**INSTRUCTOR:** Dr. Harry S. (Steve) Mills, EDBH 134K, 970-339-6238.

**E-mail:** Use Course Shell on http://online.aims.edu for Course-Related Business.

**Emergency e-mail:** steve.mills@aims.edu (NOT preferred. Leads to teacher irritability.)

**Course Websites:** Log in to Aims Online ( https://online.aims.edu/ ). Navigate to this class's course shell. Use the course shell to send me e-mail and check for announcements.

I don't plan on more than one or two announcements most weeks. If you check once or twice per week, you should be plenty caught up. Announcements are Last-in-first-out, which means the latest announcement is at the top.

**Archive server:** http://harryzaims.com/, a private server on which I house most of the content.

**Course Description:**
Focuses on a variety of functions and the exploration of their graphs. Topics include: equations and inequalities, operations on functions, exponential and logarithmic functions, linear and non-linear systems, and an introduction to conic sections. This course provides essential skills for Science, Technology, Engineering, and Math (STEM) pathways. This is a statewide Guaranteed Transfer course in the GT-MA1 category.

**Guaranteed Transfer (GT) Pathways Course Statement:**
The Colorado Commission on Higher Education has approved MAT 121 College Algebra for inclusion in the Guaranteed Transfer (GT) Pathways program in the GT-MA1 category. For transferring students, successful completion with a minimum C– grade guarantees transfer and application of credit in this GT Pathways category. For more information on the GT Pathways program, go to https://highered.colorado.gov/academics/transfers/gtpathways/curriculum.html.

For more details, see below.

**Required Materials:**

**Textbook:** **College Algebra**, 6th Edition, Dugopolski. There are options for the book.

- You can buy it bundled with MyMathLab access code (New Books Only)
- You can buy it used.
- You can just buy access to the eBook, by purchasing MyMathLab access, direct from the Pearson Website.
- There's a looseleaf version of the textbook that's cheaper than the hard-back book.

**Scientific Calculator:** The TI 30X IIB or comparable product with a Previous Entry feature is preferred. When you can see what you entered, you'll make fewer mistakes, be able to fix any mistakes you make, and explore patterns, by changing one thing in a big formula, and seeing how the output changes, without having to re-enter the whole long expression. What you want is a calculator just one step below a graphing calculator, that lets you edit the entries like you do in a graphing calculator.

**Electronic Graphing Capability:** While we're denying their use on tests, a graphing calculator, or graphing app on your smartphone, or one of the many free online graphers, available online, *must* be used, to do some of the explorations that come up in the homework. You might want to check out WolframAlpha for an all-purpose tool. You just kind of type in what you want, and it does it! You'll want to use whatever

works for you, but you will need some standard graphing calculator capabilities for some of the assigned exercises.
GRAPHING CALCULATORS ARE NOT PERMITTED ON TESTS

**MyMathLab:** Registering for MyMathLab and using it to work and submit homework is required for ALL ONLINE students. Registering is easy, and you get a free trial for 2 or 3 weeks.

**Home-made Video:** Virtually every problem I've assigned, for the semester, is worked, by me, on a video. I keep all those videos in my Videos Directory (http://www.harryzaims.com/121-all/videos/). Sometimes the **numbers** are different, but yeah, I pretty much have worked every exercise, if you get stuck, and want to ask about it. BOOM! There's my 5-minute spiel on the problem.

**Grades**: **4** Categories: Tests (70%), Homework (20%), Writing Projects (10%), Attendance (10%)

**Tests:** These will count 70% of the final grade. There are 5 of them. I drop the lowest test, except for the Comprehensive Final Test at the end.

**Makeup Tests, Deadlines and such:** Makeup tests generally require a college-excused absence. I reserve the right to make exceptions, but it's very difficult to get an exception, and they tend to receive only half-credit. Being lax on this is disrespectful to every student who shows up at the appointed time and place.

**Homework:** Homework will comprise 20% of your grade. I have compiled a list of all the assigned problems for this semester. ( http://www.harryzaims.com/121-all/homework-assignments/ ). You should write up your homework, for future reference and to just master the concepts, better. But you will be DOING all the homework on Pearson's MyMathLab for this online section of the course. To get started, follow the MyMathLab link, here, or with the "Register for MyMathLab" link on the Course Shell at https://online.aims.edu.

**The videos I made for the homewor**k are here: http://harryzaims.com/121-all/videos/ . I used the assigned exercises as a vehicle for explaining everything to you. It comes to something more than I could squeeze into our face time, in the old-fashioned way, but it provides far more detail, and it's on-demand, 24/7. This resource is great for when you get stuck. Some students just take the time to watch the videos and then do the homework, later. Some watch the video and do the problem. *All* students should compare their work with my solutions. All students should watch the videos, because I always mention what I'm looking for and what type problems you will be seeing on tests. If you're not doing it at all like I am in the notes (that are found in the Videos directories), you probably want to watch the corresponding videos, to make *sure* you're getting it.

