

MAT 1000, MATHEMATICS IN TODAY'S WORLD, WINTER 2008

SECTIONS 001, 002, 003, 004, 006, 009

This course is taught in the “lecture-quiz” format. All students attend the lectures at 11:45 – 12:40 on Mondays and Wednesdays in 146 Deroy Auditorium, and in addition, two meetings of the discussion sections on Tuesdays and Thursdays.

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Overview: This is a mathematical literacy course. The objective is to understand some of the mathematics that plays an important role in modern society. The emphasis will be on conceptual understanding. Computations will play a supporting role. During the first part of the semester we will focus on data analysis, with an introduction to statistics. We will study social choice and decision making, with an analysis of possible voting system, during the second part of the course.

Prerequisite: In order to stay in this class, each student must have either (1) received a grade of C- or better in MAT 0993 *taken at WSU in Spring/Summer 2007 or Fall 2007* or (2) had a placement into MAT 0995 or higher by the WSU Mathematics Placement Test *taken from 05/19/07 through 01/03/08*. This prerequisite for the course is of great importance and will be strictly enforced.

Students who do not meet the prerequisite must officially drop the class by 01/19/08, or they will be billed for the class but not be given a grade.

Time and location:

Lecture Section 001: 11:45 – 12:40, MW, 0146 Deroy Auditorium.

Quiz Section 002 (Liu), 8:30 – 9:25, TR, 0116 STAT,
Quiz Section 006 (Liu), 9:35 – 10:30, TR, 0118 STAT.
Quiz Section 004 (Kan), 11:45 – 12:40, TR, 0319 STAT.
Quiz Section 003 (Nguyen), 10:40 – 11:35, TR, 0112 STAT,
Quiz Section 009 (Nguyen), 11:45 – 12:40, TR, 0118 STAT.

Text: *For All Practical Purposes: Mathematical Literacy in Today's World*, Seventh edition, by COMAP (a consortium), W.H. Freeman, New York, 2006. [ISBN 0-7167-6901-8 (paper back). A hardcover version is also available.]

Material Covered: We will cover Parts II (Chapters 5, 6, 7, 8) and III (Chapters 9, 10, 11) of the text. We will cover most topics in most chapters, but not all topics in all chapters.

The list below shows the specific topics covered and the approximate amount of time devoted to each chapter.

Chapter 5. Exploring Data: Distributions (2.5 weeks)

One variable statistics.
Histograms.
Median and quartiles.
Mean and standard deviation.
Outliers and their effects.
Skewed distributions.
Normal distributions.
The 68–95–99.7 rule.

Chapter 6. Exploring Data: Relationships (2 weeks)

Two variable statistics.
Scatterplots.
Outliers.
Regression lines.
Correlation.
Least-squares regression.
Interpreting correlation and regression.

Chapter 7. Data for Decisions (2 weeks)

Sampling.
Common sampling errors.
Simple random samples.
Cautions about sample surveys.
Confidence intervals.

Chapter 8. Introduction to probability (1.5 weeks)

Probability models and rules.
Discrete probability models.
Equally likely outcomes.

Chapter 9. Social Choice: The Impossible dream (2 weeks)

Voting schemes.
Plurality voting, Borda count.
Runoff methods: Plurality runoff, Hare method.
Sequential pairwise voting.
Difficulties: Condorcet's paradox, independence of irrelevant alternatives, Pareto condition.
Impossibility results: Arrow's theorem.

Chapter 10. The Manipulability of Voting Systems (1 week)

Strategic manipulation and agenda manipulation.
Manipulability theorem.

Chapter 11. Weighted voting systems (2 weeks)

Power indexes: Shapley-Shubik and Banzhaf.
Permutations and pivotal voters.
Combinations and critical voters.
Dummies, dictators, veto-power.

The schedule above leaves 1 week for a midterm and review.

Calculator: You will want to have a calculator that can compute two variable statistics. If you don't already own such a calculator, you should either borrow one for the semester or consider buying a TI-30X IIS. The WSU Bookstore sells them for under \$ 20, and you may well be able to get one more cheaply elsewhere.

Homework: Homework will be a significant part of this course. The assignments will be posted on the web at <http://www.math.wayne.edu/~sheng/teaching/winter08/Mat1000/hw/> The homework will be discussed during the discussion sessions. We will collect homework from time to time during the semester. If you find an occasional assignment difficult, you should be able to show that you have made a good faith attempt to complete it.

Worksheets: There will be a worksheet during most of the discussion sessions. On these worksheets, you are encouraged to work in a group with other students, consult the text, and ask the instructor for help. The main rule for them is to turn in your work by the end of the class period.

Quizzes: There will be five quizzes during the semester, at the end of Chapters 5, 6, 7, 10, and 11. The quizzes will take place in your discussion session. For the quizzes, you must work on your own, but you will be allowed to use a calculator. No cell phone, however.

Approximate dates for quizzes

Thursday, Jan. 24 [Chapter 5]
Thursday, Feb. 7 [Chapter 6]
Thursday, Feb. 21 [Chapter 7]
Thursday, Apr. 3 [Chapter 9 and 10]
Thursday, Apr. 17 [Chapter 11]

Midterm Exam: The midterm exam will cover Chapters 5 – 8. It will be held during a lecture session. The rules from the quizzes apply: you must work on your own, but you will be allowed to use a calculator.

The midterm exam will be on Wednesday, March 5.

Final Exam: The final exam will emphasize the material in Chapters 9 – 11, but it will touch on some of the material from the first part of the semester.

The final exam is scheduled for Thursday, April 24, 10:40 am – 1:10 pm.

Grading: Your grade will be based on the total number of points you accumulate during the semester.

Worksheets/Homework	100 points
In-class quizzes (5 quizzes, 50 points each)	250 points
Midterm exam	100 points
Final exam	150 points
Total possible	600 points

A student with at least 540 (90 percent of the possible total) will receive at least a A-.

A student with at least 480 will receive at least a B-.

A student with at least 429 will receive at least a C-.

A student with at least 360 will receive at least a D-.