

**MAT 112 MWF Section \_\_\_\_\_ Syllabus**

**Fall 2011**

**Instructor:** \_\_\_\_\_

**Office Location:** \_\_\_\_\_

**Phone:** \_\_\_\_\_

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**Office Hours:** \_\_\_\_\_

## Departmental Syllabus for MAT 112, Algebraic Operations and Functions

### Main Campus Sections

**Course Supervisor:** Dr. Helen Doerr, 203 Carnegie, 443-1485, hmdoerr@syr.edu.

Problems you cannot resolve with your instructor should be brought to the attention of the course supervisor.

**Course Description:** This course in algebra uses the TI-83+ or TI-84 graphics calculator as a tool in investigating variables and functions within an algebraic structure. Topics include variables, operations, linear functions, the absolute value function, quadratic functions, systems of functions, direct and inverse variation, exponents, and radicals. A student cannot receive credit for MAT 112 after receiving a grade of C or better in any MAT course numbered above 180.

### Materials:

- (1) Textbook: Masingila, J. O. (2004). *Algebraic Operations and Functions* (6<sup>th</sup> ed). Boston, MA: Pearson Custom Publishing—must be purchased at the Syracuse University Bookstore [Note: Do not purchase used copies of this book since work is done in the book.]
- (2) TI-83+ or TI-84 graphics calculator—may be purchased at a variety of stores (e.g., Ra-Lin, Orange Student Bookstore, Staples) and may be purchased at the Syracuse University Bookstore; you may also be able to buy a used calculator from a student on campus.

### Required Supplementary Materials:

- 3-ring notebook binder with section dividers
- Folder in which to hand in units to be graded

**Course Philosophy:** The emphasis in this course is on learning mathematical concepts through solving problems, and it is our conviction that problems are best solved in a cooperative learning situation. Hence, you will often work with two to four other students, an arrangement that we believe has the following advantages:

- Group problem solving is often broader, more creative, and more insightful than individual efforts.
- Interaction with others may stimulate additional problems, insights, and discoveries.
- Students can motivate one another to excel and to accept more challenging problems.
- Motivation to persevere with a problem may be increased.
- Socialization skills are developed and practiced.
- Students are exposed to a variety of thinking and problem-solving styles different from their own.
- Students learn to depend on themselves and each other (rather than on the instructor) for problem solutions.
- Conceptual understanding is deeper and longer lasting when ideas are shared and discussed.

## Learning Outcome Goals:

- (1) To help you develop an adult-level perspective and insight into the nature of algebraic concepts and procedures;
- (2) To improve your ability to engage in mathematical thinking, reasoning, communication, and problem solving;
- (3) To involve you in using technology as a tool to explore and learn mathematics;
- (4) To encourage you to become a reflective doer of mathematics;
- (5) To encourage you to learn mathematics through problem solving; and
- (6) To assess your learning in a variety of ways.

**Grading:** Your final grade in this course will be based on class participation and your performance on quizzes, midterms, the final exam (which is cumulative), in- and out-of-class projects, and your notebook. The relative weight assigned to each is designated below:

Tests (2)	30%
Final Exam	20%
Notebook & Quizzes	25%
Projects	15%
Class Participation	10%

**Tests and Final Exam:** The two tests will each last one full class period. The final will be cumulative and mandatory. If you must miss a test, it is imperative that you call before the test begins. Reasons for missing a test must be documentable. Each case will be handled on an individual basis. Tests that have been returned should be kept in your notebook with materials from the units tested. All undergraduate mathematics courses numbered 399 and below, except for UC sections, will have a two-hour final examination period on **Wednesday, December 14, 2011 between 8:00 a.m. and 2:30 p.m. DO NOT MAKE PLANS TO LEAVE CAMPUS BEFORE 2:30 P.M. ON DECEMBER 14, 2011.** The specific time for MAT 112 will be announced during the semester.

**Quizzes:** There will be weekly quizzes that will test your mastery of basic skills associated with the current topic. There are no make-ups for missed quizzes. All quizzes should be kept in your notebook with materials from the same unit.

**Activities/Project:** Throughout the semester, you will be asked to do activities and/or projects, both in and out of class. All assigned homework and activities or projects completed in- and out-of-class should be included in your notebook in the appropriate section.

**Notebook:** Your notebook will be a very important part of the course. In general it will contain the following items:

- Class activities (after they have been torn out from the textbook)
- Homework
- Out-of-class activities and projects
- Reflective writings

Your notebook will be collected weekly during the semester and will be graded according to the following criteria: completeness; accuracy of solutions; quality of insight and reflection articulated in the journal.

**Reflective Writing:** One important way to learn mathematics is by verbalizing your ideas through oral and written means. Thus, reflective writing is an integral part of this course and of gaining an adult-level perspective on the mathematics in this course. There will be a reflective writing exercise based on mathematics ideas encountered in class.

**Class Attendance and Participation:** In this class you will be learning mathematics by struggling with and solving problems. Attendance at and participation in class is crucial, for active involvement is an integral part of this course. In most class periods we will be using manipulatives, TI-83+ or TI-84 calculators or Calculator-based Laboratories™ to explore mathematical concepts.

*Since much of the class is experiential, it would be impossible to derive the same benefits by merely examining someone's class notes or reading the textbook.* Thus, you are EXPECTED TO ATTEND AND PARTICIPATE IN CLASS. Attendance will be taken. Class participation accounts for 10% of your course grade and attendance will be figured into this grade.

