

# MATH.3379 – INTRODUCTION TO HIGHER GEOMETRY

## COURSE SYLLABUS, SPRING 2022

### INSTRUCTOR INFORMATION

**Instructor:** Dr. Blerina Xhabli

**Email:** [bxhabli@uh.edu](mailto:bxhabli@uh.edu)

**Lecture Time/Place:** MW 2:30pm - 4:00pm/SEC 201

**Office Location & Hours:** TBA online through TEAMS

**Course Homepage:** <https://www.math.uh.edu/~blerina/Math3379SP22.html>

**Course Online Platform:** [MATH3379\\_14861\\_SP22\\_MS TEAM](#)

### COURSE DESCRIPTION

This course is designed for the future mathematics teachers in secondary education.

MATH 3379 is designed to provide advanced treatment of standard topics in Euclidean geometry using informal and axiomatic approaches. Includes proof-making techniques, traditional and transformational geometry, finite geometries, and an introduction to other geometries. In addition, the course is intended to present additional topics that will expand students' content knowledge of geometry.

*The instruction in this course is meant to serve as a model of standards-based teaching addressing both content and practice standards as set forth by the National Council of Teachers of Mathematics and the Common Core State Standards.*

### COURSE OBJECTIVES

**Content Standards:** Through whole-class instruction, cooperative learning groups, student to class presentations, and hands-on activities with concrete materials and computer software, students will be able to:

- Demonstrate genuine understanding of fundamental concepts of Euclidean and non-Euclidean geometries.
- Demonstrate genuine understanding of the fundamentals of solid, coordinate, and transformational geometries.
- Apply problem-solving skills to geometric situations.
- Acquire new methods for making geometry comprehensible to school mathematics students.
- Enhance spatial skills by constructing, transforming and modeling figures.
- Demonstrate the ability to formulate conjectures and to prove geometric generalizations.

**Process Goals** (based on Standards for Mathematical Practice from the Common Core State Standards):

- Students will make sense of problems and persevere in solving them.
- Students will reason abstractly (representing quantities symbolically and manipulating those symbolic representations) and quantitatively (attending to the meaning of quantities, and not just how to compute them).
- Students will use appropriate tools (e.g. manipulatives, calculator) strategically to solve mathematical problems.
- Students will develop and extend understanding through active communication (reading, writing, speaking, and listening) of mathematics, attending to precision of mathematical language.
- Students will construct viable mathematical arguments and critique the reasoning of others.

**Main Topics Covered:** Topics for discussion will be selected from but not limited to:

- Undefined terms, definitions, postulates, axioms, and theorems as they relate to Euclidean and non-Euclidean geometries.
- The formulation of generalizations: Proofs using formal and informal methods.
- Concepts involving congruency and similarity.
- Measurement involving two- and three-dimensional shapes.
- Constructions with compass, straightedge, and GeoGebra.

## COURSE MATERIALS

**Required Software:**

- Geogebra - <https://www.geogebra.org> - Download the Classic version to your desktop.
- Virtual Math Teams - <https://www.vmt.mathematicalthinking.org> - Create an account.

**Required Course Materials/Tools:**

- Access to online resources as the instructor provides in your TEAMS account
- Access to a high school geometry textbook for your reference
- Access to the basic three modules that contain the relevant coursework such as handouts, pre-class homeworks etc will be displayed clearly in your MATH3379 team.
  - Module 1: Axiomatic Development
  - Module 2: Transformations
  - Module 3: Analytic Geometry and Measurement
- Supplemental Textbook: Foundations of Geometry, Second Edition by Gerard Venema.

A central aim of this course is to help you learn to develop your own ideas about mathematical questions. You therefore should NEVER consult any reference materials outside of the provided course materials in answering questions for this course. This includes materials found on the internet. The ideas that you present should be your own. You will be directed to the textbook to read the content after the topic is covered in the lecture!

## TECHNOLOGY REQUIREMENTS

Computer and internet access is required for this course. In summary, students will need:

- A functioning and updated Computer (with microphone, speaker or earphones, and webcam)
- Reliable Internet Connection
- PDF viewer/Ability to watch mp4 files.
- Ability to access Microsoft TEAMS platform.

Note that all UH students have access to MS teams with their CougarNet ID.

## RESOURCES FOR ONLINE LEARNING

University of Houston is committed to student success, and provides information to optimize the online learning experience through our [Power-On](#) webpage. Please visit this webpage for a comprehensive set of resources, tools and tips including: obtaining access to the internet, AccessUH; requesting a laptop through the Laptop Loaner Program; using your smartphone as a webcam; and downloading Microsoft Office 365 at no cost. For questions or assistance contact [UHOnline@uh.edu](mailto:UHOnline@uh.edu).

