Credit Hours: 3

Contact Hours: This is a 3-credit course, offered in accelerated format. This means that 16 weeks of material is covered in 8 weeks. The exact number of hours per week that you can expect to spend on each course will vary based upon the weekly coursework, as well as your study style and preferences. You should plan to spend 14-20 hours per week in each course reading material, interacting on the discussion boards, writing papers, completing projects, and doing research.

COURSE DESCRIPTION AND OUTCOMES

### Course Description:

This course examines the concepts and techniques of college algebra and their uses in solving problems that arise in real world examples. This course contains a brief review of intermediate algebra, elementary functions including exponential and logarithmic, graphing of functions for mathematics, science, computer and business applications, equations and inequalities, and linear systems. The course will emphasize the development of problem solving skills applicable to the real world rather than on memorization of formulas.

This course fulfills a general education Mathematics requirement. This is an approved Colorado gtPathways course. The course provides opportunities for students to interpret and represent mathematical information, to perform a variety of calculations, to apply and analyze mathematical information, and to reason and communicate their work and analysis mathematically and using written and spoken language.

Course Overview:

There are many different branches of mathematics, as represented in the following image: algebra, geometry, analysis, statistics, etc.

(Source: http://www2.stetson.edu/~mhale/logic/tree.gif)
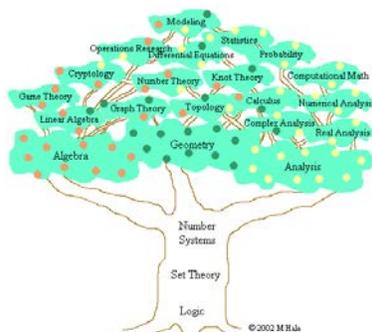
Each branch of the tree has its purpose. The purpose of *algebra* is to solve equations (and an occasional inequality). Every topic that we will cover this semester will affect our ability to solve equations both directly and indirectly. It is important to keep the big picture in mind throughout this course. The topics that we will focus on include intermediate algebra, equations and inequalities, functions and their graphs, inverse functions, exponential and logarithmic functions, linear and non-linear systems, and mathematical modeling.

Course Learning Outcomes:

- Apply function concepts including; evaluating, operations, composition, inverses, and transformations.
- Solve polynomial, exponential, and logarithmic equations and relate and interpret these solutions.
- Construct graphs of linear, polynomial, exponential, logarithmic, absolute value, square root, piecewise defined, and rational functions and then analyze them.
- Model and interpret real-world problems using polynomial equations or regressions.
- Solve systems of equations.
- Explain key results both symbolically and in English.

COLORADO gtPATHWAYS COURSE

Colorado Guaranteed Transfer (GT) Pathways Course: The Colorado Commission on Higher Education has approved <u>MTH122: College Algebra</u> 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 http://highered.colorado.gov/academics/transfers/gtpathways/curriculum.html

The table in **Appendix A** details the specific alignment of Course Learning Outcomes and Assessments to gtPathways Content and Criteria requirements.

PARTICIPATION & ATTENDANCE

Prompt and consistent attendance in your online courses is essential for your success at CSU-Global Campus. Failure to verify your attendance within the first 7 days of this course may result in your withdrawal. If for some reason you would like to drop a course, please contact your advisor.

Online classes have deadlines, assignments, and participation requirements just like on-campus classes. Budget your time carefully and keep an open line of communication with your instructor. If you are having technical problems, problems with your assignments, or other problems that are impeding your progress, let your instructor know as soon as possible.

COURSE MATERIALS

Textbook Information is located in the CSU-Global Booklist on the Student Portal.

COURSE SCHEDULE

Due Dates
The Academic Week at CSU-Global begins on Monday and ends the following Sunday.

