

FYSP 179 – Symmetry in Science, Art, and Life (Fall 2008)

Instructor: Kevin Woods, King 220B, Kevin.Woods@oberlin.edu.

Class: Tuesday, Thursday 3:00-4:15pm, King 121.

Office Hours:

Monday 9:30-10:30am, Tuesday 2:00-3:00pm, Thursday 4:30-5:30pm, Friday 1:30-2:30pm.
Also, feel free to stop by any time my door is open (but be understanding if I say I am too busy), or you can make an appointment via email.

Readings:

Everything will be available online, though we will read much of *Fearful Symmetry*, by Stewart and Golubitsky, which you might want to buy used online. We will be discussing these readings in class, so you will need to print out copies of them (I suggest printing 2-sided to save paper and your print quota!) It is also ok if you bring a laptop with an electronic copy of the reading, as long as you are engaged in the discussion and not using the computer for other things.

Blackboard:

I will post readings, homework, and other announcements on Blackboard.

Outline of course:

Both the natural world and the man-made world are rife with symmetry. We will examine various arenas where symmetry makes an appearance. Some of these topics will be from art: Bach's canons, Islamic decoration; and some will be from science: the chemistry of crystals, the developmental biology of mirror symmetry in animals. As the semester progresses, we will also think about the aesthetics of pattern: why do we find beauty in symmetry?

We will have daily readings and discussions about these topics. The readings for the first third of the semester are set (see Blackboard). The readings for the second third of the semester will be found by you, based on your interests. And we'll go from there. Each student, at various times, will write response papers based on the readings that everyone will read before class, as well as a final research paper.

Interleaved will be a mathematical strain. You will have problems sets where the mathematical notions of symmetry are explored. Some of most every day will be spent on student presentations of problems you have been solving.

Grading:

Class participation (30%),
Written Mathematical Homework (20%),
Short Response to Reading (5%),
Developing a Reading and a Response Paper (15%),
Art Project (10%),
Final Research Paper (20%).

Class participation (30%).

This counts so much because it is a vital part of this discussion-based course. It is important that you be actively engaged in the discussions: listening, thinking, and talking. It is important that you have read the readings and any posted student response papers. It is important that you be in class each day, on time.

In addition, part of every class will be spent on student presentations of mathematical problems (I will provide handouts with these problems). Everyone should come to class each day prepared to present the solution to **at least one problem**. Of course everyone won't speak every day, but I'll do a combination of calling on specific people and asking for volunteers. When one person is presenting, every student in the class has a responsibility. Ask yourself, "Is this presentation correct, and is it clear?" Engaging with the presenter is also part of the participation grade.

Finally, we will be using the **Discussion Board** on Blackboard. I will post all of the readings here. By the midnight before each class, you must post a short paragraph commenting on the reading, the posted student response, or previous comments. Feel free to start new threads, but label them with the date of the class, e.g., "9/4 Dihedral Groups". Also I encourage you to continue the discussion with more posts, but you're only required to post one. Your posts should be more than just "I didn't get ___" or "I really liked ___". Explain why you liked it or where your confusion starts.

Written Mathematical Homework (20%).

At the beginning of each Tuesday, you will be responsible for handing in solutions to problems. I will put these problem numbers on the board each day, and I will also put them on Blackboard. Sometimes the problems will have already been presented in class, and sometimes they will never be presented and you will have had to figure them out on your own or with other students. I'm looking for not only correct solutions, but clear ones too. You're learning how to write in a foreign language (Math), so content counts but so does how you say it. These will be graded by me, with either a check, check-minus, minus, or zero. A check will be awarded for **correct and clear** work with no or very minor problems, a check minus for work that is good but with minor problems in correctness or clarity, a minus for things with major problems, and a zero for things that aren't turned in at all or are way off.

To encourage you to proofread and make changes for clarity, you must **type** your solutions. You will generally turn in two days' worth of homework: each day must be on a separate piece of paper, as they will be divvied up.

For typing up solutions, Microsoft Word works fine (for special math things, you can go to "Insert > Object" and choose "Microsoft Equation"). If you'd like to go all out, LaTeX is the gold standard for writing pretty mathematics. Check out "The Not Short Introduction to LaTeX" online. There are many free implementations of LaTeX; I use WinEDT as my front end for Windows; TeXShop is popular for the Mac.

Late Work Policy: Homework can be turned in until I start grading (no guarantee when that will be). However, I will drop a week's worth of homework grades at the end of the semester.

Short Response to Reading (5%).

A 1.5-2 page response to one of the readings between September 9 and September 30. This will be posted in advance for everyone to read and will help start our discussion. Specific instructions will come in a handout.

Developing a Reading and a Response Paper (15%).

Tentatively between October 2 and November 4. In pairs, you will choose a reading related to some appearance of symmetry. Each of you will individually write a 4-5 page response. This will be posted in advance for everyone to read. You will also lead that day's discussion. Specific instructions will come later.

Art Project (10%).

Tentatively due November 25. You will create a work of art. This will be graded on creativity, use of symmetry, and a short artist's statement. Specific instructions will come later.

Final Research Paper (20%).

The final draft will be due at the end of our scheduled exam time, Friday, December 19 at 9pm, though there will be earlier deadlines in November and December for drafts, etc. This will be a 9-11 page research paper with at least 4-6 works cited. Specific instructions will come later.

Honor Code:

See <http://www.oberlin.edu/students/links-life/rules-regs.html> for the complete Honor Code.

For each assignment, I will give you specific Honor Code. The general theme is that discussion with other students is great, but the final work must be your own, though you may "use sources of assistance routinely offered to all students, such as reference librarians and writing tutors" (Honor Code text).

For the mathematical assignments, I encourage you to work together. Written assignments must be in your own words, however. Work on the problem together, and then go back home and write up your solution. In particular, you should never look at someone else's write-up before it is due. Other than the other students (and me!), you may not use any other outside sources for the math problems.

Disabilities:

If you have a disability of any sort that may affect your performance in this class, please consult with me and with Jane Boomer in the Office of Disability Services. All requests for accommodation must go through that office.