**Marshall University**

**MTH 127 Syllabus**

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| **Course Title/Number** | College Algebra-Expanded Version - MTH 127 |
| **Semester/Year** | Spring 2018 |
| **Section/CRN** | 206 3917 |
| **Days/Time** | MTWRF 1:00 – 1:50 |
| **Location** | SH 335 (MWF) / SH 624 (TR) |
| **Instructor** | Shannon Miller-Mace |
| **Office** | SH 741B |
| **Phone** | (304) 696-3697 |
| **E-Mail** | miller207@marshall.edu or Blackboard Messages |
| **Office Hours** | MT 9:30 – 12:00, or by appointment. |

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| **Teaching Assistant** | Anh Nguyen |

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| **University Policies** | By enrolling in this course, you agree to the University Policies listed below. Please read the full text of each policy by going to [www.marshall.edu/academic-affairs](http://www.marshall.edu/academic-affairs) and clicking on “Marshall University Policies.” Or, you can access the policies directly by going to [www.marshall.edu/academic-affairs/policies/](http://www.marshall.edu/academic-affairs/policies/). Academic Dishonesty/Excused Absence Policy for Undergraduates/Computing Services Acceptable Use/Inclement Weather/Dead Week/Students with Disabilities/Academic Forgiveness/Academic Probation and Suspension/Academic Rights and Responsibilities of Students/Affirmative Action/Sexual Harassment |

**Course Description: From Catalog**

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| A brief but careful review of the main techniques of algebra. Polynomial, rational, exponential, and logarithmic functions. Graphs, equations and inequalities, sequences. Prerequisite: Math ACT 17-20 or C or better in MTH 099, MTH 102, or MTH 102B. 5 credit hours.  |

**Courses that have MTH 127/130 as a prerequisite:**

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| * Graduation Requirement for College of Business
* MTH 122 - Trigonometry, MTH 132 - Precalculus, MTH 140 - Applied calculus

CHM 111, CS 110, CI 248, ENGR 221, IST 420/421, PS 109, PHY 101, PHY 201 This course is intended to prepare students for MTH 132. It will prepare students for subsequent courses in trigonometry and calculus that use algebra. |

**Required Texts, Additional Reading, and Other Materials**

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| **Textbook:** College Algebra with Integrated Review ISBN: 978-1-944894-97-9 (with textbook) or 978-1-944894-98-6 (with e-book only)**Activities Website:**  Free student account for Desmos.com website. **Calculator:** TI-30 (any TI-30 is acceptable (TI-30X IIS recommended), TI-34 or 36 are not). Cell phone and smart device calculators are not permitted.**Internet Access**: Students will need access to a computer and internet in order to complete Hawkes online homework, Desmos interactive activities, and other MUOnline/Blackboard assignments.  |

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| **Course Student Learning Outcomes** | **How students will practice this outcome** | **How students will be assessed on this outcome** |
| Identify and implement appropriate solution methodsfor single-variable equations | Online homework, written assignments, in-class activities | Course exams and common final |
| Identify and graph standardalgebraic functions | Online homework, written assignments, in-class activities | Course exams and common final |
| Interpret graphs of functions | Online homework, written assignments, in-class activities | Course exams and common final |
| Construct functions to model applications | Online homework, written assignments, in-class activities | Course exams and common final |
| Communicate written mathematics using appropriate notation and explanation where appropriate | Online homework, written assignments, in-class activities | Course exams and common final |

**Attendance Policy**

Attendance is required in the MWF portion of our course in order to complete the variety of in-class assignments assigned each day. Attendance is also required on TR lab days to be able to complete in lab activities. Only University excused absences will warrant make-up assignments or tests.

**Course Requirements / Due Dates**

Students will utilize Hawkes Learning System ([www.learn.hawkeslearning.com](http://www.learn.hawkeslearning.com)) for the **Learn and Practice** portion of each lesson, as well as Desmos ([www.desmos.com](http://www.desmos.com)) to complete **Activities** related to those lessons. Students will be assessed on their learning by completing **Certifications** ([www.learn.hawkeslearning.com](http://www.learn.hawkeslearning.com)) in the Hawkes Learning System and taking **Tests** in class.