1. **Discussion Boards:** The original post must be completed by Thursday at 11:59 p.m. MT and Peer Responses posted by Sunday 11:59 p.m. MT. Late posts may not be awarded points.
2. **Opening Exercises:** Take the opening exercise before reading each week's content to see which areas you will need to focus on. You may take these exercises as many times as you need. The opening exercises will not affect your final grade.
3. **Mastery Exercises:** Students may access and retake mastery exercises through the last day of class until they achieve the scores they desire.
4. **Critical Thinking:** Assignments are due Sunday at 11:59 p.m. MT.

5.   **Live Classroom:** Although participation is not required, Live Classroom sessions take place in Weeks 1, 3, 5, and 7. There are four total sessions. These sessions will be recorded so that they can be viewed later.

WEEKLY READING AND ASSIGNMENT DETAILS

Module 1

Readings
- Chapter: Just-in-Time Review, Sections 1 through 28, in *Algebra &Trigonometry: Graphs and Models*. Watch mini-lectures provided to enhance the readings.

Opening Exercise (0 points)

Discussion (25 points)

Live Classroom (0 points)

Mastery Exercise (10 points)

Critical Thinking (50 points)

Choose one of the following two assignments to complete this week. Do not complete both assignments. Identify your assignment choice in the title of your submission.

Note that while there are two options for the Critical Thinking Assignment, there is only one rubric. Review the rubric to confirm you are meeting the assignment requirements.

Option #1: Algebra Review #1

Write a response that completes the following tasks and meets the list of requirements that follow to build your response for this Critical Thinking Assignment:

1. Rationalize the denominator. $\dfrac{3}{2+\sqrt{x}}$
2. Simplify the expression. Write your final answer in terms of positive exponents only.
$\dfrac{2b^2a^{-3}}{(4a)^{-1}b^{-2}}$
3. Multiply and simplify the expression by combining like terms. $(5-2)(x^4+6x^2-1)$
4. Factor the following: $8x^3+27$
5. Solve the following for x: $5x^2-6=0$

Option #2: Algebra Review #2

Write a response that completes the following tasks and meets the list of requirements that follow to build your response for this Critical Thinking Assignment:

1. Write the interval notation for $\{x|x \leq -1 \; or \; x > 9\}$
2. Simplify the expression. Write your final answer in terms of positive exponents only.
$\dfrac{15x^{-1}y^{-2}}{(5x)^2y^2}$
3. Find the domain. Use interval notations for your final answer. $\dfrac{x-3}{x^2-9}$
4. Factor the following: $35x^3-21x^2-7x$
5. Assume x>0. Subtract and simplify your final answer completely $3\sqrt{8x^2}-2\sqrt{32x^2}$

Portfolio Project Reminder

Instead of a typical Portfolio Project, this course requires that you complete a Midterm and Final Exam. The Midterm is worth 160/370 points of your Critical Thinking score and the Final is worth all 350 points of your Portfolio Project score. There are multiple practice opportunities in MyMathLab (MML). While there is nothing you are required to turn in this week, do not wait until "later" to sign in and start practicing! Your Study Plan, a feature in MML, is a good source for extra exercises.

Module 2

Readings

- Chapter 1, Sections 1 through 6, in *Algebra & Trigonometry: Graphs and Models*
- Khan Academy (n.d.). Linear regression and correlation: Fitting a line to data. Retrieved from https://www.khanacademy.org/math/probability/regression/regression-correlation/v/fitting-a-line-to-data

Opening Exercise (0 points)

Discussion (25 points)

Mastery Exercise (10 points)

Critical Thinking (50 points)

Choose one of the following two assignments to complete this week. Do not complete both assignments. Identify your assignment choice in the title of your submission.

Note that while there are two options for the Critical Thinking Assignment, there is only one rubric. Review the rubric to confirm you are meeting the assignment requirements.

Option #1: Linear Regression: Copier Maintenance

The table below shows the average annual price, in dollars, of copier maintenance agreements sold at Johnson Office Supply in several recent years.

