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Fall 9-1-2021

### M 439.01: Euclidean and Non-Euclidean Geometry

Bharath Sriraman

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**MATH 439 Euclidean and Non-Euclidean Geometry**  
**Fall 2021**

*Historical Note: After 1542, candidates for the Master of Arts degree at the University of Paris had to take an oath that they had read the first 6 books of the Elements*

**Pre-Requisite: Math 307**

**Time:** MWF 11.00 – 11:50 am

**Place:** M 306

**Professor:** Dr. Sriraman

**Office:** Math 310

**Office Hours:** By appointment

**E-mail:** sriramanb@mso.umt.edu

**Texts:** Thirteen Books of Euclid's Elements; Notes on Spherical Geometry. All Texts are provided free as pdf files.

*What are The Elements?*

*Some Definitions, 5 Common notions and 5 Postulates to deduce an orderly chain of 467 theorems!*

**Other Material:** Compass, protractor and straightedge. Geometer's Sketchpad will be provided.

**Learning Outcomes:** Upon completion of this course, a student will be able to:

1. Construct mathematical proofs using the axioms of Euclidean geometry;
2. Explore, conjecture, and prove mathematical ideas and theorems;
3. Develop a facility with geometric theorems and proofs, through hands-on exploration;
4. Explain different geometries and their development, through comparisons of their axioms, and the validity of basic theorems in different geometries.

To further the learning outcomes this is the course agenda:

**Agenda:** We will survey different geometries with a firm basis in axiomatic Euclidean geometry.

The following topics will be covered

1. Geometry Explorations/Constructions using Sketchpad
2. Geometry and Numbers
3. Axiomatic Euclidean Geometry
4. Various Non-Euclidean Geometries particularly Spherical Geometry

**Academic Misconduct:** Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University. Academic misconduct is defined as all forms of academic dishonesty and the Student Conduct Code. In particular, Student Conduct Code Section IV.a.5 identifies the following violations: Submitting false information: Knowingly submitting false, altered, or invented information, data, quotations, citations, or documentation in connection with an academic exercise.

## **DISABILITY MODIFICATIONS:**

The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and the Office for Disability Equity (ODE). If you anticipate or experience barriers based on disability, please contact the ODE at: (406) 243-2243, [ode@umontana.edu](mailto:ode@umontana.edu), or visit [www.umt.edu/disability](http://www.umt.edu/disability) for more information. Retroactive accommodation requests will not be honored, so please, do not delay. As your instructor, I will work with you and the ODE to implement an effective accommodation, and you are welcome to contact me privately if you wish.

**Important Dates:** (For detailed Add/Drop dates, refer to this link)

<https://www.umt.edu/registrar/calendar/autumn-2021.php>

Acceptable reasons for a late drop are listed in the university catalog and include reasons such as accident, illness, family emergency or a change in work schedule. The following examples are not considered sufficient for a late drop: protecting GPA, forgetting to turn in the change slip, losing financial aid, losing eligibility to engage in sports.

Final Exam: Thursday Dec, 16 (8-10 am)

The final exam is compulsory and no exceptions can be made about the date/time at which it is held- this date is determined by the University Administration.

## **Grading Distribution:**

Project/Investigations Folder	70
One Book from the Elements	80
Mid-term	100
Final Exam	150
	<b>400 points</b>

**Grading Scale:** 90-100 A ; 80-89.9 B ; 70-79.9 C ; 60-69.9 D ; Below 60 F

## **Endnotes**

**Investigations Folder:** I will assign “interesting” investigations periodically over the course of the semester [which will be posted on Moodle]. These can be completed independently or with a partner on Fridays. Instructions for completing these will be found there as well. The folder will be collected before Thanksgiving. We will periodically go over these during the semester

**One Book from the Elements:** I will assign one of the Books of the Elements to a pair of students to study and present to the Class.

## **Mid-terms and Final**

The midterm will be given in late October. The final will be cumulative in the traditional sense. It will be longer than the mid-term exam and will feature some questions relating directly to material taught earlier in the course.