## COURSE DELIVERING FORMAT AND STRUCTURE

This course is being offered in the **face to face format**. Every lecture session will be held **every Mon/Wed 02:30pm - 4:00pm** according to the class schedule at **SEC 201**. Being a face to face delivered course, all students agree that they are available during the meeting times.

Even though the course format/structure is face to face, due to the changing nature of the pandemic, the team for this lecture will be created and available on MS TEAMS. In case of a need to move to the online setting, all students will be enrolled in the class team. Every student is automatically put on the MS Team of this course.

**This course is not self-paced**; students are expected to attend the lectures regularly and follow assignment due dates as specified by the instructor. After every lecture session, we recommend working on the corresponding homework assignments.

For the first two weeks of classes, we will implement a soft opening. As a result, all the lecture sessions will be partially recorded and the links of the recordings will be displayed in your TEAMS account. If you can't attend the lecture session in person, make sure you watch the recorded video of the session. The best approach is to watch the missed lecture video before the next upcoming lecture session. **Attendance is strongly recommended.**

- Lecture Sessions will take place in SEC 201; Make sure you attend the class.
- Students are expected to participate actively during the lecture sessions.
- Students may be recorded during the lecture sessions.
- By coming to the lecture sessions, students give consent to be recorded on a lecture video.

## FACE COVERING POLICY

To reduce the spread of [COVID-19](#), the University strongly encourages everyone (vaccinated or not) to wear face coverings indoors on campus including classrooms for both faculty and students.

## PRESENCE IN CLASS

Your presence in class each session means that you:

- Are NOT exhibiting any [Coronavirus Symptoms](#) that makes you think you have [COVID-19](#)
- Have NOT tested positive or been diagnosed for [COVID-19](#)
- Have NOT knowingly been exposed to someone with [COVID-19](#) or suspected [COVID-19](#)

If you are experiencing any [COVID-19 symptoms](#) that are not clearly related to a pre-existing medical condition, do not come to class. Please see [Student Protocols](#) for what to do if you experience symptoms and [Potential Exposure to Coronavirus](#) for what to do if you have potentially been exposed to [COVID-19](#). Consult the [Undergraduate Excused Absence Policy](#) for information regarding excused absences due to medical reasons.

## COVID-19 INFORMATION

Students are encouraged to visit the University's [COVID-19](#) website for important information including on-campus testing, vaccines, diagnosis and symptom protocols, campus cleaning and safety practices, report forms, and positive cases on campus. Please check the website throughout semester for updates.

## VACCINATIONS

Data suggests that vaccination remains the best intervention for reliable protection against [COVID-19](#). Students are asked to familiarize themselves with pertinent [vaccine information](#), consult with their health care provider. The University strongly encourages all students and faculty/staff to be vaccinated.

## REASONABLE ACADEMIC ADJUSTMENTS/AUXILIARY AIDS

University of Houston complies with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990, pertaining to the provision of reasonable academic adjustments/auxiliary aids for disabled students. In accordance with Section 504 and ADA guidelines, UH strives to provide reasonable academic adjustments/auxiliary aids to students who request and require them. If you believe that you have a disability requiring an academic adjustments/auxiliary aid, please contact the [Justin Dart Jr. Student Accessibility Center](#) (formerly the Dart Center for Students with DisABILITIES).

## RECORDING OF THE CLASS

Students may not record all or part of class, livestream all or part of class, or make/distribute screen captures, without advanced written consent of the instructor. If you have or think you may have a disability such that you need to record class-related activities, please contact the [Center for Students with DisABILITIES](#). If you have an accommodation to record class-related activities, those recordings may not be shared with any other student, whether in this course or not, or with any other person or on any other platform. Classes may be recorded by the instructor. Students may use instructor's recordings for their own studying and notetaking. Instructor's recordings are not authorized to be shared with anyone without the prior written approval of the instructor. Failure to comply with requirements regarding recordings will result in a disciplinary referral to the Dean of Students Office and may result in disciplinary action.