Year, x	Average Price, P
2003, 3	$ 275
2006, 6	302
2009, 9	312
2012, 12	326
2015, 15	342

Write a response that completes the following tasks and meets the list of requirements that follow to build your response for this Critical Thinking Assignment:

1. Without using a graphing calculator, model the data with a linear function using years 6 and 12, and using this function, predict the average price in 2018. Round to the nearest dollar.
2. Perform the linear regression on the above data. It will be easier if you use Microsoft Excel (or an equivalent program) to perform the calculations. This video will help: https://www.khanacademy.org/math/probability/regression/regression-correlation/v/fitting-a-line-to-data
3. State the slope and y-intercept.
   a. What does the slope represent in this case?
   b. What does the y-intercept represent in this case?
4. Attach the scatter plot together with the graph of the line.

5. Using the equation from regression analysis, predict the average price in 2018. Compare the results with part 1.

Option #2: Diner Lunches

The table below shows the average number of lunches per day, sold at a Diner, for various years.

Year, x	Lunches Sold, S
2011, 0	47
2012, 1	55
2013, 2	68
2014, 3	75
2015, 4	90

Write a response that completes the following tasks and meets the list of requirements that follow to build your response for this Critical Thinking Assignment:

1. Without using a graphing calculator, model the data with a linear function using years 1 and 3, and using this function, predict the average number of lunches sold in 2019. Round to the nearest whole number.
2. Perform the linear regression on the above data. It will be easier if you use Microsoft Excel (or an equivalent program) to perform the calculations. This video will help: https://www.khanacademy.org/math/probability/regression/regression-correlation/v/fitting-a-line-to-data
3. State the slope and y-intercept.
   a. What does the slope represent in this case?
   b. What does the y-intercept represent in this case?
4. Attach the scatter plot together with the graph of the line.
5. Using the equation from regression analysis, predict the average price in 2019. Compare the results with part 1.

Module 3

Readings
- Chapter 2, Sections 1 through 5, in *Algebra & Trigonometry: Graphs and Models*

Opening Exercise (0 points)

Discussion (25 points)

Live Classroom (0 points)

Mastery Exercise (10 points)

Critical Thinking (55 points)
Choose one of the following two assignments to complete this week. Do not complete both assignments. Identify your assignment choice in the title of your submission.

Note that while there are two options for the Critical Thinking Assignment, there is only one rubric. Review the rubric to confirm you are meeting the assignment requirements.

Option #1: Piecewise Functions: Wireless Plans

There is a new wireless company out there – Math-Mobile. Their talk plan is quite interesting.

- For a flat fee of $15 you get a phone number plus 75 anytime minutes
- For minutes 76 through 150, the additional cost is $0.10 per minute
- For minutes from 151 to 250, the additional cost is $0.20 per minute
- For every minute past 250, the additional cost is $0.25 per minute

Write a response that completes the following tasks and meets the list of requirements that follow to build your response for this Critical Thinking Assignment:

1. Construct a piecewise function modeling the monthly pre-tax/fees bill.
2. Check your function with the following values:
   - For 165 minutes, the bill is $25.50
   - For 375 minutes, the bill is $73.75
   - Does your function agree with these values? If not, make necessary adjustments.
3. Construct a graph of this function. What are the implied domain and range?
4. What is your bill if you talk just 50 minutes? 125 minutes? 500 minutes?

Option #2: Piecewise Functions: Paycheck with Overtime

Your job pays time and a half for overtime (hours worked over 40 hours per week). Your hourly rate is $14.00 per hour.

1. Construct a piecewise function modeling the weekly paycheck.
2. Construct a graph of this function. What are the implied domain and range?
3. How much will you get paid if you work 60 hours?
4. You want to make $1,100 per week. How many hours should you request?
5. You still want to make $1,100 per week, but 60 weekly hours is the absolute max that you can work. What pay raise should you ask for in order to achieve your goal?

