

Syllabus

Course Description: An intensive review of high school algebra as preparation for calculus and other mathematics. Facility with exponents, basic graphing, solving linear and quadratic equations in one variable, solving linear systems in two variables, polynomials, factorization of algebraic expressions, binomial theorem, and inequalities. Algebraic manipulations, analytic geometry of lines.

Does not count toward graduation. A through C/Unsatisfactory grading only. The Pass/No Credit option may not be used.

This course has been designated as a High Demand/Controlled Access (HD/CA) course. Students registering for HD/CA courses for the first time will have priority to do so.

This course is not for credit and does not count towards one's cumulative GPA, but the grade does appear on one's transcript, counts towards the semester GPA, and counts towards credit enrollment. It is necessary to pass this course with a grade of C or better to move onto MAT 122 or MAT 123. You may also enter AMS 102, MAT 118, and a few other courses such as PSY 202 with a 2+ on the placement exam, but admittance into MAT 122 and MAT 123 requires a 3 or a passing grade in MAP 103. This course does NOT satisfy the SBC QPS requirement but does satisfy the S1 skills requirement.

Prerequisite: Level 2 on the mathematics placement examination or MAP 101.

Grading Scheme:

25%: Test 1 Tuesday 2/22 from 8:15 PM to 9:35 PM

25%: Test 2 Tuesday 4/5 from 8:15 PM to 9:35 PM

25%: Cumulative Final Exam Wednesday 5/11 from 11:15 AM to 1:45 PM

15%: Homework

10%: Quiz Average

Grading Scale: A 90-100, A- 85-89, B+ 80-84, B 75-79, B- 70-74, C+ 65-59, C 60-64

*NOTE: These letter grades are threshold scores only. Actual final scores needed to earn a certain letter grade may be lowered if warranted based on the difficulty of the exams. In other words, if your final total points in the course equal 85%, you will not earn less than an A-; however, the threshold for a A- may be lower.

There will be no extensions for (or exemptions from) any HW, Quiz, or Exam unless your absence is based on a well-documented extenuating circumstance. There will be no extra credit given to any student on an individual basis.

Homework: Once a week you will be asked to print out on paper some HW problems to complete and discuss with your classmates. Your homework will be due in person in three separate batches (see weekly schedule on Blackboard).

Blackboard: This will be our main resource for sharing information regarding grades, announcements, and course materials so please check it regularly.

Calculators: Will not be permitted during any quiz or test. It is also strongly encouraged that you stay away from them while you work through your homework.

Textbook: There is no textbook nor online homework service that you need to purchase. All the materials for the course will be generated by the instructors of the course.

Meeting Times

Lecture 01: MWF from 10:30 AM to 11:25 AM with Stephanie Lamb in Light Engineering Lab 152

Lecture 02: TuTh from 6:30 PM to 7:50 PM with Mark Lombardi in Physics P127

Lecture 03: TuTh from 11:30 AM to 12:50 PM with Thomas Rico in Physics P127

Lecture 04: TuTh from 4:45 PM to 6:05 PM with Mark Lombardi in Physics P113

Contact Info (Zoom Links on Blackboard)

Stephanie Lamb (stephanie.salvator@stonybrook.edu)

- Monday: MLC from 5:00 PM to 6:00 PM on Zoom
- Wednesday: Office hour from 1:00 PM to 2:00 PM in Math Tower 2-120
- Friday: Office hour from 11:30 AM to 12:30 PM on Zoom

Mark Lombardi (mark.lombardi@stonybrook.edu)

- Tuesday: Office hour from 3:30 PM to 4:30 PM in Math Tower 2-121
- Wednesday: MLC from 3:30 PM to 4:30 PM on Zoom
- Thursday: Office hour from 3:30 PM to 4:30 PM in Math Tower 2-121

Thomas Rico (thomas.rico@stonybrook.edu)

- Monday: MLC from 2:00 PM to 3:00 PM on Zoom
- Tuesday: Office hour from 1:30 PM to 2:30 PM in Math Tower 2-120
- Thursday: Office hour from 1:30 PM to 2:30 PM in Math Tower 2-120

Weekly Schedule

Week 1 (1/24 - 1/28): Numbers and Variables. Operations of addition and multiplication and their properties (commutativity, associativity, and distributivity). Subtraction and division as operations opposite to addition and multiplication. Parentheses and order of operations. Fractions and operations with them.

