

UNIVERSITY OF NORTH CAROLINA  
AT GREENSBORO

College of Arts & Sciences  
Mathematics & Statistics

### COURSE SYLLABUS – Fall 2014

1. **Course Prefix and Number:** MAT 330
2. **Course Title:** Axiomatic Foundations of Geometry
3. **Credits:** 3:3
4. **Course Prerequisites/Corequisites:**  
Prerequisites: Grade of at least C in MAT 292
5. **For Whom Planned:** Mathematics majors; required for students seeking secondary licensure in mathematics; elective for all other mathematics majors and for other education majors concentrating in mathematics
6. **Instructor Information:** Carol E. Seaman, Ph. D., 139 Petty Building, 336-256-1134, [ceseaman@uncg.edu](mailto:ceseaman@uncg.edu),  
Office hours: Tuesdays & Thursdays 12:15pm-1:45 pm, or by appointment
7. **Course Purpose/Catalog Description:** Axiomatic systems, logic and proof, incidence geometries, absolute geometries, Euclidean geometry, and an introduction to non-Euclidean geometries and transformational geometry. Required for students seeking secondary licensure in mathematics.
8. **Course Goals and/or Objectives:** This course aims to develop an understanding of axiomatic geometric systems, both Euclidean and non-Euclidean. We will focus on the foundations of geometry by exploring finite and infinite geometries, neutral geometries, Euclidean plane geometry, and non-Euclidean hyperbolic geometry through an axiomatic approach.

#### **Student Learning Outcomes (SLO):**

Upon successful completion of this course students will be able to

1. Write mathematical proofs in geometry that exhibit valid reasoning, correct notation and form, and appropriate use of definitions, axioms, and previously proven results.
  2. Demonstrate the use of the axiomatic method to determine geometric results in a variety of settings (such as finite, neutral, Euclidean, and non-Euclidean geometries).
  3. Use definitions and models to explore and analyze the properties of Euclidean and non-Euclidean geometries.
  4. Demonstrate effective written and oral communication skills in mathematics.
9. **Teaching Strategies:** Class time will be a combination of problem-solving activities, individual student presentations, lecture, and discussion of pre-assigned readings and solutions to homework assignments. Students will be expected to present problem solutions and to participate in whole class discussions.

#### **10. Evaluation Methods and Guidelines for Assignments:**

##### **Academic Integrity Policy:**

Responsibility for academic integrity lies with individual students and faculty members of the UNCG community. Students are responsible for becoming familiar with the Academic Integrity Policy in all its aspects and for indicating their knowledge and acceptance of the Policy by signing the Academic Integrity pledge for all major work submitted. Specific information on the Academic Integrity Policy and obligations of the faculty and students may be found on the UNCG web site of [academicintegrity.uncg.edu](http://academicintegrity.uncg.edu) or by calling the Office of the Dean of Students at (336) 334-5514.

**UNCG Commercial Note-Taking Policy:**

“Selling class notes for commercial gain or purchasing such class notes in this or any other course at UNCG is a violation of the University’s Copyright Policy and of the Student Code of Conduct. Sharing notes for studying purposes, or borrowing notes to make up for absences, without commercial gain, are not violations.”

**Blackboard™:**

Grades for all assignments and exams will be posted to the Gradebook section of our course site on Blackboard™. You may also check this website for current assignments, due dates, links to external sites, and other announcements.

**Assignment Guidelines:**

**All written problem solutions/proofs must adhere to a professional standard of spelling, grammar, punctuation, and legibility. (Typed work is preferred. Handwritten work must be well organized, neat with good penmanship, and easy to read, with sufficient white space for feedback.) In all work cohesion of thought, clarity of expression, and completeness of analysis will need to be evident. Use of appropriately labeled diagrams, geometric vocabulary, and valid proof formats will be standard requirements for each assignment.**

**You are highly encouraged to work with other students in this class on homework assignments. Doing mathematics is a community activity. Problem-solve together, learn from each other, discuss the problems and concepts, *but then write up the solutions or proofs on your own and in your own words.* All written work submitted should represent your understanding of the problem and the solution/proof. *Writing a final version of the solution/proof together is cheating.* It is also a violation of academic integrity to consult other sources (online or written texts or persons not taking our class) to find solutions/proofs for the assigned problems.**

**Written Problem Solutions/Proofs (SLO 1, 2, 3, 4)**

On most non-exam weeks you will submit written solutions/proofs for assigned problem sets. I do not accept assignments after the due date. However, assignments may be turned in early if your absence is caused by a school-sponsored activity or discussed with me in advance. Each problem solution/proof is graded on a 3-point rubric as follows (I will assign points in  $\frac{1}{4}$  point increments, e.g., a  $2\frac{1}{2}$  or a  $1\frac{3}{4}$ , when the solution falls between categories.):

