SYLLABUS: MTH 103 Finite Math with a Special Emphasis on Math & Art

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Motivation: To provide humanities students with a basic mathematical perspective that will enrich if not complement their specific areas of study. In particular, this course aims to show how math and art, which are often thought to be polar opposites, are actually intimately related.

Reading Materials: There is no specific textbook for this course. However, I will provide reading materials in the form of pdfs and photocopies.

Attendance: Class attendance is mandatory and essential to understanding the material. We’ll often be doing group activities and you need to be in class to participate and get credit. If you have to miss a class, then it’s your responsibility to find out what you missed, get notes from a classmate, and be ready for the next lesson.

Grading: Attendance (10%); Eight assignments (20%); four in-class quizzes (50%); a final paper (10%); and group presentations (10%).

Topics (in sequence):
1) What’s Geometry?
Concepts: the abstract notions of length, area, and volume, some formulas and how we get them
Activity: Finding the area of a circle using Archimedes’s trick and the volume of a sphere using his cylinder and cone.
2) What’s a Tessellation?
Concepts: polygons, angles, tessellations
Activity: making your own Escher drawings
3) What’s Symmetry?
Concepts: symmetry--reflections, translations, rotations; groups
Activity: Trip to the Lowe Art Museum with Sculpture walk. Make your own symmetrical art.
4) The Space We Live in. Spatial Coordinates & Perspective by Numbers
Concepts: xyz-coordinate system; the perspective theorem
Activities: Window taping, plotting a box in 3D, drawing the 2D image of that box
5) Making Pictures. Drawing in one and two point perspective
Concepts: The vanishing point theorem; the viewing distance formula
Activities: Finding out where to stand to see a painting “pop”; the fence post activity; drawing a fantastic street scene
6) The Geometry of Seeing (Projective Geometry)
Concepts: projective transformations, Desargues’ theorem (maybe)
7) What’s Topology? [or The Space We Live In?]
Concepts: Euler’s formula, spheres & tori, Möbius strips & Klein bottles, the Color Problems
Activity: Making topological surfaces out of paper; Extra credit: Make or crochet your own hyperbolic surface
8) Is Reality Hyperbolic?
Concepts: parallel postulate; non-intersecting lines; hyperbolic triangles, the Poincaré disk
Activity: tiling your own hyperbolic plane

Some Totally Optional Reading:
Stephen Barr, Experiments in Topology, Dover, 1989
Timothy Gowers, A Very Short Introduction to Mathematics, Oxford University, 2002
Jeffrey Weeks, The Shape of Space, Dekker, 2002
Hermann Weyl, Symmetry, Princeton, 1989
HOMEWORK: “One must learn by doing the thing; for though you think you know it, you have no certainty until you try.” –Sophocles.

Homework problems will be assigned each week or so and will be collected at the beginning of class of the due date. **To do well in this class it is essential that you do the homework.** I strongly encourage you to work on these problems together and to get help from me or the tutors in the Math Lab. **Homework is graded on the basis of completeness.** To receive full credit, you must show your work. If it looks to me that you just copied the answers, then you will receive a zero for that assignment.

Each homework set must be stapled and contain the following information:
1. Your name.
2. The homework assignment #.
3. The due date.

**Guidelines for handing things in:** Please adhere to the following policies. I will deduct points on quizzes, homework sets, and papers that do not adhere to them...

- Use 8.5” x 11” paper that has no tears or fringe.
- Type or write neatly using a pencil. Do not cross out errors. If you find yourself erasing extensively, stop and start again on a fresh page. If you must use a pen, do not scribble things out.
- Use a straight edge or ruler to draw graph axes. Label these axes with the appropriate variable or title. Show your scale on the axes too.
- Clearly define any variables you introduce.

State your final answer to any story problem by writing a **full sentence** or paragraph. Simply stating that \( x = 3 \), for example, is not a satisfactory answer to an application/story/word problem.

WITHDRAWALS: If for any reason you decide to withdraw from this class, please contact me. If the withdrawal is completed on or before Feb. 3, no record of the class will appear on your transcript. You will receive a “W” on your transcript if you withdraw between Feb. 4 and April 2.

STUDENT RIGHTS AND RESPONSIBILITIES: Students are expected to respect the rights of others to learn in a non-threatening, non-distracting environment. For more details consult the Student Rights and Responsibilities handbook: [http://www6.miami.edu/dean-students/srr.pdf](http://www6.miami.edu/dean-students/srr.pdf). Students who feel they have a physical or learning disability should contact the Services for Students with Disabilities office.

CHEATING: Cheating in this class is unacceptable. Cheating includes giving or receiving unauthorized help during a quiz or exam, copying or allowing someone to copy homework, or attempting to deceive the instructor in any way about your or another’s achievement in this course. **A first offense results in a zero for that assignment, quiz, or exam. A second offense results in a zero for the course.** For more information about cheating and plagiarism policies, see the University of Miami Undergraduate Honor Code: [http://www6.miami.edu/dean-students/pdf/undergrad_honorcode.pdf](http://www6.miami.edu/dean-students/pdf/undergrad_honorcode.pdf)

**MTH 103 - Expectations**

**Class Expectations:** I expect you to be responsible.

- Come to class prepared everyday.
- Participate in the lectures: answer my questions, ask questions, work on problems that I give you.
- Turn off your cell phones and any other electronic gadgets during class time.
- Come see me during my office hours if you have questions.
- If for some reason you cannot make it to class, find out what information you missed in your absence by talking to your classmates or to me.
- If for some very important reason you cannot make it to class on a day that we are having an exam, let me know as soon as possible. Make-ups will be scheduled to take place BEFORE the in-class exam whenever possible. If an unforeseen emergency causes your absence, you must contact me IMMEDIATELY to schedule a make-up exam.