Honors 213 Foundations of Geometry

TEXT

Euclidean and Non-Euclidean Geometries , Third Edition, Marvin Jay Greenberg, W H Freeman and Company, 1993.

TIME 2:00–2:50 P.M. M,T,Θ, F

ROOM Thompson Hall 320

INSTRUCTOR Bryan Smith (Professor)

OFFICE Thompson Hall 321-E

PHONE Extension 3562

E-Mail bryans@ups.edu

OFFICE HOURS 11:00 A.M. - Noon Monday, Tuesday, Thursday, and Friday
9:30 A.M. - 11:00 A.M. Wednesday

I am also happy to meet at any other time we can arrange. Feel free to stop me after class or call to find a mutually acceptable time. I also encourage you to contact me by electronic mail.

EXAMINATIONS There will be three, 100 point, one hour, in-class examinations. Make-up examinations will be given only if you make arrangements prior to the exam. Each examination will be written so that approximately half of the problems are ones you have seen before. The rest of the exam will involve similar, but new problems. Sufficient interest from the class can change examination dates or move the exams to a 2-hour, evening format. The examinations are tentatively scheduled for the following days:

Examination One	Friday February 15
Examination Two	Tuesday March 12
Examination Three	Friday April 12

Writing There will be one paper assigned slightly after the midpoint of the semester.

Since the primary goal of this course is for you to learn the basics of 'mathematical reasoning' or 'mathematical ways of knowing', you will learn how mathematics addresses the fundamental concepts of proof, communication, meaning, and truth. To provide contrast, your paper will examine how some other discipline (your major, minor or some other field of interest) approaches these same fundamental concepts. You can find examples of such papers at math.ups.edu/ bryans/Current/journalspring2001.html

Clearly this is a topic that begs for entire books rather than a paper written in 2-4 weeks. So do not get carried away with your choice of topic. The primary goal of the paper is for you to investigate how different disciplines deal (or don't) with such philosophical fundamentals as "truth" and begin the process of deciding how you will include these fundamentals in your own world view.

Paper Logistics

Due March 15: Meet with me to discuss your selected topic. Don't wait until the last minute as I will be ensuring there is a wide distribution of selected disciplines.

- **Due April 5:** Turn in 3 copies of a draft of the paper. I will distribute 2 of those copies to your referees. (This means each of you will referee two papers.) The referees will read the paper for accuracy, clarity of exposition and appropriateness for the *Journal of Undergraduate Mathematics at Puget Sound* as outlined in the *Journal* Guidelines for Authors (see the class web page for details).
- **Due April 17** Referees give their reports to authors.
- **Due April 24:** Turn in the final version of the paper along with all referee comments. If the paper receives a passing grade, it will be published in the journal.
- The author will receive a grade for the paper itself and the referees will receive grades for the quality of their comments.

Course Information Updates If you wish, after every examination (and at other requested times) I will post a report on your current standing in the class on my university web page. You should keep track of your grades on the various assignments and check them against these reports. If there are any discrepancies they should be dealt with immediately.

FINAL EXAMINATION The Final will be cumulative but will be weighted more heavily (about 1/3) on the material covered since the third in-class examination. It is scheduled for Monday May 13, 2002 from 4:00 until 6:00 P.M. Please note this schedule and do not plan to leave town until after the final.

HOMEWORK There will be homework assignments almost every week. Each assignment will consist of at least two problems. One-third to one-half of the problems will be outlined in class and will be graded on clarity of exposition as well as correctness. When you prepare the problems that are outlined in class, think of them as writing assignments because they will be graded as such. They are expository papers written in support of a claim you are making about the validity of your argument. The remaining problems can be written in the more traditional outline form and will be graded on content and accuracy.

TOTAL POINTS

Homework	45%
Paper	15%
Referee Reports	5%
Examinations	25%
Final Examination	10%

First Assignment (Due Friday January 25) Find my university web page

(http://math.ups.edu/ → faculty → Bryan Smith)

and locate the *Journal of Undergraduate Mathematics at Puget Sound* "Guidelines for Authors" page. Then send an e-mail message to me at bryans@ups.edu indicating that you have an account, understand how to access the World Wide Web, and are aware of how to avoid mistakenly sending e-mail to Beverly Smith that is meant for Bryan Smith.

Goals

Non-Euclidean Geometry We will explore the 2000 year history and development of one of the most interesting ideas to arise in western civilization. Our approach will follow that of our author (Greenberg) who uses historical vignettes as motivation and the axiomatic method as the primary tool for understanding the basics of non-Euclidean Geometry.

Reading/Writing It is important that you read the text. In fact, developing the ability to read technical material with understanding is one of the primary goals of this course. Another is to fine-tune the ability to present written arguments clearly and gracefully. It is easier to do this in mathematics than most other disciplines since the standard practice is to explicitly justify every claim.

Proof Most of this course, either directly or indirectly, deals with the issue of "proof". In particular, you will learn what it means when a mathematician claims to have proven a fact and through your paper, you will explore other notions of proof. Our primary tools for the study of mathematical proof are exactly the same as those used by our author (Greenberg) in his presentation of non-Euclidean geometry: elementary formal logic and the axiomatic method.