News Math
Course Description and Procedures – Fall 2005

This is the third version of a new course, which is being taught as a section of MATH 2053, Finite Mathematics.
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Office Hours: Most anytime between 8 am and 4:30 pm Monday – Friday. However, checking in advance by phone, e-mail or in person will avoid missed connections or waiting.

There is no textbook. Graphing calculator is required – one of TI- 82, 83, 84, 85, 86, or 89. The major source materials for this course will be newspaper and magazine articles. We will read, analyze, interpret, and criticize the mathematics, statistics, and other quantitative information in the articles. The major goal of the course is as follows:

Students will develop the power and habit of mind to search out quantitative information, critique it, reflect upon it, and apply it in their public, personal and professional lives.

Most of the thirty scheduled 80-minute periods will proceed as follows:

1) News of the Day. Students will bring items to class from recent publications and these will be discussed. Credit toward course grades will be given for bringing news items that contain mathematics and explaining the mathematical content to the class or raising valid questions about the mathematics.

2) Brief introduction to the mathematical topics to be studied.

3) Article(s) of the day. Discussion of news article(s) that contains substantial mathematical material and extending the mathematics. Sometimes the articles of the day will be discussed for more than one class period.   Group exercises will contain questions about the articles.

4) Homework assignment. This will sometimes consist of articles with mathematical arguments to be analyzed for the next class meeting. Work related to some material from the article of the day will often be part of the homework.

5) Examination material will include questions similar to material in group exercises and homework, questions about mathematical and statistical concepts discussed in class, and new material contained in newspaper and magazine articles.

Course grades will be determined by student performances on the quizzes, group exercises, contributions to today's news, homework scores, and two examinations – one about mid-term and the final examination at the time in the University schedule. Total points:
Homework and group exercises– 250 points
Mid-term exam – 100 points
Final exam – 100 points
Today's news contributions or other significant contributions to enriching class discussions will add bonus points from 0 to 5. See explanation on another page.

Earning 90% of the 450 points will merit a grade of A, 80% for a B, 70% for a C, and 60% for a D.

Class attendance is essential – be on time, too. Late assignments will be penalized an amount based on how late and the reasons for being late.

Group discussion of all assignments is encouraged, but homework and examinations must be written independently. **Academic honesty** is essential!

The **content of the course** will consist of a broad range of uses of mathematics in public media. Most of the mathematical topics and processes fall into one of the broad areas below:
- Measurement and number sense
- Rates of change
- Probability
- Statistics

However, the content will not be covered sequentially but will be visited and revisited at various points in the course as necessary to understand the source news articles.

Across all this content will be the following processes:
- Modeling with functions
- Analytical thinking
- Problem solving
- Visual and tabular representation of quantitative information
- Logic, reasoning, and argument
- Exploring, computing, and graphing with the calculator
- Interpreting and explaining
- Estimating, computing, and checking without a calculator

Inclement Weather Policy - Class will meet unless the University is closed. On-campus students are expected to be present. Off-campus students should make their own decisions in the best interest of personal safety. Off-campus students will not be penalized for being absent on those days the Fayetteville Public Schools are closed due to weather. If attendance is severely affected by weather, deadlines and exam dates may be adjusted. Please do not call the Department of Mathematics with weather-related inquiries. You may call me at home (442-2997) or my office (575-6317) or e-mail me for information.

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News of the Day
Articles for Bonus Points

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Up to five bonus points will be awarded for articles brought to class. Most of the articles will come from newspapers and magazines but there are other possibilities. In the past students have brought mathematical puzzles from web sites, advertisements (such as the "five times less" ad), and even e-mails from grandmothers.

I will evaluate (from 0 to 5) the articles based on several factors including the following:

1. Mathematical or statistical content – more is better, complicated is better

2. Graphs – unusual is better
3. Graphs that use several techniques such as color or multiple dimensions
4. Graphs that are misleading
5. Questions about the accuracy of the mathematics or the graphs
6. Content is what class is currently studying
7. Consistency of mathematics or statistics in headlines, graphs, and text
8. Especially effective explanations using mathematics, statistics, or graphs

Evaluations of 0, 4, and 5 are rare. Evaluations of 4 and 5 depend both on the content of the article and your explanation and questions.

You must have read the article, highlighted the mathematical or statistical parts, and be prepared to explain (briefly!) what article says and why it is interesting. You must write your name on the article!

Articles will be collected and, time permitting, discussed in class. They will not be returned.

An example follows.   This example would get three bonus points.

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Lesson 1
Using Numbers

In Lesson 1 we encounter several uses and misuses of numbers, particularly in news articles. The goal of this lesson is to introduce some concepts (for examples, percent and risk) we will study more in depth in later lessons. The articles in this lesson are:

1) *Numbed by the Numbers, When They Just Don't Add Up* by Daniel Okrent (*New York Times*)
2) *Three Bad Numbers* by Daniel Okrent (*New York Times*)
3) *Stupidity is a Curable Disease* by Jon Carroll (*San Francisco Chronicle*)
4) *Math for journalists* by Bob Baker
5) *Lower Math* by Dave Barry (*Washington Post* Magazine)
6) *Five Times Less* from Harps Food Stores

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Lesson 2
Percent and Percent Change

In Lesson 2 we study percent – a way of comparing two quantities – and percent change – a way of measuring how much a quantity increases or decreases. The articles in this section are:

