

INSTRUCTOR: Janice Sklensky

OFFICE: SC 101A

OFFICE PHONE: x3973

E-MAIL: jsklensk@wheatonma.edu

HOME PAGE: <http://acunix.wheatonma.edu/jsklensk/home.html>

OFFICE HOURS: Posted on my home webpage - click on *schedule*.

COURSE MATERIALS: Various chapters that I have put together, available from me for \$15.

Also various supplies: a ruler, graph paper, a small calculator, and some art supplies, to start with; if I think of more, I'll let you know. The ruler and the calculator must be brought to class every day.

Most "handouts" for this class will in fact not be handed out, but instead will be posted on the web, in an effort to use less paper. Some of my web pages are public and can be accessed directly by going to my home page listed above and clicking on the *Math in Art* link, while others are available only through On Course (for instance, all the displays and in-class work that I will show during class).

OPTIONAL READING: *The da Vinci Code* by Dan Brown, *Flatland* by Edwin Abbott, *The Golden Ratio* by Mario Livio, *Arcadia*, by Tom Stoppard are just a few books or plays you might enjoy.

CONNECTION: This course in combination with any one of Art History 102, 111, 202, or 211 forms a 2-course connection.

OVERVIEW

In this course, we will explore several math topics that are connected to visual art. The topics we will study will include (but may not be limited to):

- *Systems of Proportions*: we will begin by reviewing the concepts of proportionality and ratios. We will then investigate how artists and architects can use proportion in their work, and learn about several specific systems of proportionality that have been used by artists or architects through the millenia. We will also develop standards for judging whether a specific system of proportions was used in building a temple or creating a work of art.
- *The Golden Ratio*: we will learn Euclid's definition of the Mean and Extreme Ratio and investigate how this leads to the famous constant φ , the Golden Ratio. We will investigate whether it appears in the Great Pyramid, and through projects you may investigate various other works. We will also investigate the connection between the Golden Ratio and sequence of numbers 1, 1, 2, 3, 5, 8, 13, 21, ... After reviewing the concept of similar shapes from geometry, we will see how the Golden Ratio answers a question posed by the Greeks involving similar rectangles.
- *Perspective*: we will learn the 3-dimensional coordinate system, and learn how we can

combine this idea with geometry to develop some very precise rules for drawing with depth. We will use our ideas both to do some drawing and to investigate the perspective in classic art works.

- *Fractals*: we will learn about self-similarity, fractional dimension, iteration, and complex numbers. We will then see how these ideas lead to some very cool pictures, and create some ourselves. We will also see some pictures from hundreds of years ago that appear remarkably fractal in nature, and discuss how mathematicians and computer scientists use the idea of fractals to create very realistic looking clouds, mountains, and trees, and other natural objects that can be used in graphics.
- *Non-Euclidean Geometry and the Fourth Dimension*: we will learn about a type of geometry that does *not* assume that parallel lines never meet, and see where that idea takes us; we will also explore the concept of a fourth spatial dimension. We will discuss how the cubists were inspired by these ideas.

COURSE STRUCTURE, GOALS, AND EXPECTATIONS:

The main goals for this class are to

- use your interest in art to motivate learning mathematics that can be used to create, analyze, or understand various works of art, thus honing your logical abilities,
- help you gain an appreciation for how beautiful math can be by actually being able to *see* some of what it can do,
- begin to give you a feel for how universal a language math is, rather than the isolated field many people believe it to be.
- give you a deeper and more layered appreciation for some of the art you see.

In this class, as with all others, how much you actually learn is entirely up to you. Math is a subject you can only learn by doing—observing me (and others) may give you a start, but it is certainly not enough. Class will combine lecture with time for in-class work so that you may *do* what you've been hearing about.

The rule of thumb for how much work you should expect to spend on any college class is 2 to 3 hours of work outside of class for every hour in class. No matter what your experience has been in other classes,

Plan to spend at least 8 hours a week on this class outside of class!

Of course, some weeks you may spend more than 8 hours on this class, especially when studying for an exam or working on a project, while others you may spend less, but it's best if you have the time set aside to work on this class.

IS THIS THE RIGHT MATH COURSE FOR YOU?

This course is intended for students who are interested in art or art history. If you are not especially interested in these topics, we may well offer a different math class better suited to your interests. The more background you have in art and/or art history, the more you will get out of this class, I believe. For that reason as well as the fact that some majors require or recommend specific math courses, it's often a good idea to wait to take this class until you are at least a sophomore. But if you're a first-year whose heart is set on taking this class now, don't worry – it's certainly accessible to you.

CLASS PARTICIPATION

As with any class, you will get more out of it if you actively participate. To encourage you, I am including class participation in your overall grade. This includes attendance, being on time, paying attention, asking constructive questions in and out of class, answering questions that I pose, listening respectfully to your classmates, working with classmates to investigate problems when I ask you to, giving helpful feedback to classmates when that is required, having a general aura of interest, and other similar aspects of good academic citizenship.

I plan to pay attention each day to the ebb and flow of communication and participation; active and constructive participation will earn you a point, lack of participation will earn you no points, and active destructive participation (repeatedly arriving late, talking while I'm talking or otherwise distracting class-mates, asking questions that essentially ask me to repeat what I already said because you weren't paying attention or weren't there, a lack of focus during in-class work times, for instance) will take away a point from your total. Please be aware that repeated absence will cause you to lose participation points – if you miss more than three classes, each subsequent absence will result in lost points.