## SYLLABUS CHANGES

Due to the changing nature of the COVID-19 pandemic, please note that the instructor may need to make modifications to the course syllabus and may do so at any time. Notice of such changes will be announced as quickly as possible in class and posted on TEAMS. Here is the tentative academic plan:

Weekly Plan	Monday	Wednesday
1. Week 01/17 - 01/19	Martin Luther King Day No classes	Introduction to Essence of Mathematics Proofs and Their Importance
2. Week 01/24 - 01/26	Introduction to Modules Curriculum More Proof Methods(continued)	Module I - Axiomatic Development of Geometry Lesson 1: Where should we live?
3. Week 01/31 - 02/02	Module I - Axiomatic Development of Geometry Lesson 2: What is geometry?	Module I - Axiomatic Development of Geometry Lesson 3: Where do differences come from?
4. Week 02/07 - 02/09	Module I - Axiomatic Development of Geometry Lesson 3 (continued)	Module I - Axiomatic Development of Geometry Lesson 4: Sets of Axioms
5. Week 02/14 - 02/16	Module I - Axiomatic Development of Geometry Lesson 4 (continued)	Module I - Axiomatic Development of Geometry Lesson 5: Consequences of our Choices
6. Week 02/21 - 02/23	Module I - Axiomatic Development of Geometry Lesson 5 (continued)	Module I - Axiomatic Development of Geometry Lesson 6: Understanding Axiomatic Systems
7. Week 02/28 - 03/02	Module I - Axiomatic Development of Geometry Summary of Module I	<b>Module I - Axiomatic Development of Geometry</b> <b>Exam: March 2 @2:30pm in class</b>
8. Week 03/07 - 03/09	Module II - Transformational Geometry Lesson 1: Introduction to Transformations	Module II - Transformational Geometry Lesson 1 (continued)
9. Week 03/14 - 03/16	Spring Break No classes	Spring Break No classes
10. Week 03/21 - 03/23	Module II - Transformational Geometry Lesson 2: Distance-Preserving Transformations	Module II - Transformational Geometry Lesson 3: Rotations and Reflections
11. Week 03/28 - 03/30	Module II - Transformational Geometry Lesson 3 (continued)	Module II - Transformational Geometry Lesson 4: Transformations and Congruence
12. Week 04/04 - 04/06	Module II - Transformational Geometry Lesson 4 (continued)	Module II - Transformational Geometry Lesson 5: Fixed Points
13. Week 04/11 - 04/13	Module II - Transformational Geometry Lesson 6: Triangle Congruence	Module II - Transformational Geometry Summary of Module II
14. Week 04/18 - 04/20	Module III - Similarity Geometry Lesson 1: Changing Size	Module III - Similarity Geometry Lesson 2: Understanding Dilations
15. Week 04/25 - 04/27	Module III - Similarity Geometry Lesson 3: Similarity	Module III - Similarity Geometry Wrapping up Module III
16. Week 05/02 - 05/04	Presentation Projects Day 1	Presentation Projects Day 2
Finals' Week 05/09 - 05/11	Study for your finals	<b>Final Exam: May 11 @2:00pm in class</b>

## GRADE COMPONENTS FOR THIS COURSE

I expect everyone to complete all course requirements. The effort, detail, and thoughtfulness you put into your work should reflect the standards of performance you will be expected to meet as a professional teacher:

- meticulous preparation
- use and application of mathematical knowledge
- careful consideration of alternatives
- genuine curiosity about all ideas
- collegial work
- analysis and reflectiveness
- clear expression, with respect for the place and value of precision
- organization
- timeliness

**Final course grades are assigned according to student performance, using the guidelines below:**

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### **Participation/Group Work/Class Attendance: 5%**

Professional participation is expected during all classes. You will be given a participation grade for each day of class. Absence from class for any reason will result in losing all of the points for that day. In addition, points may be deducted for lack of preparation, failure to participate fully during class, and inappropriate use of electronic devices during class. Students are expected to be prepared ahead of time with course readings and assignments. Read below.

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### **Preparation/Daily Class Work and Assignments/Class Notes: 5%**

There will be regular classwork and daily assignments to be used as tools to develop your understanding of topics. Daily homework assignments will be assigned in class and submitted prior to the next class period through teams. They will be graded for completion and attempted work and may include responses to readings and student work along with proofs and other formats of questions. Students are required to write up class notes or summaries of the lessons as groups. Class notes will be posted to teams after each class by the end of the day. Each student will be expected to post the notes for the class at least twice during the semester. The first round of notes will be assigned randomly. This will be graded on a provided rubric and will be included in your preparation grade.