1. **Learning Activities:** The “activities” portion of the course will contain items from our MWF in-the-classroom experience like activities, challenge questions, quizzes, individual worksheets, lecture discussion, etc. All of these grades, including the Desmos Activities, will count toward the activities portion of your grade.
2. **Homework Certifications:** Each textbook section corresponds to at least one homework (Certify) section in the Hawkes learning system. Many assignments have prerequisite sections that must be completed prior to attempting the assignment. These prerequisites are review and reinforcement of mathematical topics that support the material you are learning in class. They are listed on the course schedule as “Prep work” and you should read through the “Learn” screens and attempt the assignments prior to the lab day for which they are assigned. **All assignments must be completed this semester, even if you have some certifications from previous semesters.**
3. **Tests:** There will be three midterm exams as outlined in the course schedule. Exam dates are January 31, February 28, and April 4 for classes with TR Lab.
4. **Common Final Exam:** The common final exam for MTH 127 will take place on **Saturday April 28** from 2-4 pm. You may use the required calculator for the course (TI-30), but no other assistance (formula sheets, notebooks, phones, or other internet connected devices) will be permitted. **You must bring your own calculator or do without. There will be NO sharing of calculators permitted during the exam.**

**Grading Policy:**

Activities make-up 15% and Certifications will be worth 20% of the semester grade. Each Unit Test (three total) will be worth 15% and the Comprehensive Final Exam (one exam) will be worth 20% of the semester grade.

Grade Scale

A = 90 – 100%

B = 80 – 89%

C = 70 – 79%

D = 60 – 69%

F = Below 60%

Grade Calculation

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| Learning Activities  | 15% |
| Homework Certifications  | 20% |
| Tests (3 total)  | 45% |
| Common Final Exam | 20% |
| **Total** | **100%** |

**\*The Final Exam for this course is scheduled for Saturday, April 28th, 2018 at 2:00pm.\***

# Course Content:

1. Solving equations in one variable of the following types
	1. linear equations and inequalities, basic equations with absolute value
	2. quadratic equations with real and complex solutions (factoring and quadratic formula only - omit completing the square)
	3. equations with rational expressions
	4. equations with radicals
	5. equations with exponential and/or logarithmic expressions
2. Basic Functions
	1. definition of “function”, “domain”, and “range”
	2. graphing lines
	3. linear and quadratic functions and their applications
	4. identification of other common functions graphically
	5. graphing functions with translation and reflection (no stretching/compressing)
	6. identifying symmetry in functions (even/odd)
3. graphically determine where a function is increasing, decreasing, and constant
4. composition of functions and inverse functions
5. Polynomial and rational functions
	1. finding zeros of factored polynomials
	2. finding polynomials satisfying given zeros and end behavior
	3. basic graph sketching including end behavior at *±∞*
	4. intermediate value theorem
	5. equations of asymptotes - vertical and horizontal (no oblique)
6. Exponential and logarithmic functions and
	1. basic properties of exponential functions and their graphs
	2. basic properties of logarithmic functions and their graphs
	3. applications of exponential and logarithmic functions (focus on financial applications: Compound interest)
7. Systems of equations
	1. solving systems of linear equations in two variables using substitution and elimination