1. *Other People's Money* by Paul Krugman (*New York Times*)
2. *Big Stink in Little Elkins* by Mike Masterson (*Arkansas Democrat-Gazette*)
3. *Must be the new math* (Letter to the Editor, *Arkansas Democrat-Gazette*)
4. *Using the funny math* (Letter to the Editor, *Arkansas Democrat-Gazette*)
5. Math on Rodriguez is off (Letter to the Editor, Arkansas Democrat-Gazette)

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Lesson 3
Linear and Exponential Growth
(with side trip to Weighted Averages)

In Lesson 3 we study change – rates of change that are linear (i.e. a constant rate of change) or exponential (i.e. the change depends on the quantity that is changing). As we will often do in this course, we encounter other quantitative or mathematical concepts in the articles. In the first article below we encounter the concept of a weighted average. The articles in this section are:

1. *Math, Plain and Simple* by Amy Rauch-Neilson (*Better Investing*)
2. *Forgive your ancestors* (Letter to the Editor, *Arkansas Democrat-Gazette*)
3. *Social Security works* (Letter to the Editor, *Northwest Arkansas Times*)
4. *Forcing fuel efficiency on consumers doesn't work* by Jerry Taylor (*Lincoln (NE) Journal-Star*)
5. Better to take a bus (Letter to the Editor, Arkansas Democrat-Gazette)

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Lesson 4
Indices and Condensed Measures

In Lesson 4 we study measures that allow comparing circumstances or objects. Most of our attention will be on indices (or indexes) but we use the very general expression 'condensed measure' to describe some measures that are not indices by our definition, although they are called indices. The articles in this section are:

1. *The Obesity Crisis: Out of Balance* (*Blue & You magazine*)
2. *Tell the Truth: Does this Index Make Me Look Fat* by Gina Kolata (*New York Times*)
3. Turkish shopping bag showing how BMI is computed in Turkey
4. Description of Cost of Living Index (COLI) from ACCRA (formerly an acronym for American Chamber of Commerce

Researchers Association) web site. ACCRA produces the COLI.

5. *Description of consumer price Index (CPI) from US Department of Labor web site.*

6. *A Primer on Stock-Market Averages and Indices by Dale Steinreich (www.mises.org)*

7. *List Dow Jones 30 stocks and DJIA divisor on February 4, 2005.*

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Lesson 5
Graphical Interpretation and Production

In Lesson 5 we study graphs, sometimes referred to as visual representations of quantitative information. We will learn about interpreting graphs, criticizing them, and producing them. The articles in this section are:

1. Six Graphs: Enrollment Rates Rise *(Morning News),* GOP Disputes *(NY Times),* Acceptance of Sexual Betrayal *(social sciences textbook),* Is the glass half full … *(Arkansas Democrat-Gazette),* Fears, Again, of Oil Supplies at Risk *(NY Times), and* Number of Students on Central Plaza (*unknown source).*

2. *December 1995 Cyclone Tracks*

3. Decade After Health Care Crisis, Soaring Costs Bring New Strains by Robin Toner and Sheryl Gay Stolberg (NY Times)

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Lesson 6
Counting

In Lesson 6 we study ways to answer the question: How many? This counting is in preparation for our study of probability and risk in future lessons as well as being able to answer everyday questions. The article in this section is from the 'games' section of the newspaper:

1. Daily Jumble and Cryptoquote *(Arkansas Democrat Gazette)*

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Lesson 7
Odds

In Lesson 7 we study ways to answer the question: What are the chances? This question can be answered several ways – 1 out of 10, 10%, 9 to one odds, and probability 0.1 are examples of four ways. We will encounter several terms that are used quite a lot but not very well understood. Among such terms are "coincidence," "random," and "odds." The articles in this section are:

1. *Odds on 2004 Democratic Presidential Nominees* by Dan Seligman (*Forbes Magazine*) citing article by William Safire (*NY Times*)
2. *Without an Inside Post, Horses Have Only and Outside Chance of Winning* by Andrew Beyer (*Washington Post)*
3. The Odds of That by Lisa Belkin (NY Times Magazine)

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Lesson 8
Risk

In Lesson 8 we study the meaning of risk – something that is very much a part of our everyday lives. Our goal is to understand what risk is, investigate several examples of risk, and look at ways risk is reduced.. The articles in this lesson are:

1. *Playing It Safe Can Sure Be Risky* by David Leonhardt (*NY Times*)
2. *30 million Thanksgiving travelers are expected to hit the highways* by Nedra Pickler (*The Intelligencer* of Doylestown, PA)
3. *The Financial Page: What Weather Costs* by James Surowiecki (*The New Yorker*)
4. Strategies on Fourth Down, From a Mathematical Point of View by Virginia Postrel (NY Times)

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Lesson 9
Geometric Measurement

In Lesson 9 we study ways to answer the questions: How much area or how much volume? In so doing, we need to recall some area and volume formulas for basic geometric shapes such as triangles, circular disks, trapezoids, and spheres. One tool we will use is the Pythagorean Theorem. The article in this section is:

1. *Math Man* by Trish Wesley (*HortJournal*)

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Lesson 10
Weather Maps, Measurements and Indices

In Lesson 10 we study some of the many measurements used in weather reporting and forecasting. We will encounter indices again, but these may not satisfy our definition of indices. The articles and maps in this lesson are:

1. Two sample weather maps with isobars and isotherms
2. Weather Map from The Weather Channel
3. Relative humidity map from NOAA
4. Wind Chill Temperature Comparisons from NOAA
5. *The Heat Index "Equation,"* by Lans P. Rothfusz