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### **Homework Assignments: 30%**

Some homework assignments will involve more in-depth explanations and writing and will be graded for accuracy and completeness. These homework assignments will be announced and you will have at least one week to complete them. There will be three types of homework assignments:

**Formal Writing Assignments (FWA):** These FWAs will be 1-2 page reports where the student shows the understanding of the topic by answering different questions asked. They go along with the following lessons: • Axiomatic Systems • Composing Isometries • Transformations

**Simulations of Practice Writing Assignments (SOPWA):** In these SOPWAs, the student will show how he or she plans to facilitate a discussion with their “students” about the given geometry concept while addressing given questions about certain lessons. The three writing SOPs go along with the following lessons: • Axiomatic Systems • Reflections • Dilations and Similarity

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**Simulations of Practice Video Assignments (SOPVA):** The student will complete these assignments by submitting a short video (5-7 minutes) of themselves responding to a mock teaching situation. These SOPVAs go along with the following lessons: • Axiomatic Systems • Rotations • Dilations

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**Exam(s) and Quizzes Assessments: 40%**

There will be one midterm exam and one cumulative final exam consisting of in-class and take home sections. There will also be short announced and unannounced quizzes during the semester. Questions will focus on reasoning and explanation of ideas, reflect the classwork and homework assignments, and will include demonstration of your mathematical knowledge for teaching.

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**Final Project: 10%**

There will be two group projects during this semester. The first project will be completed outside of class and submitted through teams. The second will involve a 10-minute presentation on a geometric topic selected from a list provided by the instructor. Presentations will be given during the last few weeks of class. Presentation slots will be randomly assigned.

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**Portfolio: 10%**

Throughout the semester you will gather selected pieces of your work and write reflections on your learning through that work. The collection of work will be submitted electronically at the end of the semester.

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**Letter Grades will be assigned as follows:**

A	$93 \leq x \leq 100$	B-	$80 \leq x < 83$	D+	$67 \leq x < 70$
A-	$90 \leq x < 93$	C+	$77 \leq x < 80$	D	$63 \leq x < 67$
B+	$87 \leq x < 90$	C	$73 \leq x < 77$	D-	$60 \leq x < 63$
B	$83 \leq x < 87$	C-	$70 \leq x < 73$	F	$0 \leq x < 60$

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## ACADEMIC EXPECTATIONS

In effort to create a learning environment that is aligned with current recommendations for teaching and learning mathematics in K-12 settings, the following practices will be applied for instruction in this course:

- **Use of Technology:** We will use dynamic geometry programs such as GeoGebra for the exploration of ideas generated in class and through assignments. In addition, students will be directed to particular internet sites and to selected chapters of the textbook to read about the concepts of study. However, it is prohibited to do general internet searches when completing homework. Instead, the students are encouraged to problem-solve and communicate with peers in order to work as mathematicians work when pursuing new ideas.
  - **Attendance:** I expect you to be present, arrive on time for a prompt start, and be prepared for every class. Much of the work we do will be done collaboratively, as such, it is not possible to make up the work done during class. Thus, attendance is mandatory -- that is, I expect you to attend all scheduled classes, unless it is unavoidable. Just as any professional teacher does, in the event of an emergency or other special circumstances, I expect you to contact me prior to class (via email) if you will not be present in class for any reason.
  - **Participation:** Your participation in our class activities and discussions is important not only for your own learning but also the learning of others. Sharing your solutions, undeveloped ideas, and
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puzzlements with the class, as well as responding to classmates' ideas, statements, and questions, are all critical to our work together. As a teacher, you need to do more than understand your own thinking, or your own solutions to math problems -- you have to be able to track others' thinking, figure out what others are saying, and determine whether and how they make sense mathematically. In our class, the "others" will be your classmates. But in the future, they will be your students. Listening to and interacting with others in our class is explicitly to help you develop mathematical dispositions and skills that matter for teaching. Talking in class is also crucial -- as a goal, not a means. As a teacher, you will have to talk mathematics and talk about mathematics teaching all the time. This course provides you the opportunity to learn to speak more clearly, with an attentive focus on your listener. Therefore, I expect professional behavior from you. I expect you to be fully engaged during class and be respectful of others (i.e., your fellow students and the instructor).

- **Preparation:** I expect you to complete assignments before class and be prepared for, and actively engaged in, every class. Be sure to carefully examine the directions for each assignment -- your grade will depend upon the extent to which you fulfill the requirements. Even if you miss a class, I expect you to be prepared for subsequent classes (including completing any assignments that are due the day you return to class). You can meet these expectations by reading and working through the class slides posted on TEAMS, or by contacting me (or a friend from class) and requesting any materials and assignments that you have missed.
- **Late Assignments:** A lot of daily assignments will be submitted through TEAM assignments feature and therefore will have firm cut off times. All assignments must be turned in on time -- even if you miss a class, you should arrange for your assignment to be turned in on time (e.g., scanning it as a PDF and sending it via email if a hard copy is requested in class). Note that late assignments will not be accepted for ANY reason.