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| **MTH 127 Spring 2018 Schedule** **(MWF Class, TR Labs)** | **Recommended Text problems:** |
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| Week 1 (1/8-1/12) | 1 | Introduction to the course **1.1 The Real Number System**3: Inequalities4: Set-builder and interval notation5: Absolute value | Pg. 12 # 5-25, 32-40, 41-52 |
| 2 | **Introduction to Hawkes: Prep Work 1.R.4** Simplifying Radicals**Learn, Practice, Certify 1.1 Introduction to Desmos: Compound Inequalities** |   |
| 3 | **3.1 Cartesian Coordinate System**1: Cartesian coordinate system2: The graph of an equation3: Distance and midpoint formulas | Pg. 185-187 #1-26, 33-51, 54, 55-60, 69-73 |
| 4 | **Prep Work Due: 1.R.2** Reducing Fractions, **2.R.1** Multiplication and Division with Fractions, **2.R.2** Addition and Subtraction with Fractions**Lab: Practice and Certify 3.1Desmos: Pool Border Problem** |   |
| 5 | **2.1a Linear Equations in One Variable**1: Solutions to equations2: Solving linear equations4: Solving linear equations for one variable | Pg. 106-108 #1-25  |
| Week 2 (1/15-1/19) | 1 | MLK Day |   |
| 2 | **Prep Work Due: 4.R.1** Order of Operations**Lab: Practice and Certify 2.1a,bDesmos: The Coordinate Plane** |   |
| 3 | **2.1b Applications of Linear Equations in One Variable** (Topic 5) | Pg. 108-110 #47-56, 61, 65-67, 69, 72 |
| 4 | **Prep Work Due: 4.R.2** Variables and Algebraic Expressions**Lab: Practice and Certify 2.2Desmos: Expression Mash-Up** |   |
| 5 | **2.2 Linear Inequalities in One Variable**1: Solving linear inequalities2: Solving compound linear inequalities4: Translating Inequality Phrases  | Pg. 118-119 #1-33, 49-57, 59 |
| Week 3 (1/22-1/26) | 1 | **3.2 Linear Equations in Two Variables**1: Recognizing linear equations in two variables2: x and y intercepts3: Horizontal and vertical lines | Pg. 194-196 # 1-48 |
| 2 | **Prep Work Due: 4.R.3**  Simplifying Expressions**Lab: Practice and Certify 3.2Desmos: Connecting Graphs, Equations, and Tables** |   |
| 3 | **3.3 Forms of Linear Equations**1: The slope of a line2: Slope-intercept form of a line3: Point-slope form of a line  | Pg. 209-210 #1-12, 13- 21, 25-28, 34-67 |
| 4 | **Practice with graphs of lines****Lab: Practice and Certify 3.3Desmos: Polygraph: Lines** |   |
| 5 | **3.4 Parallel and Perpendicular Lines**1: Slopes of parallel lines2: Slopes of perpendicular lines | Pg. 219-221#1-6, 19-21, 29-33, 39-41, 55-66 |
| Week 4 (1/29-2/2) | 1 | Review for Test 1 |   |
| 2 | **Review Activities: Test 1Desmos: Polygraph Lines, Part 2** |   |
| 3 | Test 1 |   |
| 4 | **Prep Work: 5.R.1** Greatest Common Factor**Lab: Learn, Practice, Certify 5.R.2** Factoring Trinomials by Grouping**Desmos: Marbleslide: Lines** |   |
| 5 | **2.3 Quadratic Equations in One Variable (Real Solutions Only)**1: Solving quadratic equations by factoring2: Solving "perfect square" quadratic equations | Pg. 132-133 #1-8, 15-19 |
| Week 5 (2/5-2/9) | 1 | **2.3 Quadratic Equations in One Variable (Real Solutions Only)**1: Solving quadratic equations by factoring2: Solving "perfect square" quadratic equations | Pg. 132-133 #9-13, 21-23 |
| 2 | **Prep Work: 5.R.3** Additional Factoring Practice**Lab: Discuss Test 1Desmos: Picture Perfect**  |   |
| 3 | **1.6 The Complex Number System**1: The imaginary unit and its properties2: The algebra of complex numbers (no division)3: Roots and complex numbers**2.3 Quadratic Equations in One Variable** 4: The quadratic formula  | Pg. 83-84 # 1-21, 42, 43Pg. 133 #34-60 |
