83 - 86.9$
B-	$80 - 82.9$
C+	$77 - 79.9$
C	$73 - 76.9$
C-	$70 - 72.9$
D	$60 - 69.9$
F	< 60

HOMEWORK ASSIGNMENTS:

Homework will be assigned and posted on the web page and collected periodically. You are responsible for checking the web page and noting the assignments and the due date. You may work on homework together, as well as consult the tutors and the instructor. However, the final work that you turn in must be your own work.

ACADEMIC INTEGRITY:

Academic dishonesty, or cheating, occurs when a student represents someone else's work as their own, or assists another student in doing so. This can happen on exams, quizzes, homework, or projects. Academic dishonesty also may occur when a student uses any prohibited reference or equipment in the completion of a task. For example, the use of a calculator, notes, books or the internet when it is prohibited. Plagiarism is a common form of academic dishonesty. This can take the form of copying and pasting exerpts from the web, and representing them as original work. The type and severity of any occurence, as well as the legitimacy of any claim of academic dishonesty, will be judged by the instructor and the disciplinary committee. All students are asked to help in promoting a culture of academic integrity by discouraging cheating in all forms.

DISABLED STUDENT SERVICES:

Students with physical, psychological or learning disabilities that affect their ability to perform major life activities associated with this class may be eligible for reasonable accommodations under the Americans with Disabilities Act. If you have a documented disability please contact the Disability Support Services office to arrange for accommodations for this class.

If students have disabilities and will need formal accommodations in order to fully participate or effectively demonstration learning in this class, they should contact the Disability Support Services Office at (425)629-5015 or dss@digipen.edu. The DSS Office welcomes the opportunity to meet with students to discuss how the accommodations will be implemented. Also, if you may need assistance in the event of an evacuation, please let the instructor know.

COMPUTATIONAL RESOURCES:

We will make use of some computational packages which are installed on the MAC workstations in the labs, such as SciLab, Audacity, PARI/GP, and the Gnu C/C++ / LLVM compilers gcc and g++. You are encouraged to do linear algebra and other calculations for the homework using a calculator or symbolic package or program. There is a link on the web page with examples of how to use PARI to do basic linear algebra calculations.

PROJECTS:

Projects will be assigned in class and will include at least the programming of the Gaussian Elimination algorithm in C.

TENTATIVE WEEKLY TOPICS:

Week	Dates	Topics
1	Aug 31 - Sep 4	Basic concepts of vectors, dot products and projections; Review of trigonometry: sine and cosine; Software: introduction to SciLab.
2	Sep 8 - 11	Matrix Algebra: matrix addition and multiplication, inverses, determinants. Software: introduction to gcc/g++ and text editors.
3	Sep 14 - 17	Linear systems of equations, augmented matrices, matrix equations, elementary row operations, Gaussian elimination.
4	Sep 21 - 25	Trigonometric identities: sum and difference, double angle, half angle, sum-to-product and product-to-sum;
5	Sep 28 - Oct 2	Complex numbers: Cartesian and polar forms, addition, multiplication, length, Euler identity, and exponentiation. Complex vectors, complex dot product.
6	Oct 5 - 9	2D transformations: rotations, reflections, projections, and shears; determinants. Planes in 3D, implicit and parametric forms, intersections of lines and planes.
7	Oct 12 - 16	Midterm Exam; Lines in 2D and 3D, planes in 3D, implicit and parametric forms. Intersections of lines, planes, graphs and curves in 2D and 3D.
8	Oct 19 - 23	Sampled functions as vectors, manipulating samples, basic filters as vector operations.
9	Oct 26 - 30	Interpolation with polynomials and other functions, solving for interpolation coefficients with linear systems.
10	Nov 2 - 6	Vector spaces and affine spaces, spanning sets and bases, Affine transformations.
11	Nov 9 - 13	Linear independence and spanning, basis and dimension. Standard and special bases, bases of functions.
12	Nov 16 - 20	Sampled phasors and Fourier bases, Fourier transform, transforms as matrix operations.
13	Nov 23 - 25	Applications to discrete signals, Fourier series and spectrum. Interpolation and reconstruction of signals.
14	Nov 30 - Dec 4	Applications to motion and simulations, approximation of path lengths and uniform velocity.
15	Dec 7 - 11	Final Exams