- HW 1 posted to Blackboard on 1/23.

Week 2 (1/31 - 2/4): Powers with integer exponents. Power rules.

- HW 2 posted to Blackboard on 1/30.
- HW 1 Review
- Quiz 1 (Based on Week 1's material)

Week 3 (2/7 - 2/11): Algebraic expressions. Polynomials and operations with them. Formulas to remember: short multiplication (the square of a sum/difference), and the difference of squares. Rational expressions and operations with them.

- HW 3 posted to Blackboard on 2/6.
- HW 2 Review
- Quiz 2 (Based on Week 2's material)

Week 4 (2/14 - 2/18): Notion of an equation. Equivalent equations. Solutions to linear equations. Number of solutions to linear equations.

- HW 4 posted to Blackboard on 2/13.
- HW 3 Review
- Quiz 3 (Based on Week 3's material)

Week 5 (2/21 - 2/25): Composing algebraic expressions after word description. Word problems leading to linear equations.

- ***Test 1 (Covering HW 1-4) on Tuesday 2/22 from 8:15 PM to 9:35 PM***
- HW 1-4 due in person when you sit for the exam.
- HW 5 posted to Blackboard on 2/20.
- HW 4 Review
- Quiz 4 (Based on Week 4's material)

Week 6 (2/28 - 4/4): Number line, intervals, and absolute value of a real number. Solving absolute value linear equations and linear inequalities.

- HW 6 posted to Blackboard on 2/27.
- HW 5 Review
- Quiz 5 (Based on Week 5's material)

Week 7 (3/7 - 3/11): Rectangular coordinate system. Linear equations in two variables. Graphs of linear equations. Lines on a plane. Intercepts, slope, vertical and horizontal lines. Various forms of a linear equation: standard, slope-intercept, and point-slope form. Parallel and perpendicular lines.

- HW 7 posted to Blackboard on 3/6.
- HW 6 Review
- Quiz 6 (Based on Week 6's material)

Week 8 (3/14 - 3/18): Spring Recess (No Classes).

Week 9 (3/21 - 3/25): Systems of two linear equations and their geometrical interpretation. Inconsistent and dependent systems. Word problems leading to systems of linear equations.

- HW 8 posted to Blackboard on 3/20.
- HW 7 Review
- Quiz 7 (Based on Week 7's material)

Week 10 (3/28 - 4/1): Notion of a radical. Rules for radicals. Radicals as powers with rational exponents.

- HW 9 posted to Blackboard on 3/27.
- HW 8 Review
- Quiz 8 (Based on Week 9's material)

Week 11 (4/4 - 4/8): Quadratic polynomials and quadratic equations. Finding roots to a quadratic equation by balancing an equation of the type $ax^2 + c = 0$, by difference of two square factoring, by Vieta's Theorem, by binomial factoring, and by completing the square.

- ***Test 2 (Covering HW 5-9) on Tuesday 4/5 from 8:15 PM to 9:35 PM***
- HW 5-9 due in person when you sit for the exam.
- HW 10 posted to Blackboard on 4/3.
- HW 9 Review
- Quiz 9 (Based on Week 10's material)

Week 12 (4/11 - 4/15): Finding roots by factoring by grouping. Finding roots by the quadratic formula. Factor any quadratic when roots are known. Solving equations which are reducible to a quadratic form.

- HW 11 posted to Blackboard on 4/10.
- HW 10 Review
- Quiz 10 (Based on Week 11's material)

Week 13 (4/18 - 4/22): Quadratic functions and their graphs. Vertex, axis of symmetry, intercepts of a parabola. Quadratic inequalities.

- HW 12 posted to Blackboard on 4/17.
- HW 11 Review
- Quiz 11 (Based on Week 12's material)

Week 14 (4/25 - 4/29): Word problems leading to quadratic equations. Interpreting area and perimeter from geometric sketches of simple shapes (triangles, quadrilaterals, and circles).

- HW 13 posted to Blackboard on 4/24.
- HW 12 Review
- Quiz 12 (Based on Week 13's material)

Week 15 (5/2 - 5/16): Review for Final Exam.

