

MCS 303, Geometry

Spring 2023, 11:30–12:20 MTuThF in OH 318

Instructor: Imre Tuba
Office: Olin Hall 312
Phone: (507) 933-7009
E-mail: ituba@gustavus.edu

Website: <https://homepages.gac.edu/~ituba/mcs303s23>. I will also use Moodle to post grades and possibly a few other things.

Office hours: See class website.

Prerequisite: Completion of MCS 221 or instructor's permission. If you have not had MCS 221, be sure to talk to me.

Textbook: Michael Hvidsten, Exploring Geometry, 2nd edition.

Course objective: Geometry is one of the oldest branches of mathematics. It has played an instrumental role in the historical development of mathematics into the intellectual discipline that it is today. Euclid's Elements around 300 BCE was probably the first systematic and logically almost complete treatment of mathematics. More than half of it is devoted to geometry. It is also the oldest math textbook that is still in use today. More than 2000 years after its publication until logically sound systems of geometries different from Euclid's were discovered. In this course, you will learn both about Euclidean and non-Euclidean geometries. You will learn how a system of geometry can be built from its basic axiomatic components. You will also learn about building models, which allow you to study geometry in more concrete settings. Rigorous reasoning and proof writing are essential components in this course. You will be expected to write your own clear, rigorous, and convincing arguments.

Class attendance: While attendance is not part of your grade, and I do not formally track it, your attendance is expected in every class unless you have an exception approved by the college. You are in college to learn, and I expect that you take your studies seriously. If you skip classes you will miss the chance to learn skills that will be tested on the exams.

On work outside class: Have you ever wondered why you are only expected to take four classes at a time to be a full time student? That's because you are expected to do a lot of work on your own outside class. In fact, the rule of thumb of college education is that for every hour you spend in class, you need to spend two hours studying outside class. So for the four hours of class we have each week, you should also budget another eight hours to do your homework, read your textbook, and review your lecture notes. That is if you are well-prepared for the course. If your background is lacking, then you'll have to spend more time.

Homework and reading will be posted on the class website regularly. You will be able to follow the progress of the course using the website. HW is an essential part of your learning. Take it very seriously. It is extremely important that you keep up with the HW. If you do not, you will quickly find yourself lost in class and at a great disadvantage during exams. Treat the HW as a learning opportunity, rather than something you need to get out of the way. Reread, revise, and polish your solutions until they are correct, concise, efficient, and elegant. This will really deepen your understanding of the material. You won't do well in a math class without doing all of the HW. Attending class and reading your textbook are necessary but not sufficient conditions for passing the course.

Most of your homework will consist of exercises in the textbook. Your work on these exercises will be tested on quizzes and exams. Every quiz and half of every exam will consist of exercises straight

from this kind of homework. After the due date, they can show up on quizzes/exams. I strongly suggest that you write up and turn in your homework by the due date. I will correct your work but will not assign a score to it. This is so you treat the homework as a learning opportunity rather than a means of evaluation. In fact, you can turn in your homework to me any time for feedback. I will comment on it and turn it back to you as soon as I can. If you'd like, you can then correct your mistakes and turn it in again for me to check.

There is an obvious winning strategy. Do the HW, seek feedback on it, revise it, and keep your HW notes neat and organized. The familiarity you gain with the exercises by doing this will let you do the quizzes with ease. It will also let you complete half of each exam quickly and move onto the other half of the exam. The experience you gain by keeping up with your homework will be invaluable in doing that other half of the exam. On the other hand, if you do not keep up with your HW, you will face many unfamiliar problems under time pressure on quizzes and exams. This is very difficult and your grade will likely reflect it. Clearly, if you don't turn in homework, I can't give you feedback on your work, no matter how much I want.

Collaboration on the HW: Limited collaboration on the homework with your fellow students in the class is OK. But see the section on Academic Integrity! The idea is to let you discuss and critique each other's ideas and not to let you split the workload. Keep collaboration constructive and reasonable. You should fully understand the solution and write it up on your own. Your understanding of the material will be tested on the quizzes and exams.

If you are approached by another student from the class who wants to copy your HW, think twice before generously sharing. You will feel bad if your crafty buddy outscores you on an exam by exploiting your and everybody else's collective wisdom without doing work of his/her own. Be especially careful not to give a fellow student a chance to use your work to cheat on a quiz or exam.

