

HMA 270 HONORS HISTORY OF MATHEMATICS (SPRING 2010)

Time and Place. M,W,F 2:00-3:20, E382

Instructor. Dr. Gabriela Sanchis, 384 G Esbenshade Hall, Office Phone: 361-1339

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Office Hours. M: 9-10:30, 3:30-5:00; T, Th: 9-10:30; and by appointment.

Textbook. From Five Fingers to Infinity (ed. Frank Swetz)

Prerequisites. High school algebra, trigonometry, and geometry

Course Objectives.

- Students will gain an understanding of how mathematics developed in an intuitive and experimental fashion out of a need to solve problems.
- Students will become familiar with the tools and notation available in different time periods, and how these helped or hindered mathematical discoveries.
- Students will be able to summarize the development of areas such as arithmetic, algebra, and geometry in the major periods we study.
- Students will be able to recall the names and relative chronological order of important mathematicians and their most important contributions.
- Students will gain appreciation for the creative aspects of mathematicians' work and how mathematicians have used both imagination and logic to advance the subject.

Attendance. You are expected to attend all classes. If you do miss a class, it is your responsibility to obtain from a classmate any notes, assignments, handouts, or anything else you may have missed.

Exams. We will have two examinations, tentatively scheduled for Wednesdays, March 3 and April 14.

Academic Integrity. All work must be one's own and must comply with the Standard of Integrity defined in the Elizabethtown College 2009-2010 Catalog, pp. 282 - 285.

Grading. 94-100 A; 90-93 A-; 87-89 B+; 83-86 B; 80-82 B-; 77-79 C+; 73-76 C; 70-72 C-; 67-69 D+; 63-66 D; 60-62 D-; below 60 F

Course grades will be calculated according to the following weighting:

Automathography:	5%
Group Presentations:	10%
Homework:	25%
Exams:	30%
Research Paper:	
Topic:	1%
Preliminary report and outline:	4%
Final draft:	15%
Final Presentation:	10%

Assignments.

- (1) Automathography: Your first assignment is to write a 1-2 page essay introducing your mathematical self to me. Tell me about courses you have taken, about topics that you have found exciting, about things you have found boring or difficult, about your goals as a student. If you have worries about any special problems or needs, let me know. You are encouraged to be creative in your response; don't just answer the questions above, but include whatever else you wish. The email message is due on or before Wednesday, January 27.

- (2) **Group Presentations:** Within the first two weeks of class, you should divide yourselves into groups of two. Each group will choose two articles from the book “From Five Fingers to Infinity” which they find interesting. The book is divided into eight parts, and I require only that each group’s two articles be chosen from different parts, and that parts 2 through 8 all be represented. Each group will then read their chosen article and any material necessary to completely understand it and then prepare a 10-15 minute presentation summarizing the main ideas of the article. You are welcome to supplement the article with information from other sources, in which case your presentation should include a bibliography. Each group, then, will be giving two short presentations during the semester, which I will schedule as soon as everyone has chosen their articles. The book contains 114 articles, and they are numbered. You should make your choices by Friday, January 29. Record your choices on the sign-up sheet in the class directory.
- (3) **Homework:** Homework related to the lecture topics will be assigned and collected on the due date. Homework will be graded. You are encouraged to discuss the homework problems with others in the class, but the final write-up of solutions should be done individually. To receive full credit on a problem your solution must be complete, accurate, clearly written, and easy to follow. The lowest two homework grades will be dropped.
- (4) **Term Paper:** You will write a research paper on a topic of your choosing. This is meant to be an interesting and enjoyable assignment, not a chore, so choose your topic with care. Your paper should satisfy the following constraints:
 - It must be a paper on the history of mathematics; it cannot be all history or all mathematics.
 - Enough expository material should be included so as to make the paper self-contained. Test your paper for readability by asking a friend to read it.
 - You should use many different research materials, from articles to books to the internet. Your paper should include a bibliography listing your sources and they should be cited in the body of your paper when appropriate. More information regarding citation standards is provided towards the end of this syllabus.
 - The paper should be prepared on a word processor, preferably one that can handle mathematics (Microsoft Word can - just use the pull down menus » **Insert** » **Equation** » **Insert New Equation**). It is worth investing the time to learn how to do this. Other issues such as length, format, etc., are up to you. You are telling a story which needs certain background, exposition and detail. When that is successfully done, stop; you have finished. You should turn in two copies of your paper as I intend to keep one copy.
 - A topic (by email) is due Friday February 19. You should come and discuss your choice of topic with me before then. A preliminary report and outline (typed on a word processor) is due on Friday March 5. The latter should include (a) your topic, (b) a few words about what you intend to do, (c) an outline, (d) your preliminary bibliography, and (e) any questions you have about your paper. The final version of your paper is due Wednesday, April 21. Each student will give a 25 minute Powerpoint presentation on his/her paper during the last week of class.

