

Syllabus for College Geometry, MTG 3212, Class Number 82905, Fall 2022

Book: Gerard Venema *Foundation of Geometry*,
ISBN-10: 0-13-684526-6, ISBN-13: 978-0-13-684526-3.

Synopsis: The course College Geometry is devoted to rigorous treatment of the basics of elementary geometry – the birth cradle of Mathematics in Europe, more than 20 Centuries ago. The goal is to develop the elementary geometry in a mathematically rigorous way – axiomatically. We will form a list of “natural” axioms which will determine first the Neutral Geometry, where no specific restrictions on parallel lines are imposed, and then the two specializations of that geometry: the Euclidean, and the Lobachevsky-Bolyai plane geometries. There will be a discussion of the plane geometry of Riemann, the real projective plane as well. These are known as the Classical Plane Geometries. The course is structured by gradually adding items to the list of axioms, and studying the properties of the geometries satisfying the restrictions imposed by these items. Along the way, the simplest (and most general) plane geometries will be discussed (viz. finite affine and projective geometries), the role the Euclid's Fifth Postulate plays in the determination of the different types of plane geometries will be discussed, the basic geometric figures of Neutral Geometry (angles, triangles, polygons, circles, etc.) will be introduced and their properties compared in the two specializations of that geometry mentioned above. If the time permits, the plane geometric transformations will be given a thorough treatment. The best known to the students geometry, the Euclidean geometry, will be developed in depth as far as the classical theorems (of Menelaus, Ceva, Pascal, Ptolemy, and others) relating triangles, circles, transversal lines, areas etc . The philosophical question of which geometry is best suited for the purposes of “everyday” life will be discussed as well. The students who have knowledge of how to do proofs (e.g., as covered in the course “Introduction to Advanced Mathematics”), will benefit greatly from this course for all the statements in the course will be proved. An important feature of the course is that it provides a fine (arguably – the finest) example of how a mathematical theory should be developed. Thus, students interested in Math Logic will also benefit from the material presented here. A significant amount of exercises in the book are theorems left to be proved by the students, so the ability to do proofs is essential for successful completion of this course. Those students who don't have previous knowledge or experience of how to do proofs will have to carefully read Chapter 2 of the book used in the course (we will quickly go over it in the first week of lectures). The needed properties of the set of real numbers and real valued functions will be reviewed in Chapter 4. The geometric part of the course starts with Chapter 5, and will cover Chapter 6, 7 and parts of 8, 9, 10, and 12.

Help for Students: There is a solution manual available to help the students with the numerous proofs from the exercise sections of the book.

Assessment of students' achievements: Two Midterms and a Final Exam will be performed during the course. There will also be several Quizzes and “turn-in” homework assigned.

Note: All the problems for Exams will be taken from those suggested by the Instructor for work at home.

Grading system: The overall grade will be based on 15% of the Turn-in homework's total score, 15% of the total Quizzes' score, 30% of the total of the Midterms' scores, and 40% of the Final Exam score. The scale for the overall grades follows:

Example: Suppose a student has A points total on the HW, B points total on the Quizzes, C points total on the Midterm Exams, and D points on the Final Exam. Suppose further that the maximal possible

points one can get on these are A', B', C', and D' respectively. Then, one can compute a number S by the formula

$$S = [15*A + 15*B + 30*C + 40*D] / [15*A' + 15*B' + 30*C' + 40*D'].$$

The overall grade of the student above is determined now by the scale:

0.92 < S	: A	0.89 < S < 0.92	: A-	0.86 < S < 0.89	: B+
0.78 < S < 0.86	: B	0.75 < S < 0.78	: B-	0.71 < S < 0.75	: C+
0.62 < S < 0.71	: C	0.58 < S < 0.62	: C-	0.55 < S < 0.58	: D+
0.49 < S < 0.55	: D	0.46 < S < 0.49	: D-	S < 0.46	: F

Important note: The class is scheduled to be taught face-to-face, but if need be, the teaching can be switched to a remote teaching. The latter will be maintained using Zoom. The students on the class will be informed about any such changes in a timely fashion.

Academic Misconduct Statement

Florida International University is a community dedicated to generating and imparting knowledge through excellent teaching and research, the rigorous and respectful exchange of ideas and community service. All students should respect the right of others to have an equitable opportunity to learn and honestly to demonstrate the quality of their learning. Therefore, all students are expected to adhere to a standard of academic conduct, which demonstrates respect for themselves, their fellow students, and the educational mission of the University. All students are deemed by the University to understand that if they are found responsible for academic misconduct, they will be subject to the Academic Misconduct procedures and sanctions, as outlined in the Student Handbook.

Academic Misconduct includes: **Cheating** – The unauthorized use of books, notes, aids, electronic sources; or assistance from another person with respect to examinations, course assignments, field service reports, class recitations; or the unauthorized possession of examination papers or course materials, whether originally authorized or not. **Plagiarism** – The use and appropriation of another's work without any indication of the source and the representation of such work as the student's own. Any student who fails to give credit for ideas, expressions or materials taken from another source, including internet sources, is responsible for plagiarism.

To learn more about the academic integrity policies and procedures visit integrity.fiu.edu (Links to an external site.)

Accessibility and Accommodation

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For additional assistance please contact FIU's [Disability Resource Center](#)

Important remark: The Instructor reserves the right to make any changes he considers academically advisable. Any such changes will be announced in advanced in class or by posting them to the e-mail accounts of the students. The students are responsible to be aware of the changes announced this way.