PROBLEM SETS

While a portion of this course will focus on how math has appeared in art, most of the focus will be on learning the math itself – and to help you with this, I will be collecting homework. There are numerous reasons to collect and grade problem sets: so that your grade does not rest solely on exams and a few projects; to give you feedback as to whether you're understanding the material; to give me feedback as to whether anyone is having trouble, and to let me know whether I need to spend more (or less) time on material.

I have found that collecting homework every day is overwhelming to you, to me, and to the homework grader if we have one. For that reason, you will have *weekly* problem sets, due Wednesdays *at the beginning of class*. Let me emphasize, however, that the problem sets do reflect an entire week's worth of material, and should be worked on steadily throughout the week.

Late problem sets will have points deducted!
--

If turned in on Wednesday from the time I collect it to 2:30, I will deduct 0-25 percent depending on the situation. Problem sets turned in after 2:30 pm Wednesday and before 2:30pm Thursday will receive half credit. I can not accept any problem sets after 2:30pm Thursday of the week the problem set is due.

PROJECTS:

As this is a course that covers mathematics as it connects to art, creating some art work using the mathematical ideas you've learned is a fun and challenging way to put the material you've been learning into action. There will be many opportunities throughout the semester for you to do just this! There will also be projects that do not involve creating artwork, for those of you who feel your talents lie elsewhere.

Here's how the projects work. This portion of the class will be worth 20% of your final grade. To get the full 20%, you need to receive 100 points on projects (just as, to receive the full 25% on homework, you must get full credit on every problem set). How do you get those points? By doing some of the projects available. Several projects will consist of using mathematical ideas to construct a work of art, and of writing a description of the math involved that could be easily read and understood by your friends in the class. Others will consist of analyzing a work of art, or reading books or articles and analyzing them. For each project that you do, I will assign you points based on the correctness of the math, the extent to which you incorporated math in the work, the clarity of your explanation, and also the effort you put into the art, and to a lesser extent the quality of the art. Just keep doing projects until you reach 100 points. Most people do between 3 and 5 projects. For more details, see the link on my course web page.

In order to give you the opportunity to (to some extent) choose those projects which most appeal to you, I have listed the possibilities I've already thought of, along with their due dates, on the web. Follow the links from the course web page. I will hand out detailed instructions for each project in class as we cover the relevant topics. Most projects will be due on Fridays.

You may also propose other ideas for projects to me, if I've missed a good possibility.

EXAMS AND FINAL:

During the semester, I will give three midterm exams to make sure that you are putting together the concepts and skills we have covered. The primary emphasis of the exams will be for you to show me how well you've mastered the underlying mathematical ideas. The final will be cumulative. The dates of all exams are fairly firmly scheduled, and are listed on the course syllabus.

Notify me in advance if you will be missing an exam. If your reason for missing is acceptable, we will arrange that you take the exam **early**. If you miss an exam without notifying me in advance, I reserve the right not to give you a make-up exam. I will not give any student more than one make-up exam during the semester.

ATTENDANCE:

While you do have some reading sources, much of this course is only available through the classes. Thus missing this class is clearly not a wise idea. If you **do** miss class, you are responsible for the material that was covered. *Warning:* – I can only keep one day's worth of events in my head and may not remember something important, so ask your friends as well as me.

Also, as I mentioned earlier, once you miss three classes, your absences will begin to count against your participation grade: the more classes you miss, the more points you will lose.

ACCOMODATIONS:

In compliance with the Wheaton College policy and equal access laws, Dean Wilhelm is available to discuss appropriate accommodations that may be recommended for students with disabilities. Requests for accommodations are to be made during the first two weeks of the semester so that timely and appropriate arrangements can be made.

Students are required to register with Denyse Wilhelm, Assistant Dean of Academic Resources and Disability Services, ADA/504 Coordinator, whose office is located in Kollett Hall, first floor at the Filene Center for Academic Advising and Career Services. Contact ext. 8215 to schedule an appointment, or email Dean Wilhelm at wilhelm_denyse@wheatoncollege.edu.

EVALUATION

I expect to use the weights below, although I reserve the right to change my mind if the semester does not go as expected.

Class Participation	5%
Problem Sets	25%
Projects	20%
Midterm Exams	30%
Final Exam	20%

If you question the fairness of any grade, bring it to me **within a week** of receiving it.

HONOR CODE

I expect you to abide by the Honor Code. *Remember: If you see a violation of the Honor Code occurring, you are bound by the Honor Code to report it.*

As part of the honor code, you are required to write *I have abided by the Wheaton College Honor Code in this work*, followed by your signature, on all written assignments. Every time you do, you should be pondering the question "how exactly does the honor code apply to *this* assignment, and did I *really* abide by it?" If, upon consideration, you do not feel you can truthfully write and sign the pledge, please come speak to me immediately!

So, specifically, how does the Honor Code apply in this class?

For all assignments: You may discuss the work with classmates, and you may use references that help you figure out how to do a problem on your own, but you may not use any references (people, other people's projects or assignments, books, the web) which either give you the answer or lead you directly to the solution. When you do use references (appropriately, as described above), you *must* cite them.

Homework: For the problem sets, you must write the results on your own, in your own words.

Projects: Both the art work and the explanation of it must represent your own work.

Midterm and Final Exams: You may not have your phone out at any time during the

exam. You may not use any notes, books, friend or colleague. You may not look at anybody's exam until after all exams have been returned. You may not use a calculator unless I specify that you may, and you may not use the memory aspect of a calculator.