Honors 301 – Special Topics
Block 7-A Fall 2009

Mathematics and the Arts

Prof. Jan Minton
Office: 461 Trelxler
Phone: 375-2488
Email: jminton@roanoke.edu
Office Hours: MWF; 11:00 – 12:30, TTh: 2:00-4:00 and by appointment

Course Description: The purpose of this course is to find commonality between mathematics and the arts. Students will explore the aesthetics of mathematics as well as the mathematical underpinnings of various art forms. Creativity, beauty, and elegance of the art world are also hallmarks of mathematical inquiry and discovery. Perspective, symmetry, and proportion from the world of mathematics are among the essential tools used in the art world.

Intended Learning Outcomes: By the end of this course, successful students will be able to ...

1. Acknowledge that a mathematical idea, while convincing by its logic, can also be moving by its beauty
2. Compare the creative processes of artists and mathematicians.
3. Use the geometry of perspective to create three dimensional realism in simple drawings.
4. Create visual patterns based on symmetry.
5. Derive the Golden Ratio by calculation and construction and consider its presence in visual arts and music.
6. Explain the basic notion and features of fractals and give examples of their artistic possibilities.

Materials: Coloring implements (pencils, markers, whatever … your choice)
Tracing paper
Various kinds of graph paper (this can be found on-line)

Textbooks: Proof a play by David Auburn
Picasso at the Lapin Agile a play by Steve Martin
Art a play by Yasmina Reza
Flatland: A Romance in Many Dimensions by Edwin A. Abbott

Other Readings: Mathematics and Art – So Many Connections http://www.mathaware.org/mam/03/essay3.html
an online essay by Doris Schattschneider
A Mathematician’s Lament an essay by Paul Lockhart
Fractals and an Art for the Sake of Science an essay by Benoit B. Mandelbrot
The Regular Division of the Plane transcript of lecture by M.C. Escher
Possibly others …

Exams: There will be a midterm exam and the final exam. Each exam will be a mixture of short answer, short essay, and math “problems”. The mid-term is scheduled for October 7 and the final exam is 2:00-5:00 Thursday, December 10.
**Paper:** There will be one paper (5 page minimum) due in electronic form on October 2. This paper should be based on at least one journal source or book that relates mathematics to the art world. Your paper should serve as an example of either “Math ______ Art” or “Art _________ Math” as covered in the Doris Schattschneider web essay.

**Group Study:** Students in the class will form 4 study groups each to address a particular Math and Art topic. The groups will meet primarily outside of class and ultimately give a class presentation and post a “Wiki” that expands upon their topic. Group topics must be approved no later than Oct. 26. All “Wikis” are due by 5:00 Nov. 13. Group presentations will be Nov. 16, and 18.

**Art Work and Poster:** Students must complete a *work of art* that has a mathematical basis. The concept of the art work must be approved by November 11 and is due December 1. The class will host an exhibition of these mathematical works of art. The work along with a poster that sheds light on the relevant mathematics will be on display for visitors. Students will be on hand to discuss their works. Date of the Art Show is TBA during the last week of class.

**Other Graded Work:** In and out of class assignments may be collected for grading. Also, brief quizzes are a possibility. Two pieces of “other graded work” will be dropped. There will be no make-ups of “other graded work”.

**Attendance:** Attendance is critical. Students are expected to contribute to in-class discussions. Also, much of the mathematics covered will come from class notes rather than a mathematics textbook.

**Academic Integrity and Electronic Devices**

The college policy is fully supported. All work done for a grade must be done individually unless clearly stated otherwise on the assignment or approved by the instructor.

Cell phones must be turned off and put away prior to entering the classroom.

**The use of any electronic device during a quiz or exam is strictly prohibited.** This includes PalmPilots, Pocket PCs, and Blackberrys. Any use of such devices during a quiz or exam will be considered a breach of academic integrity. Basic handheld calculators may be used.

**Course Grades:**

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<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Paper</td>
<td>15%</td>
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<tr>
<td>Group Work</td>
<td>15%</td>
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<tr>
<td>Art Work &amp; Poster</td>
<td>15%</td>
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<tr>
<td>Mid-Term</td>
<td>20%</td>
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<tr>
<td>Final</td>
<td>20%</td>
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<tr>
<td>Other Graded Work</td>
<td>15%</td>
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Final course averages guarantee as a minimum the following course letter grades:

- **A** 93-100
- **B-** 80-82
- **D+** 67-69
- **A-** 90-92
- **C+** 77-79
- **D** 63-66
- **B+** 87-89
- **C** 73-76
- **D-** 60-62
- **B** 83-86
- **C-** 70-72
- **F** below 60