- HW 13 Review
- Quiz 13 (Based on Week 14's material)

Cumulative Final Exam (Covering HW 1-13) on Wednesday, May 11th from 11:15 AM to 1:45 PM (Room TBA)

- HW 10-13 due in person when you sit for the exam.

Learning Outcomes for Students

Week 1:

- distinguish integers, rational, irrational, and real numbers
- represent real numbers as decimals and points on the real line
- operate with numerical expressions and evaluate them
- explain what a variable is and what it is used for
- perform operations in a correct order
- express symbolically the properties of commutativity and associativity of addition and multiplication
- describe the numbers 0 and 1 by their properties
- explain what the reciprocal of a number is
- comprehend subtraction and division as operations opposite to addition and multiplication respectively
- explain why division by 0 does not make sense
- explain why subtraction and division are neither commutative nor associative
- state the property of distributivity in general terms
- use distributive property to clear parenthesis in algebraic expressions
- understand what a fraction represents and perform operations with fractions

Week 2:

- understand the meaning of a power of a variable
- use exponential notation and terminology correctly
- operate with a negative base
- explain the meaning of zero and negative exponents
- list and prove the power rules: multiplication and division of powers with the same base, power of a power, multiplication and division of powers with the same exponent
- fluently apply the power rules for operating with algebraic expressions

Week 3:

- identify a numerical expression and evaluate it
- identify an algebraic expression, comprehend it as an algorithm for calculations and explain why algebraic expressions are important
- evaluate an expression at a number
- apply distributivity to factoring expressions
- combine similar terms in algebraic expressions
- identify a polynomial expression
- understand what a monomial is
- identify a polynomial in several variables
- simplify polynomial expressions by clearing parentheses and combining similar terms
- identify the standard form of a polynomial in one variable
- identify the degree and the coefficients of a polynomial
- bring a polynomial to the standard form

- perform addition, subtraction and multiplication of polynomials
- state and prove short multiplication formulas in general terms
- apply the short multiplication and difference of squares formulas for expansion and factoring
- evaluate a polynomial at a number
- substitute an algebraic expression into a polynomial and simplify the result
- explain what a rational expression is
- evaluate a rational expression at a number
- substitute an algebraic expression into a rational expression
- perform correct cancellations in rational expressions
- analyze typical mistakes in cancellations
- use factoring for cancellations
- state the rules for multiplying and dividing rational expressions and relate these rules to fraction multiplication and division
- explain how to add and subtract rational expressions
- perform multiplication, division, addition, and subtraction of rational expressions

Week 4:

- explain what an algebraic equality is
- classify equalities with variables as identities, contradictions, and equations
- list some commonly used algebraic identities
- prove algebraic identities
- understand what an equation in one variable is and what its solution is
- explain what it means to solve an equation
- explain what it means for two equations to be equivalent
- describe and perform elementary transformations of an equation
- explain what a linear equation is
- present an algorithm for solving a linear equation
- explain how many solutions a linear equation may have and why it is so
- solve linear equations and verify whether a solution is correct

Week 5:

- translate English phrases into algebraic expressions
- use schematic drawings for problem solving
- use geometric formulas (perimeter, area, volume), physical formulas (uniform motion), and common facts about percentage and pricing in word problems
- analyze results
- solve linear equations originated in geometry and physics
- adopt a general scheme for solving a word problem
- understand how to choose a variable and compose an equation
- apply appropriate formulas for problem solving

Week 6:

- relate simplest inequalities and intervals on the number line
- adopt the interval notations for intervals on the number line

- comprehend the concept of absolute value of a number
- interpret absolute value as a distance
- interpret geometrically simplest equations involving absolute value
- solve equations involving absolute value
- describe what a linear inequality is
- explain what is the solution set of an inequality
- describe the solution of an inequality in different ways: in interval notation, using set builder notation, and graphically on the number line
- explain what it means for two inequalities to be equivalent and what the elementary transformations of inequalities are
- correct use of the equivalence sign
- explain why multiplying both sides of the inequality by a negative number results in reversing the sign of the inequality
- solve linear inequalities by performing elementary transformations
- write down the solution of a solved inequality in different ways: using inequality signs, as a set, and as an interval on the number line
- comprehend the general formula defining the absolute value of a variable
- state and explain the properties of absolute value
- perform calculations involving absolute values
- solve linear equations involving absolute value