| 4 | **Prep Work: 1.5** Factoring Practice **Lab: Practice Factoring, Practice and Certify 1.6Desmos: Central Park** |   |
| 5 | **2.3 Quadratic Equations in One Variable** 4: The quadratic formula | Pg. 133 #34-60 |
| Week 6 (2/12-2/16) | 1 | **3.6 Introduction to Circles**1: Standard form 2: Graphing circles (omit completing the square to write in standard form) | Pg. 239-241 #1-24, 25-29, 30-39 |
| 2 |  **Lab: Practice and Certify 2.3 and 3.6Desmos: Function Carnival** |   |
| 3 | **4.1 Relations and Functions**1: Relations, domains, and ranges2: Functions and the vertical line test | Pg 266-268 #1,2,4,9,10,12,13,14,17-20,25-31,35 |
| 4 | **Prep Work: 4.R.4** Translating Phrases into Algebraic Expressions**Lab: Practice with FunctionsDesmos: Circle Patterns** |   |
| 5 | **4.1 Relations and Functions**3: Functional notation and evaluation4: Implied domain of a function | Pg. 268-269 #43-46, 49, 61,63, 66,67,68 |
| Week 7 (2/19-2/23) | 1 | **4.2 Linear and Quadratic Functions**1: Linear functions and graphs2: Quadratic functions and graphs (Vertex form by formula, not completing the square) | Pg. 281 #1-5, 8, 16, 17, 19-21, 31-37 |
| 2 | **Lab: Practice and Certify 4.1, 4.2aDesmos: Domain and Range Introduction** |   |
| 3 | **4.2 Linear and Quadratic Functions**3: Max/min problems | Pg. 281-285 # 39, 41, 42, 47, 49-53 |
| 4 | **Lab: Practice and Certify 4.2b, 4.3aDesmos: Polygraph: Parabolas** |   |
| 5 | **4.3a Other Common Functions**1: Commonly occurring functions: ax^n, ax^(1/n), absolute value only**2.6 Radical Equations**1: Solving radical equations (with only one radical expression) | Pg.299 # 1-8, 13-18, 37-40Pg. 162 #1, 4, 5, 6, 10, 13, 14, 16, 34-41 |
| Week 8 (2/26-3/2) | 1 | Review Test 2 |   |
| 2 | **Review activities Test 2Desmos: Polygraph: Power, Root, Absolute Value Functions** |   |
| 3 | Test 2 |   |
| 4 | **Lab: Practice with graphing functionsDesmos: Marbleslide: Parabolas** |   |
| 5 | **4.4 Transformations of Functions**1: Shifting and reflecting only | Pg. 317-318 # 1-3, 8, 9-12, 13-21, 36-45 |
| Week 9 (3/5-3/9) | 1 | **4.4 Transformations of Functions**2: Symmetry of functions and equations3: Intervals of monotonicity | Pg. 319 # 46-54, 61-66 |
| 2 |  **Prep Work: 6.R.2** Special Products**Lab: Practice and Certify 4.4Desmos: What's My Transformation** |   |
| 3 | **2.4 Higher Degree Polynomial Equations**2: General polynomial equations of the form ax^n=b, or cubics that have a common factor of x only, real solutions only  | Pg. 141 # 21, 28, 29, 30 |
| 4 | **Prep Work: 6.R.3** Special Factorizations - Squares**Lab: Practice and Certify 2.4Desmos: Card Sort: Transformations** |   |
| 5 | **A.1 Polynomial Equations and Graphs (Text Section 5.1)**1: Zeros of polynomials2: Graphing factored polynomials**A.2 Polynomial Division and the Division Algorithm (Omit Division!) (Text Section 5.2)**3: Constructing polynomials with given zeros | Pg. 372-373 #1, 5, 6, 8, 9, 18-21, 24, 27,28, 36-41, 42-49Pg. 388 #53, 57, 58 |
| Week 10 (3/12-3/16) | 1 | **A.4 The Fundamental Theorem of Algebra (Text Section 5.4)**1: The fundamental theorem of algebra2: Multiple zeros and their geometric meaning | Pg. 415 #1-8, 39, 42, 44 |
| 2 | **Prep Work: 6.R.1** Defining Rational Expressions**Lab: Practice and Certify A.1, A.2, A.4Desmos: Polygraph: Polynomial Pandemonium** |   |
