First Year Seminar 1314: The Mathematical Gardner
Fall Term 2010
Course Description

September 22, 2010

Instructor: John Schmitt
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My (and course) webpage: http://community.middlebury.edu/~jschmitt/
Office Hours: Monday 11am—12pm, Thursday 10am—12pm, Friday 11am—12pm, or by arrangement

Meeting Times:
Section A, Tuesday and Thursday, 1:30 pm — 2:45 pm, Warner Hall 507

Course Description:
In this course we will have an “orgy of right-brain tomfoolery” as inspired by the writings of Martin Gardner. For several decades Gardner’s contributions to *Scientific American* in the form of his column on mathematical games bridged the divide between professional mathematicians and the general public. He shared with us like no other, introducing or popularizing topics such as paper-folding, Hex, polyominoes, four-dimensional ticktacktoe — the list goes on seemingly forever. We will examine these mathematical curiosities and Gardner’s journalistic style — the former for pure pleasure and the latter in the hopes of emulation.

Textbook: Martin Gardner’s *Mathematical Games* (on CD) by Martin Gardner, Mathematical Association of America (MAA), 2005. (Current sale price of $39.95 from the MAA or from the college bookstore)

Texts (including a copy of course text) written by Martin Gardner and available on reserve in Davis Family Library

- Martin Gardner’s *Mathematical Games*
• Martin Gardner’s Sixth Book of Mathematical Games from Scientific American
• *aha! Gotcha*: Paradoxes to puzzle and delight
• *aha! Insight*
• A Gardner’s workout: training the mind and entertaining the spirit
• *Hexaflexagons, Probability, Paradoxes, and the Tower of Hanoi*
• *Knotted Doughnuts and Other Mathematical Entertainments*
• *The Last Recreations: Hydras, Eggs and Other Mathematical Mystifications*
• *Mathematical Magic Show*
• *Mathematical Puzzles and Diversions*
• *New Mathematical Diversions*, original version and revised version
• *Origami, Eleusis, and the Soma Cube*
• *Penrose Tiles to Trapdoor Ciphers*
• *Time Travel and Other Mathematical Bewilderments*
• *The Universe in a Handkerchief: Lewis Carroll’s Mathematical Recreations, Games, Puzzles, and Word Plays*
• *Wheels, Life and Other Mathematical Amusements*

**Texts in the style of and inspired by Martin Gardner, available on reserve in Davis Family Library**


All of the above listed works fall into the genre known as “recreational mathematics”. The Davis Family Library also has a subscription to *The Journal of Recreational Mathematics*.

**A requirement:**
As a result of your readings you will create many mathematical objects, puzzles, and curiosities. This is a required part of your reading, and so reading ten pages of text might take a couple of hours as a result of creating and puzzling. You are REQUIRED to bring these creations to class following the assigned reading and to save these creations in an organized portfolio. These creations will form part of your grade.

**Seminar Philosophy:**
This course is a seminar-style course, not a lecture-style course. Thus, your active participation will drive our class meeting time. Each day we meet you will be prepared — you will have done the reading, puzzled the puzzles, and generated answers and questions for us all to consider.

**Goals of the Course:**

- Think deeply about simple ideas.
- Discover the breadth of mathematics.
- Emulate the writing style of Martin Gardner
- Write about mathematics and mathematical ideas.
- Have intellectual fun.
Special Needs: If you require special arrangements for class or during tests/exams please talk to me as soon as possible to make such arrangements. (It will be important to let me know if you are color-blind.)

Grading Percentages:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Participation</td>
<td>15</td>
</tr>
<tr>
<td>Paper 1</td>
<td>20</td>
</tr>
<tr>
<td>Paper 2</td>
<td>30</td>
</tr>
<tr>
<td>Short Assignments</td>
<td>35</td>
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</tbody>
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Assignment of Grades:

The assignment of grades will follow the scheme below.

<table>
<thead>
<tr>
<th>Percentage Range</th>
<th>Grade</th>
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<tbody>
<tr>
<td>90 and above</td>
<td>A</td>
</tr>
<tr>
<td>80 - 89</td>
<td>B</td>
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<tr>
<td>70 - 79</td>
<td>C</td>
</tr>
<tr>
<td>60 - 69</td>
<td>D</td>
</tr>
<tr>
<td>below 60</td>
<td>F</td>
</tr>
</tbody>
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Plus and minus will be assigned at my discretion. (I reserve the right to curve upwards.)

The “Participation” portion of your grade will derive from your active participation in class — the intelligent observations you make, the good questions you ask, the solutions you provide, your preparedness, etc. It is a somewhat subjective component on which I am willing to give you feedback on a regular basis — just ask!