- 3 – Solution/proof is clearly and completely communicated, demonstrates a comprehensive analysis of the problem, is entirely correct in content and format, and contains appropriate diagrams/illustrations that clearly illuminate the solution/proof. (equivalent to a grade of A+)
- 2 – Solution/proof is communicated with only minor errors, demonstrates an adequate analysis of the problem, is correct in content and format in most respects, and contains appropriate diagrams/illustrations. (equivalent to a grade of B)
- 1 – Solution/proof contains flaws in communication, incomplete analysis of the problem, errors in content and/or format, and/or inadequate/misleading diagrams. (equivalent to a grade of C-)
- 0 – No solution/proof is submitted. (equivalent to a grade of zero)

**Class Participation (SLO 2, 3, 4)**

To be effectively engaged in this class you will need to:

- Be prepared by reading and reflecting on assigned material for each class meeting, including preparation of problem solutions for class discussion.
- Show involvement in class through participation in class discussion.
- Demonstrate purposeful engagement with activities during class time.
- Be prepared for vocabulary quizzes

Each non-exam week you will have **5-minute vocabulary quizzes** based on the text readings assigned for the week. Scores on each quiz will range from 0 (entirely incorrect) to 2 (entirely correct) in  $\frac{1}{4}$  point increments. The cumulative score will be part of the participation grade.

### Absence Policy

- 3 absences = final grade in the course will be lowered by one letter grade level (A- to B+)
- 5 absences = final grade in the course will be lowered by one full letter grade (A- to B-)
- 8 absences = F in the course
- 3 tardies = 1 absence, this means arriving to class late *and/or* leaving class early (unless arranged prior to class meeting time)

### Hour Exams (SLO 1, 2, 3, 4)

We will have three one-hour exams (tentatively scheduled for September 25, October 28, and November 25) – each worth 15% of your course grade. These exams will contain short answer questions on definitions and theorems and discussion questions on solutions/proofs that have been presented in class or assigned in homework. In cases of extreme emergency, serious illness, or school-sponsored activity, if I am notified by the scheduled exam day, you may make-up one missed exam.

### Final Exam (SLO 1, 2, 3, 4)

The final exam will be cumulative and will contain short answer questions on vocabulary and theorems and discussion questions on solutions/proofs that have been presented in class. It will also contain new problems (not previously discussed in class) for which you will write a solution/proof. The final exam is scheduled for Saturday, December 6, 2013 from 3:30pm to 6:30pm.

### Grades will be determined in the following manner:

1.	Written Problem Solutions/Proofs	30%
2.	Participation	5%
3.	Hour Exams	45%
4.	Final Exam	20%

<b>Grading Scale:</b>	A+ 97.0-100	B 83.0-86.9	C- 70.0-72.9
	A 93.0-96.9	B- 80.0-82.9	D+ 67.0-69.9
	A- 90.0-92.9	C+ 77.0-79.9	D 63.0-66.9
	B+ 87.0-89.9	C 73.0-76.9	D- 60.0-62.9
			F 59.9 or less

### 11. Required Text(s)/Readings/References:

Foundations of Geometry, 2<sup>nd</sup> ed., Gerard A. Venema, 2012, Pearson Prentice Hall, ISBN: 0-13-602058-5.

### 12. Topical Outline:

Chapters 1&2 (~3 weeks):	Historical background of geometry; axiomatic systems and their properties; finite and incidence geometries; Euclidean and non- Euclidean parallel postulates
Chapter 3 (~3 weeks):	Development of the axiom system for a neutral geometry
Chapter 4 (~4 weeks):	Neutral geometry – geometry without a parallel postulate
Chapter 5, 7, & 8 (~4weeks):	Euclidean geometry of the plane, including area and circles

**13. Other Information:****“UNCG Cares” Statement:**

UNCG cares about your success as a student. We recognize students often balance many challenging personal issues and demands. Please take advantage of the University resources designed to help. For assistance accessing these resources contact the Dean of Students Office at 334-5514 or Student Academic Services at 334-5730. The Counseling and Testing Center is available for mental health assistance, 334-5874. You may also visit me during my office hours or by appointment.

**Inclement Weather:**

If the university is closed, class will be cancelled. In case you are unsure, check your university e-mail and blackboard – you may also call the UNCG “inclement weather announcement” at 336-334-4400.

**Contact with Instructor:**

Let me encourage each of you to spend time with me during office hours. Good students take advantage of the opportunity for one-on-one time with their instructors. We can talk about your course concerns, about homework assignments, about exams, or explore some aspect of geometry you find exciting or challenging. My time is your time during office hours. Each of you is welcome! At other times, take advantage of e-mail. I promise to check and answer e-mail each day - provided the system is “up!”