| 3 | **2.5 Rational Expressions and Equations**1: Simplifying rational expressions2: Combining rational expression4: Solving rational equations | Pg. 152-154 #1-6, 13, 14, 17, 23, 24, 25, 27, 49, 50, 52, 54,55  |
| 4 | **Lab: Practice and Certify 2.5Desmos: Constructing Polynomials** |   |
| 5 | **6.1 Rational Functions**1: Definitions2: Vertical asymptotes | Pg. 443 # 1-11, 69 |
| Spring Break |
| Week 11 (3/26-3/30) | 1 | **6.1 Rational Functions**3: Horizontal asymptotes (no oblique)4: Graphing rational functions | Pg. 444-445 #19, 22, 23, 24, 25, 29, 31, 34, 37, 40, 41, 42, 43, 47, 49-52 |
| 2 | **Lab: Practice and Certify 6.1Desmos: Polygraph: Rational Functions** |   |
| 3 | **4.5 Combining Functions**2: Composing functions | Pg. 331 #23-27,31-37, 44-46 |
| 4 | **Lab: Practice and Certify 4.5Desmos: Marbleslide: Rationals** |   |
| 5 | **4.6 Inverses of Functions**2: Inverse functions and the horizontal line test3: Finding inverse function formulas (basic only) | Pg: 345-346 #13-16, 17-22, 30, 35, 36, 39, 47, 49, 51, 53 |
| Week 12 (4/2-4/6) | 1 | Review for Test 3 |   |
| 2 | **Review Activities for Test 3Desmos: Inverse Functions** |   |
| 3 | Test 3 |   |
| 4 | **Prep Work: 7.R.1** Simplifying Integer Exponents I**Lab: Learn, Practice, Certify 7.R.2 Desmos: Avi and Benita's Repair Shop** |   |
| 5 | **7.1 Exponential Functions and Their Graphs**1: Definition 2: Graphing3: Solving basic equations | Pg. 514-515 # 1-6, 22-38, 49, 51, 52, 53, 55, 57 |
| Week 13 (4/9-4/13) | 1 | **Review 7.17.2 Applications of Exponential Functions**3: Compound interest | Pg. 530-531 #22, 23, 25,26,27,28,29,32,33 |
| 2 |  **Prep Work: 7.R.3** Rational Exponents**Lab: Practice and Certify 7.1, 7.2Desmos: Polygraph: Exponentials** |   |
| 3 | **7.3 Logarithmic Functions**1: Definition of logarithmic functions4: Common and Natural logarithms2: Graphing logarithmic functions | Pg. 541-543 #1-8, 13-20, 25,26,31,37-45, 73-77 |
| 4 | **Lab: Practice with logarithmsDesmos: Marbleslide: Exponentials** |   |
| 5 | **7.3 Logarithmic Functions**3: Evaluating elementary logarithmic expressions | Pg. 543 #46-54, 61-64 |
| Week 14 (4/16-4/20) | 1 | **7.4 Properties of Logarithms**1: Properties of logarithms3: Applications (Richter Scale only) | Pg. 555-557 #1-6, 19-26, 31-36,97, 98,  |
| 2 | **Lab: Practice and Certify 7.3, 7.4Desmos: Polygraph: Exponential and Logarithmic Functions** |   |
| 3 | **7.5 Exponential and Logarithmic Equations**1: Converting between exponential and logarithmic forms | Pg. 571-572 #1-12, 25-33, 49-53 |
| 4 | **Lab: Practice solving exponential and logarithmic equationsDesmos: What Comes Next?** |   |
| 5 | **7.5 Exponential and Logarithmic Equations**2: Further applications (Interest only) | Pg. 573-574 #75, 79, 80 |
| Week 15 (4/23-4/27) | 1 | **8.1 Systems of Linear Equations**1: Definition and classification2: Solving by substitution3: Solving by elimination (optional) | Pg. 601 #1-15 |
| 2 | **Prep Work: 8.R.1** Solving systems by graphing**Lab: Practice Solving Systems of Linear Equations Practice and Certify 7.5Desmos: System of Two Linear Equations** |   |
| 3 | **8.1 Systems of Linear Equations**2: Solving by substitution, applications3: Solving by elimination (optional) | Pg. 603-604 #58, 63, 64, 65, 70 |
| 4 | **Review for Final ExamDesmos: Polygraph: Linear Systems** |   |
| 5 | Review for Final Exam |   |

**\*The Final Exam for this course is scheduled for Saturday, April 28th, 2018 at 2:00pm.\***