

MAT140– College Algebra (Fall 2024) Course Syllabus

Instructor

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Student Consultation Hours: 10 – 11 am on MW and 12:30 – 2 pm on TR

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Important Sites

D2L <https://d2l.ship.edu>

Zoom (appointment required) <https://ship.zoom.us/j/94338091000>

Course Materials

D2L provides links to textbook, videos, notes, and homework.

Text Book (optional): *PreCalculus 1*, by David Lippman and Melonie Rasmussen (ISBN: (978)1548 407124)

Calculator: a scientific calculator with logarithm and trigonometry buttons will be allowed (e.g., TI-30X or Casio FX families)

Course Description

College Algebra (MAT 140) is a prerequisite for both Applied Calculus and Precalculus. In this class we will learn about the building blocks of calculus (called functions) and their properties, with a special focus on linear, quadratic, exponential, and logarithmic functions. This course is for students who are in (or headed for) majors that require a calculus course.

The prerequisite for this course is Mathematics Placement Level 4. If you feel you're in the wrong course, please contact the Mathematics Department secretary (math@ship.edu) as soon as possible.

Your schedule can be changed only during the first week of class.

Tentative Schedule

Exam 1: Thursday of September 26

Exam 2: Tuesday of October 29

Exam 3: Tuesday of November 26

Final: To be announced (it will be on the final week December 9-13, and cumulative.)

Tutoring

Free walk-in or appointment-required tutoring is available in Learning Center at Mowrey.

Grading

Your grade will be based on your notes, homework, quizzes, and a cumulative Final. There would be an extra credit for your participation in Discussion Board forums. I will use the following grading scheme:

Class Activities	10%	Quiz & Attendance
Homework	30%	Homework in d2l
Exams	60%	Exam1 (25%) + Exam2 (25%) + Exam3 (25%)+ Final (25%)

At the end of the course, I will assign grades based on the following scale:

Percentage	90 -100	87-89	84-86	80-83	77-79	74-76	70-73	60-69	0-59
Final Grade	A	A-	B+	B	B-	C+	C	D	F

Expectations

In class, you will receive notes with many blanks that you are supposed to fill in during each class time. Your attendance will be checked every day.

If you miss any class, please find **study materials (book, notes, videos) in d2l and contact me** immediately if you need any assistance.

Homework: All homework will be available in d2l. **You can redo homework** assignments as many times as you want **before the deadline**.

Student Learning Objectives

Upon successful completion of this course, you will:

- Be able to explain information presented in mathematical forms (e.g. equations, graphs, diagrams, tables, and words). (SLO Q1: Interpretation)
- Be able to perform calculations and draw appropriate conclusions based on them. (SLO Q2: Analysis)
- Be able to express quantitative evidence in support of an argument. (SLO Q3: Communication)
- Master on all the basic terms and knowledge in functions
- Master all the skills dealing with linear and quadratic functions and equations
- Get familiar to other polynomials, rational, exponential, and logarithmic and be able to sketch their graphs
- Solve exponential and logarithmic equations

Tentative Course Calendar (Fall 2024)

Adjustments and updates to the course schedule, due to inclement weather or other unforeseen events, will be announced in class.