Module 4

Readings
- Chapter 3, Sections 1 through 5, in *Algebra & Trigonometry: Graphs and Models*

Opening Exercise (0 points)

Discussion (25 points)

Mastery Exercise (10 points)

Midterm Exam (160 points)
This course requires that you complete a Midterm Exam that covers the material represented in the first four modules of the course. To best prepare for the Midterm, take the full advantage of the Practice Midterm Exam in MyMathLab (MML). You have three attempts at the Practice Midterm. You have only one shot at the Final Exam. Here is the suggested strategy:
1. Review your notes.
2. Take the Practice Midterm Exam
3. Review the questions that you missed. Make sure you understand where you went wrong.
4. Refer to Your Study Plan for extra practice.
5. Take the Practice Exam Again.
6. Continue reviewing the problems that you are missing.
7. Take necessary notes. Re-take the Practice Midterm for extra practice.
8. Ask your instructor for help as you practice.

Now that you are ready and confident, open MML, and take the Midterm Exam. Please be advised that the exam is timed. You have 240 minutes to complete the test.

Module 5

Readings
- Chapter 4, Sections 1 – 3 (Division and Factors in Section 3), 5, and 6, in *Algebra & Trigonometry: Graphs and Models*

Opening Exercise (0 points)

Discussion (25 points)

Live Classroom (0 points)

Mastery Exercise (10 points)

Module 6

Readings
- Chapter 5, Sections 1-4, in *Algebra & Trigonometry: Graphs and Models*

Opening Exercise (0 points)

Discussion (25 points)

Mastery Exercise (10 points)

Critical Thinking (55 points)
Choose one of the following two assignments to complete this week. Do not complete both assignments. Identify your assignment choice in the title of your submission.

Note that while there are two options for the Critical Thinking Assignment, there is only one rubric. Review the rubric to confirm you are meeting the assignment requirements.

Option #1: Financial Math: Loan Repayment Schedules

During this module we have learned a few useful financial formulas. Here is another one: This formula computes the monthly mortgage payment (principal + interest).

$$M = P \times \frac{r/n}{1-(1+r/n)^{-nt}}$$

M-monthly mortgage payment
r-annual interest rate
n-number of payments per year
P-Principal (amount borrowed)
t-number of years

Write a response that completes the following tasks and meets the list of requirements that follow to build your response for this Critical Thinking Assignment:

First, check if you can use this formula correctly: If you borrow 300,000 at 3.75% annual rate for 30yrs, then mortgage payment (principal + interest) should come out to $1,389.35.

Consider a case where you borrow 325,000 at 3.65% annual rate for 30 years fixed.

1. Compute the mortgage payment using the above formula.

2. Construct the re-payment schedule using Excel. Consider viewing this YouTube video for some Excel short-cuts and hints:
   Video: Loan Repayment Schedule in Excel
   Link: https://www.youtube.com/watch?v=fM94yKqlmqE&feature=youtu.be
3. What is the total payment at the end of 30 years? How much of it is just interest?
4. Now respond to questions 1, 2, and 3, but for a 15-year mortgage at 3.15%.
5. In your opinion, what are the pros and cons of each option (30-year mortgage vs. 15-year mortgage)?

Option #2: Newton's Law of Cooling

Perform the following experiment and write a response that following the following steps and meets the list of requirements that follow to build your response for this Critical Thinking Assignment:

1. Boil a cup of water.
2. Set the cup in a room with regular room temperature and record the room temperature.
3. Wait 15 minutes and measure the temperature of the cup.
4. Use the measurements from part 3 to solve for *k* in the Newton's Law of Cooling given by
   $$T(t) = T_0 + (T_1 - T_0)e^{-kt}$$

   Where T_1 is the initial temperature of the water
   T_0 is the temperature in the room
   t is the time
   T(t) is the temperature of the water at time

   (NOTE: We will officially cover solving exponential equations in the next module. For now, you can use this re-arrangement of Newton's Law of Cooling to find *k*

   $$k = \frac{ln\left(\frac{T(15) - T_0}{T_1 - T_0}\right)}{-15}$$

   Where 15 minutes is the time, T_0 is most likely 212F – temperature of boiling water, T(15) is your measurement after 15 minutes and T_1 is the room temperature.
5. Use the rate found in part 4 to predict the temperature of the water after 30 minutes.
6. What was the true temperature? How close is the real measurement to the predicted value?

