Purpose: This course is designed to enhance your understanding and appreciation of mathematics as an art and science. My hope is that this course represents the beginning of a new engagement with mathematics you will carry with you for many years. We will try to reach into some areas of mathematics not usually covered in the typical high school or college courses.

Despite common opinions, mathematics is not an unapproachable subject where you either have the talent or brain to do it or not. This subject was, and continues to be, created by a very diverse group of people who enjoy it immensely and write about it so that others could share in their joy. This is not a course about how to find the one, correct, absolute answer to an isolated fact of arithmetic or algebra. Instead it is meant as a kind of disciplined exploration of the question, “What patterns are found in the world around us?” Be prepared for some new vistas.

The purposeful title of our course is Discovering in Mathematics. You will be asked to read the text and other materials then work on problems or puzzles in advance of my providing a fuller explanation. This is the essence of discovery, working out some problem and doing an investigation on your own without being prepped on how to do everything in advance.

Prerequisites: The most important attribute you can bring to this class is curiosity. If you are interested in how some rather off-beat things all tie together to make some unexpectedly harmonious and intriguing patterns in the world around you, that is good. This class is not about trudging through how to factor or FOIL polynomials once more or memorizing geometry theorems such as angle-side-angle, ASA, for no apparent purpose. This course is not about watching classic math reruns ala’ ESPN. We are taking another approach.

Text: The textbook for this course is officially out of print so can only be obtained online or through used copies. For a public online version, go to http://books.google.com and search for Symmetry, Shape, and Space. You will find a version of text having only certain sections of the text available in the preview. I have also provided links on our course web page can be used to view all the pages in the text we will be using.

Symmetry, Shape, and Space or SSS, is a fairly specialized book that tries to impart the flavor of mathematics through emphasis on one area of mathematics-geometry. For this reason, it is not meant to provide a comprehensive (re)view of mathematics suitable for most science majors.

There are a great many activities and exercises in the text along with many others I will provide which we shall work through. This is the best way to understand and form an appreciation for mathematics-do it yourself. If you are not as skilled at drawing, cutting, pasting, etc as you would like, take this as an opportunity to get better. If you don’t remember your geometry axioms or theorems or know what the golden ratio is, use this chance to put it all together so you see the individual parts and the whole.

Materials: We will be doing a large number of projects this term which involve hands-on work. You will
need some materials to do these projects. Here is a list of tools and supplies you should acquire as class begins.

- 12 or 18 inch ruler (metal or metal edged is preferable for cutting)
- graph paper (printable from Internet sites)
- good quality compass (circle drawing tool)
- colored pencils or markers
- scissors
- Scotch tape and glue stick
- X-acto hobby knife
- protractor (angle measure)
- stiff cardboard tube (Pringles potato chip tube is fine, we won’t need this for some weeks)

You should make some sort of carrier, box, or holder for your tools so you can easily bring them to class when needed. I will try to alert you to when you will need tools in class. YOU MUST COME PREPARED TO PARTICIPATE EACH DAY!

**Homework:** I will assign homework problems each week. Each homework set will be just a few exercises but it is very important that you do them for two reasons. First, they all count toward your class grade and second, pondering the details is the only way to really understand and appreciate this subject. **I will not accept late homework for grading. Period.** So as not to penalize students due to sickness or other unavoidable lapses, I will drop the two lowest homework grades.

**Projects:** In addition to class activities, we will be doing several projects involving geometric constructions, investigating some history behind geometry, using technology, etc. The idea is that you will be required to look into some applications or history of mathematics beyond those explained in our text or in the class. This is another form of discovery as well. You may need to create some artifacts such as a short research paper, poster, or other item to explain your research results. I will provide details on these projects during the term well in advance of their being due.

**Math Colloquia:** To foster connections with the mathematics community at HWS, I encourage you to attend two Math department colloquia talks this term for extra credit in this course. Details on schedules and topics will be provided throughout the term.

**Attendance/Etiquette:** I try to provide a full day’s content in each class and this may take various forms (lecture, question and answer session, hands-on construction, etc) and I do not tend to shortchange the class in terms of energy or preparation on my part. I insist in return that some basic behaviors be observed in the class.

Turn off your cell phone before coming to class and keep it off during class. Don’t use your laptop or tablet while in class. If you remotely think you may need a drink or need to use the toilet, do so before or after class. I do not appreciate students sauntering out in the middle of class discussion or lecture. This is rude and distracting behavior both to the instructor and audience.

Talking in class that is disruptive to the ongoing discussion is not acceptable. If we are going too slow or belaboring a point in class, let me know and we will try to move along more briskly. Don’t lose focus and start a side conversation to kill time. We will have several activity/construction days where you can move around the room, talk with your group, get a drink, etc but for class discussion and lecture, stay on task.

You must physically be in class and lab to fully understand the material. I realize family emergencies, illness, school activities, etc contribute to absence but you need to inform me ASAP in advance if you are going to
miss class. Missing class or lab more than two times for unexcused absence will substantially decrease your letter grade in the class. **Do not spend time in class texting or otherwise being distracted by your smart phone, tablet, or laptop.**

**Exams:** There is one traditional midterm exam in this course. The exam is held during class, with one or two additional take-home questions, covering the material contained in about 1/2 of the course.

In lieu of a final exam, each of you will be responsible for a presentation during class time. Given the size of our class, this means we will be using the last week of classes as well as the assigned final exam session for presentations. **Do NOT make any travel plans without first consulting these dates and times!**

**Midterm Exam:** Friday October 9th in class  
**Final presentations:** Presentations are in class Mon-Wed-Fri December 7 - 11 and Tuesday, December 15th, at 7 pm - 10 pm.

**Grades:** Yes, you will get a grade in this class. Your grade is based on all your activities including homework, exam, projects, class participation, and extra credit work. Exact percentages depend on the number of homework assignments but they work out something like this:

Home work is 30%, midterm exam is 30%, projects are 20%, and class participation/attendance/extra credit is 20%.

**Resources:** If you have unresolved problems with the homework or other parts of the course, come to my office hours or make an appointment for another time if that is inconvenient. Tasha Williams, our Math Intern, is available for additional help with homework and general mathematics questions. You can find her in Lansing 310 at the times listed above including convenient afternoon and evening hours.

**About the Center for Teaching and Learning (CTL)** At Hobart and William Smith Colleges, we encourage you to learn collaboratively and to seek the resources that will enable you to succeed. The Center for Teaching and Learning (CTL) is one of those resources: CTL programs and staff help you engage with your learning, accomplish the tasks before you, enhance your thinking and skills, and empower you to do your best. Resources at CTL are many: Study Mentors help you find your time and manage your responsibilities, Writing Fellows help you think well on paper, and professional staff help you assess academic needs.

I encourage you to explore these and other CTL resources designed to encourage your very best work. You can talk with me about these resources, visit the CTL office on the 2nd floor of the library to discuss options with the staff, or visit the CTL website.

Disability Accommodations: If you are a student with a disability for which you may need accommodations, you should self-identify and register for services with the Coordinator of Disability Services at the Center for Teaching and Learning (CTL), and provide documentation of your disability. Disability related accommodations and services generally will not be provided until the registration and documentation process is complete. The guidelines for documenting disabilities can be found at the following website: [http://www.hws.edu/disabilities](http://www.hws.edu/disabilities). Please direct questions about this process or Disability Services at HWS to David Silver, Coordinator of Disability Services, silver@hws.edu or x3351.