Wk	Section and Topic	STUDENT LEARNING OBJECTIVES - TSWBT (the student will be able to):	Assignments
1 (8/26-8/30)	Introduction & Arithmetic Algebra (Review A)	<ul style="list-style-type: none"> ▪ (Review) Recognize when two fractions are equivalent ▪ (Review) Find the decimal equivalent of a fraction and vice-versa ▪ (Review) Compute percentages ▪ (Review) Perform the arithmetic operations of addition, subtraction, multiplication, and division of fractions with numbers without using a calculator ▪ (Review) Evaluate simple exponential expressions with integers ▪ (Review) Use the order of operations to properly evaluate an exponential expression involving integers 	HW1 (Review A)
2 (9/3-9/6)	Functions (1.1 – 1.3)	<ul style="list-style-type: none"> ▪ Recognize the difference between an expression and an equation ▪ Understand when a given relation is a function – whether given a description, equation, ordered pairs or graph (1.1) ▪ Understand function notation, $f(x)$, and be able to use this notation to evaluate a function (1.1) ▪ Determine the function value for a given x-value from the formula $f(x)$, or from a table, or from an ordered pair or from a graphical representation of the function (1.1) ▪ Understand what the domain and range of a given function is (1.2) ▪ Describe a set of inputs (like domain) using interval notation or a shaded number line (1.2) ▪ Evaluate and plot points for simple piecewise functions (1.2) ▪ Compute the average rate of change of a function from the formula and know how this corresponds to the graph of the function (1.3) ▪ Use open intervals to describe where a graph is increasing or decreasing (1.3) 	HW2 (1.1) HW2 (1.2) HW2 (1.3)
3 (9/9-9/13)	Function Composition (1.4) & Introductory Algebra (Review B)	<ul style="list-style-type: none"> • Algebraically express the composition of two functions (1.4) • (Review) Simplify a linear algebraic expression (distribute around parentheses and combine like terms) • (Review) Evaluate the algebraic expression by substitution • (Review) Solve a simple linear equation • (Review) Recognize the equivalence between expressions such as $\frac{x}{2}$, $\frac{1}{2}x$, and $0.5x$ • (Review) Perform simple arithmetic operations on rational expressions (such as common denominations) • (Review) Simplify compound fractions (an alternative expression for fractional division) • (Review) Perform simple polynomial arithmetic ▪ (Review) Solve a linear equation using the addition and multiplication properties of equality ▪ (Review) Solve a linear equation that involves fractions, both simple equations $\frac{1}{2}x + 4 = 7$ and more complicated ones $\frac{x+1}{x-2} = 7$ 	HW3 (1.4) HW3 (Review B)
4 (9/16-9/20)	Linear Equations and Functions (2.1, 2.2)	<ul style="list-style-type: none"> ▪ Set up application problems involving linear equations such as linear supply-demand equilibrium problems (2.1) ▪ Graph a linear function (2.2) ▪ Understand that the graph of a linear equation or function looks like a line (2.1) ▪ Understand what the slope and the x- and y-intercepts tell us about the graph of a line (2.1) ▪ Estimate the slope and intercepts of a line from the graph (2.2) ▪ Determine the slope of a line given two points (2.1) ▪ Determine the slope and intercepts of a line given the equation whether the equation is given in standard form $3x + 2y = 5$, or slope-intercept form $y = \frac{3}{4}x + 2$ (2.1) ▪ Determine the equation of a line from the graph from two points, from a point and a slope (2.1) ▪ Determine the relationship between slopes and parallel or perpendicular lines (2.2) ▪ Recognize the equations for horizontal and vertical lines (2.2) ▪ Determine where two lines intersect (2.2) ▪ Compute the average rate of change for a linear function and see that it is the slope of the line (2.1) 	HW4 (2.1) HW4 (2.2)
5 (9/23-9/27)	More with Linear (2.3, 2.5)	<ul style="list-style-type: none"> ▪ Know and apply the Pythagorean Theorem, the distance formula, the midpoint formula ▪ Solve business application problems related to linear functions and equations ▪ Solve equations involving absolute value with linear ▪ Sketch a graph work of the absolute value function 	HW5 (2.3) HW5 (2.5)
			Exam 1 – Thursday 9/26

