

# Math 403: Higher Geometry

Fall 2018

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**Office Hours:** MW 11:00 AM - 1:00 PM or by appointment

**Text:**

Kallaher, Michael J.: Geometry: A Historical Survey, Private Notes

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## Additional Reading Materials

Baragar, Arthur: A Survey of Classical and Modern Geometries,  
Prentice Hall, 2001

Blumenthal, L.: A Modern View of Geometry, W. H. Freeman, 1961

Cederburg, Judith N.: A Course in Modern Geometries,  
Springer-Verlag, 1989

Densmore, Dana (Editor): Euclid's Elements, Green Lion Press, 2002

Euclid: The Elements, Translated with Introduction and Commentary  
by Thomas L. Heath, 3 volumes, Dover, 1956

Greenberg, M.: Euclidean and Non-Euclidean Geometries, W. H.  
Freeman, 1980

Hartshorne, Robin: Geometry: Euclid and Beyond, Springer, 2002

Smart, J. R.: Modern Geometries, Brooks/Cole, 1988

Stillwell, J.: Mathematics and Its History, Springer-Verlag, 1989

Wallace, E. C. and West, S. F.: Roads to Geometry,  
Prentice-Hall, 2004

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## Scoring

a. <b>Geometry Studies:</b>	Approximately one every two weeks. 8 to 9 total.	250 Points
b. <b>Writing Project:</b>	A 3-4 page article discussing and proving a geometrical result	50 Points
c. <b>One-hour Tests:</b>	Worth 100 points each. Three will be given.	300 Points
f. <b>Final</b>		200 Points
<b>Total Points Possible</b>		<b>800 Points</b>

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## Dates

**One-hour Tests:** 20 Sept, 25 Oct, 29 Nov

**Final:** Tuesday, 11 December, 1:00 - 3:00 PM

**Writing Project:** Friday, 12 October

## Rules

1. Details regarding the Writing Project will be given in class. The Writing Project will be accepted late — but no more than one week later — only if arrangements has been made ahead of time.
  2. If a test is missed, the student must make it up within two weeks at a time agreeable to both the student and the instructor.
  3. Everyone must take the Final. If the Final is missed for valid reasons an incomplete (I) will be given and a make-up will be given at a time convenient to instructor and student, but no later than 15 Feb 2019. If there is no valid reason for missing the Final, a **Final Grade** of F will be given.
  4. Exceptions to Rules 1 — 3 will be made only in case of a medical or family emergency.
  5. All tests and the Final must be done in one or more blue books. No exceptions will be allowed.
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*The mathematician has reached the highest rung on the ladder of human thought.*

Ellis

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## Brief Outline of the Course

1. Early Uses of Geometry
  2. Geometry Before the Greeks
    - a. Egyptian
    - b. Babylonian
    - c. Chinese
    - d. Hindu-Indian
  3. Early Greek Geometry
    - a. Pythagorean triples
    - b. Regular polygons
    - c. Regular polyhedra
  4. Euclidean Geometry
    - a. Euclid's book: The Elements
    - b. Logical review of The Elements
  5. Spherical Geometry
    - a. Brief Introduction
    - b. Spherical coordinate system
    - c. Latitude and Longitude
  6. Hyperbolic Geometry
    - a. Definition and axioms
    - b. Examples
    - c. Basic results
  7. Finite Geometry
    - a. Block designs
    - b. Projective and affine planes
    - c. Error-correcting codes
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