Disability. If you have a documented disability and need reasonable accommodations to fully participate in course activities or to meet course requirements, you must:

- (1) Contact the Director of Disability Services, Dr. Kristin Sagun, in the Center for Student Success, BSC room 228 by calling 361-1227.
- (2) Meet with me (the instructor) within two weeks of receiving a copy of the accommodation letter from Disability Services to discuss your accommodation needs and their implementation.

SUGGESTIONS FOR WRITING YOUR RESEARCH PAPERS

- (1) To avoid unnecessary footnotes, references should be incorporated parenthetically into your text by citing the author and page number (and date if you cite more than one work by this author). Footnotes can be used to include interesting material that is peripheral to your main theme or to point out errors or conflicts in your sources. For ease in typing these can be grouped together at the end of your paper.
- (2) A bibliography of the sources you cite should be listed on a separate sheet at the end of your paper. The items in each reference should be listed in the following order: Author, title, journal, volume, year, pages. For a book you need: Author, title, date (Publisher and place are optional). Book and journal titles should be underlined or in italics. The titles of articles in journals should be in quotation marks. For reprints of books give both the original and the reprint date.
- (3) Take advantage of Interlibrary Loan to locate books or articles not owned by the High Library. (If you find a particularly useful book, let me know and I'll try to get our library to buy it).
- (4) When unusual mathematical terms come up, add a few words of explanation.
- (5) Include biographical details; they make your paper more interesting.
- (6) Foreign titles of books should be translated parenthetically.
- (7) Include sources of illustrations; not just where you got them, but where they came from originally.
- (8) Be careful with verb tenses. History happened in the past.
- (9) Don't refer to people by their first names.
- (10) Long quotations (3 lines or more) should be indented as block quotes.

POSSIBLE PAPER TOPICS

Below are some ideas for paper topics. This list is by no means exhaustive. You may also want to look at the History Topics Index in The MacTutor History of Mathematics archive at http://turnbull.mcs.st-and.ac.uk/history/Indexes/Hist_Topics_alph.html for some ideas. Your topic is due on February 19. You should come and discuss your choice of topic with me before then.

- History of a particular branch of mathematics, e.g. History of probability and/or statistics
- History of mathematical games and puzzles
- Women in mathematics
- History of the mathematics curriculum in America
- History of π
- History of Fermat's last theorem
- History of cryptography
- Euclid's parallel postulate and the development of non-Euclidean geometry
- History of a particular mathematician (e.g. Fermat, Pascal, Descartes, Euler, Gauss, etc.)
- History of magic squares
- History of computing devices
- Native American mathematics

A BRIEF GUIDE TO THE "HISTORY OF MATHEMATICS" RESOURCES AT THE HIGH LIBRARY

Journals.

- (1) The American Mathematical Monthly
 - (2) The College Mathematics Journal
 - (3) Historia Mathematica
 - (4) The Mathematical Intelligencer
 - (5) The Mathematics Magazine
 - (6) Mathematics Teacher
- The above six journals tend to publish many articles on the history of mathematics. The articles in (2) , (5), and (6) in particular are generally geared towards undergraduate students.
 - The library has all but (4) (Historia Mathematica is a brand new subscription). However, full-text articles from (4) are available through Academic Search Premier. Also, full-text articles from (1), (2), and (5) are available through JAYSTOR.
 - You can locate articles on specific historical topics by searching Academic Search Premier and other online databases available through the library. Also the Mathematical Association of America (MAA) has a searchable database of (2) and (5) at <http://www.math.hmc.edu/journalsearch/>.

Biographical References.

- (1) Biographical Dictionary of Mathematicians (Four volumes, non-circulating, Level 2, 510.92 B615)
- (2) Dictionary of Scientific Biography (Eighteen volumes, non-circulating, Level 2, 925 D554)

General Histories.

- (1) A history of mathematics / Carl B. Boyer
- (2) The history of mathematics : an introduction / David M. Burton
- (3) The history of mathematics : a brief course / Roger Cooke
- (4) An introduction to the history of mathematics / Howard Eves
- (5) The Norton history of the mathematical sciences : the rainbow of mathematics / Ivor Grattan-Guinness
- (6) A history of mathematics ; an introduction / Victor J. Katz
- (7) Mathematical thought from ancient to modern times / Felix Klein
- (8) A concise history of mathematics / by Dirk J. Struik