6 (9/30-10/4)	Quadratic Equations and Functions (Review C, 3.1, 3.2)	<ul style="list-style-type: none"> ▪ (Review) Perform polynomial arithmetic ▪ (Review) Factor polynomials for the form $ax^2 + bx + c$ and higher degree polynomials that are simple multiples of these polynomials ▪ (Review) Solve quadratic equations using factoring ▪ Recognize a polynomial and know when it is a monomial, binomial, trinomial, or quadratic (3.1) ▪ Determine the degree, coefficients, and leading coefficient of a polynomial (3.1) ▪ Add, subtract and multiply polynomial expressions (3.1) ▪ Solve quadratic equations by factoring, the square root method, or the quadratic formula (3.2) ▪ Solve quadratic equations which involve rational expressions or fractions such as $\frac{2}{3}x^2 - x - 3 = 0$ or $\frac{3x}{x-2} + \frac{1}{x} = 4$ (3.2) ▪ Graph quadratic function (3.2) ▪ Determine the axis of symmetry and vertex from the graph or formula for a quadratic function, whether in standard form or vertex form (3.2) ▪ Determine the horizontal and vertical intercepts from the graph or formula for a quadratic function, whether in standard form or vertex form (3.2) 	HW6 (Review C) HW6 (3.1) HW6 (3.2)
7 (10/7-10/11)	Applications and Transformations for Quadratic (3.2, 1.5)	<ul style="list-style-type: none"> • Determine the maximum or minimum for a quadratic function and use this information to solve optimization application problem in quadratic situations (3.2) • Find the formula for a quadratic function given its vertex and one other point (3.2) • Recognize the vertex form as shift transformations (1.5) • Recognize the reflections across the coordinate axes (1.5) • Recognize vertical scaling (1.5) 	HW7 (3.2) HW7 (1.5)
8* (10/16-10/22)	Polynomial Functions and Sign Charts; Inequalities (3.3, 1.2)	<ul style="list-style-type: none"> • Recognize power functions $f(x) = x^n$ (3.3) • Recognize the different features for odd powers versus even powers (3.3) • Determine the end behavior for a polynomial function (3.3) • Sketch the graph of a polynomial function using the intercepts and a sign chart or testing points (3.3) • Solve inequalities involving quadratic functions or factored polynomials in general (3.3) • Graph an inequality on a number line (1.2) • Express the solution to an inequality algebraically, in interval notation or on a number line (1.2) 	No class on Tuesday 10/15 HW8 (3.3) HW8 (1.2)
9* (10/23-10/29)	Rational Functions (3.7)	<ul style="list-style-type: none"> ▪ Simplify rational functions after factoring numerator and denominator ▪ Find intercepts for a rational function ▪ Find the vertical and horizontal asymptotes for a rational function ▪ Find y-coordinate of the whole in a graph for a rational function (quadratic/quadratic, quadratic/linear, linear/quadratic, linear/linear) with a removable discontinuity 	HW9 (3.7) Exam2 – Tuesday 10/29
10* (10/30-11/5)	Inverse Function (1.6, 3.8)	<ul style="list-style-type: none"> ▪ Recognize when a function (in ordered pairs, a graph, or a formula form) is one-to-one (1.6) ▪ Sketch the inverse of a general function graphically (1.6) ▪ Determine the inverse of a linear function algebraically (1.6) ▪ Determine the inverse of a quadratic function on an appropriately restricted domain (3.8) 	HW10 (1.6) HW10 (3.8)
11* (11/6-11/12)	Exponential Functions and Graphs (4.1, 4.2)	<ul style="list-style-type: none"> ▪ Understand and apply the laws of exponents ▪ Understand the equivalence of various ways we switch between things without thinking about it, esp when fractions are involved ▪ Recognize an exponential function from a formula or graph ▪ Recognize when a given data set is best modeled by exponential functions as opposed to linear functions (4.1) ▪ Set up an exponential function for a word problem involving periodic or continuous growth/decay (4.1) ▪ Answer questions about interest compounding annually/quarterly/monthly, and continuously (4.1) ▪ Understand the role of the base in an exponential function, specifically how $b < 1$ or $b > 1$ is relevant to increasing/decreasing shape of the graph (4.2) ▪ Identify vertical intercept and horizontal asymptote for an exponential function (4.2) ▪ Apply transformations (shift and reflection) to exponential functions (4.2) ▪ Solve exponential equations involving terms with the same base 	HW11 (4.1) HW11 (4.2)
12* (11/13-11/19)	Logarithms (4.3)	<ul style="list-style-type: none"> ▪ Understand the inverse-function relationship between exponential and logarithmic equations, $\log_a x = y \leftrightarrow a^y = x$ (4.3) ▪ Evaluate simple logarithms, $\log_3 9$ (4.3) ▪ Evaluate a logarithm using the change of base formula (4.3) ▪ Solve exponential and logarithmic equations (4.3) ▪ Solve exponential application problems should be answered with logarithms 	HW12 (4.3)

