NEW YORK CITY COLLEGE OF TECHNOLOGY
The City University of New York

DEPARTMENT:	Mathematics
COURSE:	MAT 3050
TITLE:	Geometry
DESCRIPTION:	MAT 3050 covers Euclidean and Hyperbolic geometry in two and three dimensions from an axiomatic point of view. It examines classical theorems as well as groups of transformations
TEXTS:	(K1) *Geometry Book I: Planimetry* by A. P. Kiselev, Adapted from Russian by Alexander Givental, published by Sumizdat (K2) *Geometry Book II: Stereometry* by A.P. Kiselev, Adapted from Russsian by Alexander Givental, published by Sumizdat (V) *Exploring Advanced Euclidean Geometry with GeoGebra* by Gerard A. Venema, published by the Mathematical Association of America
SOFTWARE:	GeoGebra (free download available at https://www.geogebra.org/)
CREDITS:	4 (4 class hours)
PREREQUISITE:	MAT 2571
	Spring 2021 Prepared by Professor Kate Poirier

A. Testing / Assessment Guidelines:
The following assessments should be scheduled:

1. Two examinations during the semester
2. Final examination
3. Student presentations
4. Final project

Course Intended Learning Outcomes/Assessment Methods

Learning Outcomes	Assessment Methods
Demonstrate and apply understandings of major mathematics concepts, procedures, knowledge, and applications of ● geometric arguments in 2D and 3D Euclidean geometry, ● reasoning and proof in 2D and 3D Euclidean geometry, ● constructions and transformations, ● non-Euclidean geometries	Homework, exams, projects
Demonstrate knowledge of and ability to apply the mathematical processes of problem solving	Homework, exams
Reason and communicate mathematically	Homework, exams, class discussion, projects, presentations
Organize mathematical reasoning and use the language of mathematics to express mathematical reasoning precisely, both orally and in writing, to multiple audiences.	Homework, exams, class discussion, projects, presentations
Apply technology appropriately within mathematical processes	Homework, projects, presentations

General Education Learning Outcomes/Assessment Methods

Learning Outcomes	Assessment Methods
Information literacy: ● Understand and address the scope and objectives of a manageable research topic ● Identify credible and relevant sources ● Use information effectively to accomplish specific purpose, and present information in a clear and meaningful way ● Cite sources in an appropriate style ● Incorporate ideas of others in an ethical manner; summarizing, paraphrasing and quoting are correct and appropriate	Research projects, writing assignments, class discussion
Oral Communication: ● Organize ideas and supporting material in a clear and coherent manner ● Use appropriate mathematical language ● Use explanations, examples, illustrations, to support the principal ideas ● Communicate the central message clearly and effectively	Presentations, class discussion
Written Communication: ● Use appropriate, relevant, and compelling content to explore ideas within the context of the discipline and shape the whole work ● Demonstrate understanding of context, audience, and purpose that is responsive to the assigned task ● Use appropriate sources to develop ideas ● Use language, notation, and style that is appropriate for the discipline and for an assigned task	Research projects, writing assignments, class discussion, homework
Creative Thinking: ● Take risks ● Solve problems ● Connect material within the course and to other courses; synthesize material	Homework, exams, projects, presentations
Foundations and Skills for Lifelong Learning: ● Foster curiosity and independence ● Take initiative	Projects and presentations

New York City College of Technology Policy on Academic Integrity

Students and all others who work with information, ideas, texts, images, music, inventions, and other intellectual property owe their audience and sources accuracy and honesty in using, crediting, and citing sources. As a community of intellectual and professional workers, the College recognizes its responsibility for providing instruction in information literacy and academic integrity, offering models of good practice, and responding vigilantly and appropriately to infractions of academic integrity. Accordingly, academic dishonesty is prohibited in The City University of New York and at New York City College of Technology and is punishable by penalties, including failing grades, suspension, and expulsion. The complete text of the College policy on Academic Integrity may be found in the catalog.

Texts:
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(V) *Exploring Advanced Euclidean Geometry with GeoGebra* by Gerard A. Venema, published by the Mathematical Association of America

Lesson	Topic	Textbook sections
	UNIT 1: ELEMENTARY 2D EUCLIDEAN GEOMETRY	
1	Measurement and congruence & Angle addition	V 0.1, 0.2 and K1 1.1
2	Triangles and triangle congruence conditions, similar triangles & The exterior angle theorem	V 0.3, 0.5, 0.8 and K1. 1.4, 1.5, 1.6, 1.7, 1.8, 3.1, 3.2
3	Perpendicular lines and parallel lines	V 0.6 and K1 1.2, 1.11
4	Area & Pythagorean theorem	V 0.11 and K1 5.1, 5.3, 5.4, 5.5
5	Quadrilaterals & polygons	V 0.9 and K1 1.12, 1.13, 3.3
6	Circles and inscribed angles	V 0.10, 4.1, 4.2, 4.3 and K1 2.2, 2.4, 2.6
7	Basic constructions	K1 1.10, 1.14, 2.5, and www.euclidthegame.com
8	Transformations in the coordinate plane	Supplementary material
9	Conic sections	Supplementary material
	UNIT 2: THEOREMS IN ADVANCED 2D EUCLIDEAN GEOMETRY	
10	The Classical Triangle Centers	V 2.1 to 2.5
11	Circumscribed, Inscribed, and Escribed Circles	V 4.1 to 4.5
12	The Medial and Orthic Triangles	V 5.1 to 5.4
13	The Nine-Point Circle	V 7.1 to 7.3
14	Ceva's Theorem	V 8.1 to 8.6
15	Theorem of Menelaus	V 9.1 to 9.2
	UNIT 3: 3D EUCLIDEAN GEOMETRY	

16	Lines and planes	K2 Ch 1
17	Parallelepipeds and pyramids & Volumes of prisms and pyramids	K2 2.1 & 2.2
18	Similarity of polyhedra & Symmetries of space figures	K2 2.3 & 2.4
19	Regular polyhedra & Platonic solids	K2 2.5 &
20	Cylinders and cones & the ball	K2 3.1 & 3.2
	UNIT 4: NON-EUCLIDEAN GEOMETRY	
21	Introduction and foundations	K2 4.3
22	Spherical geometry	K2 4.4
23	Models of the hyperbolic plane: Klein and Minkowski Inversion in circles & Models of the hyperbolic plane: Poincaré disk and upper-half plane	K2 4.4 V 13.1, 13.2, 14.1 to 14.6
	UNIT 5: GEOMETRY OF THE COMPLEX PLANE	
24	Review of complex arithmetic; Stereographic projection & the Riemann sphere; Euler's formula	Supplementary material
25	Möbius transformations & symmetry	Supplementary material