Discussion sections: I strongly encourage you to organize a weekly session to work with (not copy from!) your fellow students on problems in class and on the homework. This will help you keep up with your work and get ideas and feedback from others who are grappling with the same exercises as you. You may find that the sense of companionship motivates you to work.

Quizzes: We will have a quiz on average every one and a half to two weeks. The problems on the quizzes will come from the homework. It is your responsibility to attend class, so if you miss a quiz because you are not in class, you will usually not be allowed to make it up. But your lowest quiz score will be dropped. If you miss more than one quiz, the missed quiz will count as a score of 0. If you miss more than one quiz and you have a compelling and documented excuse, let me know, and be prepared to show documentation for your excuse. Skipping class is not a compelling excuse.

Midterm exams: There will be two in-class exams, on or about Mar 17 and Apr 21. If you skip an exam, you will normally not be able to make it up, unless you have a compelling (e.g. medical) and documented excuse. Forgetting that there is an exam or being unprepared for it are not considered compelling excuses. Your in-class exam score will be computed as $\frac{2}{3}(\text{higher score}) + \frac{1}{3}(\text{lower score})$.

Final exam: 1-3 PM on Mon, May 22. The final exam is an important part of your obligations at Gustavus. Do not make travel/vacation plans that prevent you from taking the final exam at this time. If you have more than two final exams scheduled for the same day, let me know well in advance.

Grading scheme:

Quizzes	25%
In-class exams	45%
Final exam	30%

A score of 80% or more will guarantee an A- or better, 60% a B- or better, 40% a C- or better,

and 20% a D- or better.

On independent work: Problem solving skills are developed by solving problems, not by watching other people solve problems. Expecting to learn math without doing exercises on your own is like expecting to learn to ride a bicycle without ever sitting on a bicycle. Attending class and reading the textbook won't be enough to do well on the exams. You should work through every example and argument in the book and in your class notes and expect to have to re-read everything several times. It's slow, but then your reading list for this class is short.

On academic integrity: You must uphold the college's Honor Code (https://gustavus.edu/general_catalog/current/acainfo) on every quiz and exam. Simply put, the Honor Code obligates you not to cheat, even when nobody is watching, and to report to the college every instance of academic dishonesty that you know of. Using unauthorized aids—including help from another person—on quizzes and exams constitutes cheating. Representing someone else's work as your own—even if you make minor changes to it, or reword it—is plagiarism. Cheating and plagiarism are violations of academic integrity and college policy. They are unfair to fellow students, who are doing honest work. If you get caught, the report becomes part of your academic record at Gustavus. The consequences range from receiving no credit for the work you cheated on to expulsion from the College depending on the severity of the violation and how many past violations you have committed. It's not worth it. Don't do it. If you are in doubt whether what you are doing is legitimate, it is better to ask me.

Quality of work: It is important that you work neatly on the assignments. The quality of your work will affect your grades on the exams. Quality has to do with how easy it is for someone else to read your solution to a problem. It is not enough to do the math right, you must also communicate it well.

Academic Accommodations: Gustavus Adolphus College is committed to ensuring the full participation of all students in its programs. If you have a documented disability, or you think you may have a disability of any nature (e.g., mental health, attentional, learning, chronic health, sensory, or physical) and, as a result, need reasonable academic accommodation to participate in class, take tests or benefit from the College's services, then you should speak with the Accessibility Resources staff, for a confidential discussion of your needs and appropriate plans. Course requirements cannot be waived, but reasonable accommodations may be provided based on disability documentation and course outcomes. Accommodations cannot be made retroactively; therefore, to maximize your academic success at Gustavus, please contact Corrie Odland (codland@gustavus.edu, x7138) or Cinde Wiebusch (cwiebusc@gustavus.edu, x7228) at the Academic Support Center as early as possible. More information about accessibility resources is available at <https://gustavus.edu/asc/accessibility>.

If you need special arrangements, let me know well in advance so we can plan to accommodate your needs.

Academic Accommodations for Religious Observances: You may request appropriate academic accommodations if your religious observances conflict with any course requirement. Such accommodations should be requested early and in writing, typically by the end of the second week of classes in foreseeable cases. The Chaplains' Office is available for consultation on any requests for accommodation. Make your requests reasonable and make them in a timely manner.