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Meeting Time and Place: SCI 2 308. MW 1:00 – 2:15 PM

Office Hours:
- Monday 2:30 – 4:00 PM
- Wednesday 2:30 – 4:00 PM
- Friday by appointment 12:00 - 1:00 PM

Prerequisites: Math 160 (Calculus). Math 132 is not enough. You will be expected to understand the concept of derivative and integral, and be able to use these concepts to solve problems. You will be expected to be good at applying trigonometry and algebra as well.

Required texts and materials:

You need to have a compass and straightedge in order to perform geometric constructions. There are three required textbooks in this course.

A History of Mathematics
by Carl B. Boyer
ISBN: 0471543977
Paperback: 736 pages
Publisher: Wiley (2nd edition, 1991)

Math Through the Ages: A Gentle History for Teachers and Others,
by William P. Berlinghoff, Fernando Q. Gouvea
ISBN: 0883857367
Hardcover: 288 pages
Publisher: The Mathematical Association of America (2nd edition, 2003)

Euler: The Master of Us All
by William Dunham
ISBN: 0883853280
Paperback: 192 pages
Publisher: The Mathematical Association of America (1999)

Course Objectives: This course will provide you an introduction to the history of mathematics with an emphasis on branches of mathematics important in the high school curriculum. You will learn some general history and some history of science in order to put the development of the mathematics into perspective. In addition, you will learn biographical
information about many important mathematicians. Also, you will learn some of the history of mathematical language and symbolism: you will learn what languages earlier mathematicians employed, some of the history of our current mathematical vocabulary, and some of the symbolisms employed in the past - you will even learn the Greek alphabet.

You will also expand your knowledge of mathematics up to, including, and perhaps beyond the calculus level. Sometimes you will solve problems the way that ancient mathematicians solved them. Other times you will solve ancient mathematical problems using tools such as algebra and calculus not available to ancient mathematicians. One goal of this course is for you to practice and deepen your current mathematical skills. You will also be exposed to important themes in mathematics that you will not see in other courses.

You will see what types of problems motivated mathematicians through history. For example, you will see the role that geometric construction with ruler and compass had in the development of geometry. In addition, you will see ancient versions of word problems that make good problems even today. One goal is to help those of you who are going to go on to teach mathematics to be able to teach with a firm sense of the history of the subject and in a way that humanizes the material, linking the mathematics with what the student is learning in history or other classes. Imagine how meaningful it would be, and perhaps fun, for a student to know that the problem he or she is solving is one that challenged mathematical students in ancient times: perhaps in a civilization or culture that he or she learned about in another class, or in a book, movie, or television show.

You will learn from several sources: class lectures, selected sources on the web, and the three required texts (listed below). The textbooks have been chosen for their quality and usefulness. I am expecting that you will make use of them to go beyond what we cover in class, and to pursue knowledge about the history of mathematics later on in your mathematical careers.

The course will be divided into four units.

UNIT 1. Ancient mathematics up to Euclid. This unit will focus on the mathematics of 3 civilizations: Egyptian, Babylonian, and ancient Greek. The works of Ahmes, Thales, Pythagoras, Plato, Euclid, and several others will be discussed. The cuneiform tablets and our base 60 heritage from Mesopotamia will be discussed as well. You will learn several ruler and compass constructions including the construction of the pentagon.

UNIT 2. Pre-modern mathematics from around the world. This unit will focus on Hellenistic, Roman, Mayan, Chinese, Indian, Islamic, and Medieval European mathematics. The works of many mathematicians from around the world, from Archimedes to Fibonacci, will be discussed.

UNIT 3. Mathematics and the rise of modern science. This unit will focus on the role of mathematics, beginning in the Renaissance, in the rise of modern science including Kepler’s laws of planetary motion and Newtonian physics. The development of analytic geometry by Descartes and Fermat, and the development of calculus by Newton and Leibniz (and others) will be discussed. If time permits, some pure mathematics will be discussed including topics from number theory.

UNIT 4. Euler and his influence on modern mathematics. In order for you to get a taste of the development of mathematics after the time of Newton and Leibniz, we will focus on one of the most interesting mathematicians: Leohard Euler. We will use his ideas to help discuss selected topics in modern mathematics. The history of mathematics in the last two hundred years is an amazingly rich story requiring quite a bit of sophistication to understand. In this course we can do no more than trace a few of the developments.
**Grading:** Grading will be based on four unit grades and participation. The fourth and final unit will include some new material, but will be shorter than the other, and will be largely comprehensive. This last unit will culminate in the final exam (Monday, Dec 11 at 11:30 AM).

- 23%  Unit 1
- 23%  Unit 2
- 23%  Unit 3
- 25%  Final Unit (including Final Exam)
- 6%  Participation

Each unit will end in a midterm exam. The score in each unit will be based largely on the exam score (65% to 85%), but an important part (up to 35%) will be based on quizzes and other assignments. Most classes will have a quiz based on readings and homework. Finally I will give other assignments that you will turn in for a grade. The percent of the grade based on quizzes and assignments will partially be based on how much time is available for quizzes and grading. For example, if I need to spend more time to explain the material then we might forgo some of the quizzes.

Part of the grade for turned in assignments will be based on the quality and clarity of the writing displayed. You are encouraged to discuss your ideas with classmates, but make sure that the work you turn in is your own. Remember to write your work in complete, clear, and grammatically correct sentences. Of course, the work should be mathematically correct and clear as well.

**Class Participation:** 6% of your grade will be based on class participation. To do well in this category you will need to attend regularly (typically with more than two absences) and attentively, show a willingness to answer questions and occasionally ask helpful questions, actively participate in in-class activities, and help to maintain a positive classroom experience. Also you will be expected to follow basic classroom etiquette and rules including not using the computer during class except as part of a classroom activity, and failure to do so will result in a low participation score. Behavior that interferes with or distracts from other student's learning will also lead to a lower participation score.

**Make-Up Work:** There will be no make-up work. I will drop the lowest grade on an assignment or quiz in each unit, so if you miss a quiz it does not hurt your grade: you simply drop that score as part of your grade. In the case of a legitimate, documented absence for an exam, the weight of that exam will be transferred to the final exam. Similar arrangements will be made for legitimate, documented absences that affect the completion of two or more quizzes and assignments in a given unit.

**Web Page:** I will maintain a web page for this course. It will contain supplementary materials such as lists of assignments, recommended problems, some solutions, extra notes, listings of special office hours, and whatever cool stuff I can think of. Before each test I will post a study guide or a sample test. The web address is

www.csusm.edu/public/aitken_html/m330/

**Use of Calculators:** Some tests and quizzes will be done without the use of a calculator. When calculators are allowed, non-graphing, non-programmable calculators are allowed. But any graphing and programming calculator must be approved by me (I will set up a list of approved models). Of course, cell phones cannot be used during tests and quizzes.
Key dates:

Aug 24 to Sep 6. Add/drop period (and Open University)
Aug 28 (Mon) First day of class
Sep 4. (Mon) Labor Day - no class
Dec 6 (Wed) Last day of class
Dec 11 (Mon) Final Exam  1130-1330
Dec 15 Official end of Semester
Dec 21 (Thurs) Grades due from instructors (by 3:00 pm)
Jan 12, 2007 Grades available on SMART System.

Approximate Exam Dates:

Unit 1 Exam: 27th of September (Wednesday)
Unit 2 Exam: 25th of October (Wednesday)
Unit 3 Exam: 22nd of November (Wednesday)
Final Exam: 11th of December (Monday)