Module 7

Readings
- Chapter 5, Sections 5 and 6, in *Algebra &Trigonometry: Graphs and Models*

Opening Exercise (0 points)

Discussion (25 points)

Live Classroom (0 points)

Mastery Exercise (10 points)

Module 8

Readings
- Chapter 9, Sections 1 and 2, in *Algebra & Trigonometry: Graphs and Models*

Opening Exercise (0 points)

Discussion (25 points)

Mastery Exercise (10 points)

Final Exam (350 points)

This course requires that you complete a Midterm Exam that covers the material represented in the first four modules of the course. To best prepare for the Midterm, take the full advantage of the Practice Midterm Exam in MyMathLab (MML). You have three attempts at the Practice Midterm. You have only one shot at the Final Exam. Here is the suggested strategy:

1. Review your notes.
2. Take the Practice Midterm Exam
3. Review the questions that you missed. Make sure you understand where you went wrong.
4. Refer to Your Study Plan for extra practice.
5. Take the Practice Exam Again.
6. Continue reviewing the problems that you are missing.
7. Take necessary notes. Re-take the Practice Midterm for extra practice.
8. Ask your instructor for help as you practice.

Now that you are ready and confident, open MML, and take the Midterm Exam. Please be advised that the exam is timed. You have 240 minutes to complete the test.

Course Policies

Grading Scale	
A	95.0 – 100
A-	90.0 – 94.9
B+	86.7 – 89.9
B	83.3 – 86.6
B-	80.0 – 83.2
C+	75.0 – 79.9
C	70.0 – 74.9
D	60.0 – 69.9
F	59.9 or below

Course Grading

20% Discussion Participation
0%   Opening Exercises
0%   Live Classroom
8%   Mastery Exercises
37% Critical Thinking Assignments
35% Final Exam

IN-CLASSROOM POLICIES

For information on late work and incomplete grade policies, please refer to our **In-Classroom Student Policies and Guidelines** or the Academic Catalog for comprehensive documentation of CSU-Global institutional policies.

Academic Integrity
Students must assume responsibility for maintaining honesty in all work submitted for credit and in any other work designated by the instructor of the course. Academic dishonesty includes cheating, fabrication, facilitating academic dishonesty, plagiarism, reusing /re-purposing your own work (see *CSU-Global Guide to Writing and APA Requirements* for percentage of repurposed work that can be used in an assignment), unauthorized possession of academic materials, and unauthorized collaboration. The CSU-Global Library provides information on how students can avoid plagiarism by understanding what it is and how to use the Library and Internet resources.

Citing Sources with APA Style
All students are expected to follow the *CSU-Global Guide to Writing and APA Requirements* when citing in APA (based on the APA Style Manual, 6th edition) for all assignments. For details on CSU-Global APA style, please review the APA resources within the CSU-Global Library under the "APA Guide & Resources" link. A link to this document should also be provided within most assignment descriptions in your course.

Disability Services Statement
CSU–Global is committed to providing reasonable accommodations for all persons with disabilities. Any student with a documented disability requesting academic accommodations should contact the Disability Resource Coordinator at 720-279-0650 and/or email ada@CSUGlobal.edu for additional information to coordinate reasonable accommodations for students with documented disabilities.

Netiquette
Respect the diversity of opinions among the instructor and classmates and engage with them in a courteous, respectful, and professional manner. All posts and classroom communication must be conducted in accordance with the student code of conduct. Think before you push the Send button. Did you say just what you meant? How will the person on the other end read the words?

Maintain an environment free of harassment, stalking, threats, abuse, insults or humiliation toward the instructor and classmates. This includes, but is not limited to, demeaning written or oral comments of an ethnic, religious, age, disability, sexist (or sexual orientation), or racist nature; and the unwanted sexual advances or intimidations by email, or on discussion boards and other postings within or connected to the online classroom. If you have concerns about something that has been said, please let your instructor know.