Course supplies:

You will find it useful to have the following supplies: scissors, glue, a ruler and compass, colored pens/pencils, various shades and thicknesses of paper, a large quantity of counters (e.g. buttons, coins, beads), deck of playing cards, checkerboard, cardboard, … This list is not exhaustive. You are expected to bring to life the objects that we read about. Some of these supplies will help do that, at other times you will need to be creative in how best to bring some object to life. You need not spend much money, or any at all (visit the college’s “re-use trailer”), in obtaining some of these — be creative!

Absences:

Please see me as far in advance as possible for absences that will occur on the day of an exam. Any such absences, or unforeseen ones, must be documented in writing by the appropriate person.

Social Gatherings:

On Thursday, October 14th at 6pm (or so) we will dine as a class in the Brainerd Commons House at 132 Blinn Lane. Please put this on your calendar. There will also be a Friday evening barbeque at my home, 1 South Gorham Lane, some time in September — details
forthcoming. Other social gatherings will be announced during the semester. These are not a required part of the course, but rather a fun opportunity to socialize outside of the classroom setting.

**Honor Code:**
The Honor Code will be observed throughout this class and for all examinations. Exams will be “closed notes, closed books,” unless otherwise noted. If you have a question about how the Honor Code applies to this class please ask. In particular, failure to comply with the homework policy (see above) will be considered a violation of the honor code. As most evaluations will be term papers and writing assignments, plagiarism will not be tolerated. Proper citation will be a topic of conversation during the seminar. Questions concerning proper citation may be addressed to me, our Peer Mentor (Rob Nicol), our Course Librarian (Jess Isler) or the Center for Teaching, Learning and Research.
Writing expectations:

Over the course of the semester you will be asked to write many times. These writing assignments will vary in length, but each should possess (or at least attempt to possess) the characteristics that we find in the writings of Martin Gardner. These certainly include clarity, conciseness, and an exuberance for mathematics, puzzles, and curiosities.

Over the course of the semester the assignments will increase in length and in scope. To start, the assignment may only be a few lines or paragraphs long. In these, obviously, conciseness will be the issue. As the assignments lengthen, the clarity of your exposition will become more and more critical. As a writer of mathematics, there is little else more important.

Two major writing assignments will be assigned and you will be asked to prepare an article as Martin would have — researching, communicating with others, trying out ideas, and then writing, revising, and submitting for publication. As you read his work, keep in mind that these writing assignments are before you. In each of these assignments, in addition to the “final product”, you must compile a file (or notebook) of notes, computations, sketches, reference materials, feedback given from classmates, etc. that will inform your writing assignment, much the way Gardner did. This file (notebook) will be submitted along with your essay and will contribute to your grade. A presentation will also accompany the second writing assignment; this will also contribute to your grade.

The first major writing assignment will be due mid- to late-October. The second major writing assignment will be due at the end of the semester. The research you will need to do in order to write these essays will take approximately one month.

To support you in your writing, Rob Nicol (’11) will serve as our seminar’s Peer Mentor. Rob is a successful mathematics major who will be able to advise you on writing, as well as time management, course selection and other topics. Please make sure you take advantage of Rob’s talents and time. Rob can be contacted at rnicol@middlebury.edu.

To support you in your necessary research, our Course Librarian is Jess Isler. Jess can be contacted at 802.443.3467, jisler@middlebury.edu or Davis Family Library 210. She will lead a discussion on September 30th; this is prior to your first major writing assignment.
Major Assignment (Paper, Presentation and “Notebook”) 1

The following is an outline for this assignment. The goal of this assignment is to write an article as Martin Gardner would have — tall order, but a worthy goal. The article you write should be five pages, excluding figures, diagrams, and bibliography.

Important dates:

• **September 30**: Jess Issler, our Course Librarian, will lead a discussion on library resources and research. Location: Davis Family Library, Room 105.

• **October 5**: Inform me in writing of the topic you have chosen. Overview should be at most two paragraphs and should include one preliminary reference.

• **Week of October 11**: Schedule a meeting with Rob Nicol, our Peer Mentor, to discuss the assignment, share ideas, and receive feedback on the assignment.

• **October 21**: First draft due. Bring to class for peer-editing.

• **October 26**: Paper due along with “notebook”. Ten-minute presentations commencing.

Major Assignment (Paper, Presentation and “Notebook”) 2

The following is an outline for this assignment. The goal of this assignment is to write an article as Martin Gardner would have — tall order, but a worthy goal. The article you write should be eight to ten pages, excluding figures, diagrams, and bibliography.

Important dates:

• **November 4**: Inform me in writing of the topic you have chosen. Overview should be at most two paragraphs and should include one preliminary reference.

• **Week of November 15**: Schedule a meeting with Rob Nicol, our Peer Mentor, to discuss the assignment, share ideas, receive feedback on the assignment, and assistance with oral presentation.

• **November 23**: First draft due. Bring to class for peer-editing.

• **November 30**: 10-minute presentations commencing.

• **December 6, 5 pm**: Paper and “notebook” due.