## EXCUSED ABSENCE POLICIES

Regular class attendance, participation, and engagement in coursework are important contributors to student success. Absences may be excused as provided in the University of Houston [Undergraduate Excused Absence Policy](#) for reasons including: medical illness of student or close relative, death of a close family member, legal or government proceeding that a student is obligated to attend, recognized professional and educational activities where the student is presenting, and University-sponsored activity or athletic competition. Additional policies address absences related to [military service](#), [religious holy days](#), [pregnancy and related conditions](#), and [disability](#).

## DROPPING/WITHDRAW

If a student wants to drop or withdraw the class, it is his/her responsibility to do so by logging on <http://access.uh.edu> and completing the drop process before the drop deadline. Instructors cannot drop students for any reason.

## INCOMPLETES

An incomplete (I) may be awarded to you by your teacher if the reason is a compelling NONACADEMIC reason, you have completed virtually all course assignments AND you have a passing grade on this work.

Incompletes are NOT available to students who have done little of the coursework nor for students who have failing grades on what they have done. See your teacher to discuss eligibility and to fill out and sign the Incomplete contract. This is also required and must be signed in advance of an I being posted. Imminent failure is not an acceptable reason to be awarded an incomplete.

## COMMUNICATION VIA EMAIL AND/OR TEAMS

Email communications related to this course will be sent to your [Exchange Email Account](#) which each University of Houston student receives and will be posted on TEAMS. The Exchange mail server can be accessed via Outlook, which provides a single location for organizing and managing day-to-day information, from email and calendars to contacts and task lists. Exchange email accounts can be accessed by logging into Office 365 with your Cougarnet credentials or through AccessUH. They can also be configured on [IOS](#) and [Android](#) mobile devices. Additional assistance can be found at [Get Help](#) page.

Your instructor will be sending class emails using PeopleSoft; you are responsible for checking your UH email. Per UH Policy, notices properly addressed and so sent via PeopleSoft shall be presumed to have been received by the student. Thus, you are responsible for the content in emails sent to your UH account, regardless if your external (non-UH) email provider filters or blocks them. When emailing your instructor, it is recommended that you use a professional email address and include the course name on the subject line so that your instructor can address your questions accordingly.

## ACADEMIC HONOR PRINCIPLE

University of Houston students are expected to adhere to the Academic Honesty Policy as described in the UH Undergraduate Catalog. “Academic dishonesty” means employing a method or technique or engaging in conduct in an academic endeavor that contravenes the standards of ethical integrity expected at University of Houston or by a course instructor to fulfill any and all academic requirements.

Academic dishonesty includes, but is not limited to the following: Plagiarism; Cheating and Unauthorized Group Work; Fabrication, Falsification, and Misrepresentation; Stealing and Abuse of Academic Materials; Complicity in Academic Dishonesty; Academic Misconduct. Refer to UH Academic Honesty website and the UH Student Catalog for the definition of these terms and university’s policy on Academic Dishonesty. Anyone caught cheating will receive sanctions as explained on these documents and will be reported to the department for further disciplinary action. The sanctions for confirmed violations of this policy shall be commensurate with the nature of the offense and with the record of the student regarding any previous infractions. Sanctions may include, but are not limited to: a lowered grade, failure on the examination or assignment in question, failure in the course, probation, suspension, or expulsion from the University of Houston, or a combination of these. Students may not receive a W for courses in which they have been found in violation of the Academic Honesty Policy. If a W is received prior to a finding of policy violation, the student will become liable for the Academic Honesty penalty, including F grades.

## UH CAPS STATEMENT

Counseling and Psychological Services (CAPS) can help students who are having difficulties managing stress, adjusting to college, or feeling sad and hopeless. You can reach CAPS ([www.uh.edu/caps](http://www.uh.edu/caps)) by calling 713-743-5454 during and after business hours for routine appointments or if you or someone you know is in crisis. No appointment is necessary for the “Let’s Talk” program, a drop-in consultation service at convenient locations and hours around campus.

[http://www.uh.edu/caps/outreach/lets\\_talk.html](http://www.uh.edu/caps/outreach/lets_talk.html)

## ADDITIONAL HELPFUL INFORMATION

**COVID-19 UPDATES:** <https://uh.edu/covid-19/>

**COOGS CARE:** <https://www.uh.edu/dsaes/coogscare/>

**LAPTOP CHECKOUT REQUESTS:**

<https://www.uh.edu/infotech/about/planning/offcampus/index.php#do-you-need-a-laptop>