13* (11/20-11/26)	Logarithmic functions (4.5)	<ul style="list-style-type: none"> ▪ Identify vertical asymptote and domain for log functions ▪ Apply transformations (shifts and reflections) to log functions (4.5) ▪ Identify vertical and horizontal intercepts of transformed log functions like $g(x) = a \log(x - b) + c$ 	HW13 (4.5) Exam 3 – Tuesday 11/26
14 (12/2-6)	Review	<ul style="list-style-type: none"> • Review for the final 	
15 (12/9-13)	Final	<ul style="list-style-type: none"> • Final exam is a cumulative exam. The date will be announced later. 	Final exam

Title IX Reporting Requirements

Shippensburg University of Pennsylvania and its faculty are committed to assuring a safe and productive educational environment for all students. In order to comply with the requirements of Title IX of the Education Amendments of 1972 and the university's commitment to offering supportive measures in accordance with the regulations issued under Title IX, Shippensburg University of Pennsylvania requires faculty members to report incidents of sexual violence shared by students to the university's Title IX Coordinator, Dr. John Burnett [JABurnett@ship.edu] or [Title9@ship.edu]. The only exceptions to the faculty member's reporting obligation are when incidents of sexual violence are communicated by a student during a classroom discussion, in a writing assignment for a class, or as part of a university-approved research project. **Faculty members are obligated to report sexual violence or any other abuse of a student who was, or is, a child (a person under 18 years of age) when the abuse allegedly occurred to the person designated in the university' Protection and Supervision of Minors on Campus Policy.**

Information regarding the reporting of sexual violence and the resources that are available to victims of sexual violence are available on the Office of Human Resources website:

https://www.ship.edu/about/offices/hr/title_ix_statement/

Reports may be made to the following individuals:

Dr. John Burnett
Title IX Coordinator
Office of Human Resources
Old Main 106-A
Shippensburg, PA 17257
771-477-1323
Cell: 724-317-6415
Email: JABurnett@ship.edu

Nipa Browder
Deputy Title IX Coordinator
Office of Human Resources
Ph: 717-477-1124
Email: Nbrowder@ship.edu

Jennifer Milburn
Deputy Title IX Coordinator
Housing/ResLife/Conferences
Ph: 717-477-1904
Email: JSMilburn@ship.edu

Trejon Dinkins
Deputy Title IX Coordinator
Retention and Student Success
Ph: 717-477-1123 x3027
Email: TADinkins@ship.edu

Alix Rouby
Deputy Title IX Coordinator
Career Center
Ph: 717-477-1595
Email: AJRouby@ship.edu

Mary Burnett
Deputy Title IX Coordinator
International Programs
Ph: 717-477-1279
Email: MEBurnett@ship.edu

Link for the online reporting form: (This is for reporting an issue, not making a formal complaint)

https://cm.maxient.com/reportingform.php?ShippensburgUniv&layout_id=3

Link for the Formal Complaint form:

https://cm.maxient.com/reportingform.php?ShippensburgUniv&layout_id=21

Link for campus resources:

https://www.ship.edu/about/offices/hr/title_ix_statement/resources/