

EMAT 4550/6550 Contemporary Mathematics
Fall 2008
Tuesday/Thursday 5:00-6:15, 111-113 Aderhold Hall

Instructor: Günhan Caglayan

sezen@uga.edu

613B Aderhold Hall

706-583-8064

Office Hours: Tuesday/Thursday before/after class by appointment.

Goals

This course will focus on conic sections and some of their applications. The intent is for you to learn new mathematics, to connect this mathematics to situations in the outside world, and to develop ideas for use in high school classrooms. In particular, the course has four main goals:

- (1) Learn about algebraic and geometric representations of conic sections.
- (2) Incorporate technology into mathematical investigations and problem solving.
- (3) Connect mathematics to other subjects, particularly physics and astronomy.
- (4) Develop activities that could be carried out in high school mathematics classrooms.

Textbooks (Optional)

- Exploring Conic Sections with the Geometer's Sketchpad (Key Curriculum Press)
- Physics for Scientists and Engineers (Serway & Jewett)
- Any Calculus textbook (with Analytic Geometry)

Main Topics to be Covered

Preliminaries

Distance between Two Points

Distance from a Point to a Line

Scalar (Dot) Product of Two Vectors

Cross (Vector) Product of Two Vectors

Conics (Circle, Parabola, Ellipse, Hyperbola) in the Plane

Geometer's Sketchpad Activities

Directrix and Foci

Distance definitions (from two foci and from directrix and one foci)

Algebraic definitions (Cartesian and polar coordinates)

Relations among "a," "b," and "c"

Eccentricity (different ratios)

Cutting the Cone and Cylinder (with Graphing Calculator)

Graphing planes, cones, and cylinders in Graphing Calculator

Analyzing the intersection of a plane and a cylinder algebraically

Analyzing the intersection of a plane and a cone algebraically

Determining expressions for parameterized curves

Circle, Parabola, Ellipse, Hyperbola Applications

Motion in One Dimension

Projectile Motion

Mirrors and Lenses

Telescopes

Reflection properties of conics (Angles of incidence and reflection)

The Law of Universal Gravitation

Kepler's Laws of Planetary Motion

Circular orbits (relationship between speed and radius)

Elliptical orbits (relationship between speed and radius)

Elliptical orbits (relations among apogee, perigee, eccentricity, a, b, and c)

Determining the location of satellites in elliptical orbits

Young's double slit experiment

Expectations

(1) Attend ALL classes.

(2) Come to class on time and with your homework completed. Homework assignments are due at the beginning of the class period. Course project is due last day of classes.

(3) Keep ALL handouts, notes, homework assignments, and tests. You may consider getting a three ring binder to hold everything.

(4) Engage 100% in class activities on your own and with others. This includes asking questions and asking for help from other students or the instructor.

UGA Academic Honesty Policy

The University of Georgia seeks to promote and ensure academic honesty and personal integrity among students and other members of the University Community. A policy on academic honesty has been developed to serve these goals. All members of the academic community are responsible for knowing the policy and procedures on academic honesty.

The policy may be found at: http://www.uga.edu/honesty/ahpd/culture_honesty.htm

Grades

Your performance in this class is assessed in the following manner:

10% attendance, class participation

25% homework

20% course project

20% midterm

25% final exam