20% is a small fraction of the total points, but the bread and butter of the course. It's where you *learn* this stuff. You can just do it to earn points or you can use it as a learning tool. I urge the latter.

I'm usually more interested in seeing the FORM of your homework. Problem context (instructions) written down? Work shown? If you "cheat" the homework, I'll get you on the test, and the test weighs 6 times as much as the homework!

**Homework Deadlines**: I will keep tabs on the progress you've made, fairly loosely, until the end. When the MyMathLab shuts down on May 7th, that's the deadline. Of course, if you don't do the work, every day, you will fall hopelessly behind, and the tests are all based on the assigned homework.

**Writing Projects:** Writing Projects comprise 10% of your grade. There are FOUR (4) Writing Projects. ( Instructional videos for these are here: http://www.harryzaims.com/121-all/videos/03-Writing-Projects/ )

I wouldn't worry about them, the first week. Think of Writing Projects as a homework assignment that's extra long and you need to write up, extra nicely. But the first week of school, you have bigger fish to fry, finding where all the resources are and learning to use them..

**Writing Project Deadlines:** Writing Projects are due when you come take your test over the material the project covered. See the Course Schedule for details. There's an Early-Bird bonus for turning them in the Friday before the test, in class.

**Final Test:** This test, at the end, is the only test that you may not drop. Otherwise, we drop your lowest test score.

**Grading Scale**: 90% - 100% A 80% - 89% B 70% - 79% C 60% - 69% D

**How to Operate**: My biggest thing, early, is to clear away the distractions, and keep you focused on the fast path to completion. There are *many* resources available, but only a minimum number of activities that I *require*.

1. Carve out 12 hours per week, to begin with. 3 hours a day, 4 days a week is a typical face-to-face schedule, with 4 of those hours in class, and 8 hours out of class. Most students will find that some weeks may take longer than others, depending on your pre-existing skills or the difficulty level of the topics.

2. Focus on keeping up with the Chapter homework, in the Course Schedule . The Course Schedule tells you what's next and when it should be completed.

3. There are optional assignments in Chapter P, for "prerequisite." I'm in the process of prepping videos for those problems. (5 sections down, 2 to go). All the rest of the assignments have video sets from me, as well as whatever help you can find on Pearson site, or elsewhere. This material could be useful, if you need to brush up on a topic. If you feel like I'm talking over your head, take the time to go through the Chapter P material, a little bit at a time, and I bet I start making more and more sense...

**GT-MA1: Mathematics Content Criteria**
Students should be able to:

a) Demonstrate good problem-solving habits, including:
   - Estimating solutions and recognizing unreasonable results.
   - Considering a variety of approaches to a given problem, and selecting one that is appropriate.
   - Interpreting solutions correctly.
b) Generate and interpret symbolic, graphical, numerical, and verbal (written or oral) representations of mathematical ideas.
c) Communicate mathematical ideas in written and/or oral form using appropriate mathematical language, notation, and style.
d) Apply mathematical concepts, procedures, and techniques appropriate to the course.
e) Recognize and apply patterns or mathematical structure.
f) Utilize and integrate appropriate technology.

**GT-MA1 Competency & Student Learning Outcomes**
***Competency: Quantitative Literacy:***
Students should be able to:

1. **Interpret Information**
   a. Explain information presented in mathematical forms (e.g., equations, graphs, diagrams, tables, words).
2. **Represent Information**

a. Convert information into and between various mathematical forms (e.g., equations, graphs, diagrams, tables, words).

3. **Perform Calculations**
   a. Solve problems or equations at the appropriate course level.
   b. Use appropriate mathematical notation.
   c. Solve a variety of different problem types that involve a multi-step solution and address the validity of the results.
4. **Apply and Analyze Information**
   a. Make use of graphical objects (such as graphs of equations in two or three variables, histograms, scatterplots of bivariate data, geometrical figures, etc.) to supplement a solution to a typical problem at the appropriate level.
   b. Formulate, organize, and articulate solutions to theoretical and application problems at the appropriate course level.
   c. Make judgments based on mathematical analysis appropriate to the course level.
5. **Communicate Using Mathematical Forms**
   a. Express mathematical analysis symbolically, graphically, and in written language that clarifies/justifies/summarizes reasoning (may also include oral communication).

**Required Course Learning Outcomes**

I. Identify properties of functions including domain, range, increasing and decreasing.
II. Apply function notation.
III. Determine the inverse of a function.
IV. Examine functions algebraically.
V. Analyze behavior and roots of polynomial functions.
VI. Solve polynomial, rational and absolute value equations and inequalities.
VII. Analyze polynomial, exponential, logarithmic and rational functions.
VIII. Create graphs of polynomial, exponential, logarithmic, rational functions.
IX. Solve exponential and logarithmic equations.
X. Analyze piecewise functions.
XI. Graph parent functions and their transformations.
XII. Utilize algebraic techniques to solve application problems.
XIII. Solve systems of equations.
XIV. Classify conic sections.