**Students with Disabilities:** If you believe that you need accommodations for a disability, please contact the Office of Disability Services (ODS), <http://disabilityservices.syr.edu>, located in Room 309 of 804 University Avenue, or call 315-443-4498 for an appointment to discuss your needs and the process for requesting accommodations. ODS is responsible coordinating disability-related accommodations and will issue students with documented disabilities Accommodation Authorization Letters, as appropriate. Since accommodations may require early planning and generally are not provided retroactively, please contact ODS as soon as possible. You are also welcome to contact me privately to discuss your academic needs although I cannot arrange for disability-related accommodations.

**Academic Integrity:** The Syracuse University Academic Integrity Policy holds students accountable for the integrity of the work they submit. Students should be familiar with the Policy and know that it is their responsibility to learn about instructor and general academic expectations with regard to proper citation of sources in written work. The policy also governs the integrity of work submitted in exams and assignments as well as the veracity of signatures on attendance sheets and other verifications of participation in class activities. Serious sanctions can result from academic dishonesty of any sort. For more information and the complete policy, see <http://academicintegrity.syr.edu>

## Course and Homework Schedule for MWF Classes

<u>Date</u>	<u>Activities</u>	<u>Exercises</u>	<u>Readings</u>	<u>Reflections</u>
August 29:	1.1-1.2	#1	1.1-1.3	R1
August 31:	1.3-1.4	#2-4	1.4, 1.5	
September 2:	1.5	#5-8		
September 5:	<b>No Classes—Labor Day</b>			
September 7:	1.6-1.7	#9-11	1.6	
September 9:	1.8-1.9			R2
September 12:	2.1-2.2	#1	2.1	
September 14:	2.3-2.4	#2		
September 16:	2.5	#3,4	2.2, 2.3	R3
September 19:	2.6			
September 21:	2.7 – 2.8			
September 23:	2.9-2.10			
September 26:	2.11-2.12	#5,6		
September 28:	2.13	#7-12	2.4	R4
September 30:	2.14	#13-17	2.5, 2.6	R5
October 3:	2.15			R6
October 5:	2.16			
October 7:	<b>Exam #1</b>			
October 10:	3.1-3.2	#1-3	3.1, 3.2	
October 12:	3.3	#4-6	3.3	R7
October 14:	4.1	#1, 2		
October 17:	4.2		4.1	
October 19:	4.3		4.2	
October 21:	4.4			R8
October 24:	4.5		4.3	R9
October 26:	4.6	#3-6	4.5, 4.6	
October 28:	4.7	#7-11	4.8	R10
October 31:	4.8	#12, 20	4.7	
November 2:	4.9	#13-16	4.4	R11
November 4:	4.10	#17-19		
November 7:	4.11			
November 9:	<b>Exam #2</b>			
November 11:	5.1			
November 14:	5.2	#1-2	1.5, 5.1, & 5.2	
November 16:	5.3	#3-4		
November 18:	5.4	#5-8	5.3	R12
November 21, 23, 25:	<b>No Classes – Thanksgiving Break</b>			
November 28:	6.1	#1-7	6.1, 6.2	R13
November 30:	6.2	#8-14		
December 2:	7.1	#1	7.1, 7.2	R14
December 5:	7.2	#2	7.3-7.5	R15
December 7:	7.3 - 7.4	#3-5	7.6, 7.7	R16
December 9:	Project Presentations			
December 14:	<b>Final Exam (No early exams will be given!)</b>			

## Reflective Writing Assignments

- R1 Recall the activity using the variables of time and temperature. (a) Explain which variable would reasonably depend upon the other. Which would therefore be termed the independent variable and which the dependent variable? (b) Write a shorthand notation that indicates that one variable is a function of the other variable. (c) Based on your answer to (b), write in your own words a definition for the term function.
- R2 Explain what is meant by an arithmetic operation.
- R3 Give a reasonable explanation why the terms associative, commutative, and distributive are used as property definitions. You may want to consult a dictionary.
- R4 Explain why some data are not connected on a graph by a continuous line or curve. Give some examples of functions that would be graphed with only specific data points and some examples of functions that would be graphed with a continuous line or curve.
- R5 Finish this sentence: “By exploring the graphs of the form  $y = mx + b$ , I now understand...”
- R6 What is the meaning of a solution of a linear equation? Give an example from Activity 2.14 and explain why the solution makes sense.
- R7 Describe a situation that would have a graph of an absolute value function inequality. Give the formula, the inequality, the graph, and a written explanation of the situation.
- R8 Give a plausible explanation why changing the sign or magnitude of  $a$  in  $a(x - h)^2 - k$  is referred to as “stretching” or “reflecting”. Use these terms to describe what you learned from today’s activity.
- R9 Give a plausible argument as to why the effect of the constant term in a quadratic ( $k$  in  $a(x - h)^2 - k$ ) is sometimes referred to as a “translation”.
- R10 Describe what it means to find a solution of a quadratic equation. How does the factored form help in finding solutions?
- R11 Finish the sentence: “After experimenting with the effects of  $a$ ,  $h$ , and  $k$  in a quadratic of the form  $a(x - h)^2 + k$ , I now understand . . .”
- R12 Some systems are easier to solve by substitution than by elimination. When is the substitution method a more reasonable choice? Explain.
- R13 Explain in your own words when two variables vary directly and when they vary inversely. Give two examples of inverse variation and two of direct variation.
- R14 Explain if and when linear, absolute value, or quadratic functions are direct variations. Is it possible for a linear, absolute value, or quadratic function to be an inverse variation? Why or why not?
- R15 Explain why  $(-1)^n$  equals 1 when  $n$  is even and why it equals  $-1$  when  $n$  is odd.

R16 Why is it true that  $\sqrt{x} \cdot \sqrt{x} = x$  only if  $x$  is not negative?