**Required Topical Outline**

I. Function including domain, range, increasing and decreasing
   a. Definition of a function
   b. Identifying functions given table, graph or equation form
   c. Domain and range of algebraic functions (polynomial, radical and rational)
   d. Even and odd functions
   e. Introduction to where functions are increasing and decreasing using a graph
   f. Introduction to maxima and minima using a graph
II. Function notation
   a. Functions expressed using function notation
   b. Evaluation of function notation from equations and graphs
III. Inverse of a function
   a. Notation of an inverse function
   b. Definition of one-to-one functions
   c. Algebraic determination of the inverse of a function
   d. Graphical properties of an inverse function
   e. Domain and range of an inverse function
IV. Function composition algebraically
   a. Sum difference, product, quotient of functions

b. Composition notation
c. Inverses using composition
d. Composition of two functions

V. Behavior and roots of polynomial functions
   a. End behavior of polynomial functions
   b. Division of polynomials
   c. Polynomials as a product of linear factors
   d. Multiplicity of zeros
   e. Complex zeros

VI. Polynomial, rational and absolute value equations and inequalities
   a. Completing the square to find the vertex form of a quadratic function
   b. Absolute value inequalities
   c. Polynomial and rational inequalities using test intervals (critical values, number lines)

VII. Analysis of polynomial, exponential, logarithmic and rational functions
   a. Intercepts and End behavior
   b. Zeros
   c. Definition of exponential and logarithmic functions
   d. Domain and range
   e. Evaluation of exponential and logarithmic expressions
   f. Introduction to the number e
   g. Equations of asymptotes

VIII. Graphs of polynomial, exponential, logarithmic and rational functions
   a. Intercepts and end behavior
   b. Asymptotes of functions from the equation and from the graph

IX. Solutions of Exponential and logarithmic equations
   a. Conversion between exponential and logarithmic form
   b. Properties of logarithms
   c. Logarithmic equations
   d. Extraneous solutions
   e. Exponential equations

X. Piecewise functions
   a. Notation for piecewise functions
   b. Evaluation of piecewise functions
   c. Graphs of piecewise functions
   d. Domain of piecewise functions

XI. Parent functions and their transformations
   a. Parent (also called base/toolbox) functions
   b. Rigid transformations (horizontal/vertical translations and reflections)
   c. Non-rigid transformations (horizontal/vertical scaling)

XII. Algebraic techniques to solve application problems
   a. Quadratic models including optimization
   b. Exponential/logarithmic models

XIII. Systems of equations
   a. Methods for solving systems with three variables or more
   b. Systems of non-linear equations with two variables

XIV. Conic sections
   a. Circle
   b. Parabola
   c. Ellipse
   d. Hyperbola

**Recommended Topical Outline**

I. Function notation
   a. Difference quotient
II. Function composition algebraically
   a. Domain of a composite function
   b. Decomposition of a function
III. Behavior and roots of polynomial functions
   a. The Rational Root Theorem
   b. The Remainder Theorem and the Factor Theorem
IV. Polynomial, rational and absolute value equations and inequalities
   a. Methods of solving quadratic equations
   b. Solving equations reducible to quadratic form using substitutions
   c. Review of solving rational equations
V. Graphs of exponential, logarithmic and rational functions
   a. Identifying the removable discontinuities of a rational function
   b. Determining if a graph crosses a horizontal asymptotes
VI. Exponential and logarithmic equations
   a. Change of base formula
VII. Algebraic techniques to solve application problems
   a. Direct and inverse variation
VIII. Systems of equations
   a. Types of solutions (consistent, inconsistent, independent and dependent)
IX. Conic sections
   a. Analysis of the properties of conic sections

**Important Dates:** For final add date, final drop date and last day to withdraw, see the Academic Calendar on aims.edu.

**Comprehensive Final Exam:**
The final exam will be comprehensive.

**Calculators:**
Scientific calculators may be used. Graphing calculators, cell phones, iPads, and other electronic devices with scanning or photo ability may NOT be used while taking a written test or final exam.

**Standard Syllabus Policies Link:**
A Standard Syllabus Policies link has been created for students to access. Students are responsible for reading each of the policies. The standard syllabus policies are located at http://www.aims.edu/inside/policies/standard-syllabus/ and apply to every course at Aims Community College.

**Course Evaluations:**
Online course evaluations for most classes will be available for students to complete during the last 2 weeks of the spring semester. Other short course evaluations will be available at various times, depending on their course start and end times. Students will receive an email message directing them to a website where they can login using their Aims ID and complete evaluations. All course evaluations are confidential.
Student Course Evaluation Website: aims.campuslabs.com/courseeval

**Student Code of Conduct:**
Aims Community College is committed to the highest standards of respect for self and others, academic excellence, integrity, and civil discourse. Students, faculty, staff, administration, and guests have a right to a safe environment – free of disturbance. All are responsible for cultivating an environment of civility and mutual respect.