Week 7:

- explain what a Cartesian coordinate system on a plane is
- describe the points on Cartesian planes by their coordinates
- recognize the equations of vertical and horizontal lines
- present the general form of a linear equation in two variables and describe what a given linear equation represents geometrically
- explain how to draw a straight line by its equation
- understand what the intercepts of a line are and how to find their coordinates
- operate with linear equations in the slope-intercept form
- provide algebraic and geometric description of the slope of a line
- explain why parallel lines have the same slope
- verify if two given equations represent parallel lines
- write an equation of a line passing through two given points
- use the point-slope form of the equation of a line
- explain why perpendicular lines have negative reciprocal slopes

Week 9:

- explain what a linear system of two equations in two variables is
- explain what it means to solve a system
- give a geometric description of a linear system and its solution
- explain how many solutions a linear system may have
- perform elementary transformations of a system
- solve systems by substitution and by elimination
- use combined methods for solving a system

- check a solution of a system
- write down the solution of a system with infinitely many solutions
- choose variables appropriately
- compose a system of equations according to the text of the problem
- solve systems and verify their solutions

Week 10:

- know the definition of a principal square root of a non-negative number
- use the radical sign correctly
- identify the perfect squares
- comprehend taking the principal square root as an operation opposite to squaring
- list the properties of radicals
- explain how to calculate the radical of the square of a variable
- be aware about typical misconceptions related to radicals
- explain what is the simplest radical form and how to operate with radical expressions
- define n^{th} root of a number, in particular, third root and fourth root
- operate with odd-ordered and even-ordered roots using their properties
- understand the difference between odd-ordered and even-ordered roots
- interpret an n^{th} root as a power with a fractional exponent
- operate with rational exponents

Week 11:

- identify the standard form of a quadratic polynomial
- identify quadratic binomials and quadratic trinomials
- identify a quadratic equation
- define the roots of a quadratic equation and quadratic polynomial
- solve binomial quadratic equations and present solutions in simplest radical forms
- solve binomial equations by factoring
- perform completing the square
- factor a quadratic binomial
- factor a quadratic trinomial
- factor a quadratic trinomial using the roots
- state Vieta's theorem and apply it to finding roots
- solve a quadratic equation by factoring

Week 12:

- remember the quadratic formula
- understand proving the quadratic formula
- know what the discriminant is and how it affects the roots of the equation
- apply quadratic formula for solving quadratic equations
- solve quadratic equations which are not written in the standard form
- choose the most optimal strategy for solving a quadratic equation
- solve polynomial equations reducible to quadratic form
- solve rational equations reducible to quadratic form

Week 13:

- identify a quadratic function
- comprehend a parabola as the graph of a quadratic function
- identify geometric properties of a parabola and relate them to the algebraic formula defining the parabola
- identify on the graph the vertex, axis of symmetry, x - and y -intercepts of the parabola
- know the formula for the vertex and axis of symmetry of a parabola
- draw the parabola from its equation by identifying its essential geometric elements
- identify a quadratic inequality
- interpret a quadratic inequality geometrically
- solve quadratic inequalities using roots
- write down the solution of a quadratic inequality using interval notation

Week 14:

- solve word problems leading to quadratic equations and analyzing the results
- translate English phrases into algebraic expressions
- use schematic drawings for problem solving
- adopt a general scheme for solving a word problem
- understand how to choose a variable and compose an equation
- apply appropriate formulas for problem solving

Math Learning Center (MLC): Is a place where you can get free tutoring help with any of your math concerns. No appointment is required, just come in and ask for help. The MLC is located in the basement of the Mathematics Tower and virtually through Zoom. For more information, visit: <http://www.math.stonybrook.edu/mlc/center-hours.html>

Student Accessibility Support Center (SASC) Statement: If you have a physical, psychological, medical, or learning disability that may impact your course work, please contact the Student Accessibility Support Center, Stony Brook Union Suite 107, (631) 632-6748, or at sasc@Stonybrook.edu. They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential.

Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and the Student Accessibility Support Center. For procedures and information go to the following website: <https://ehs.stonybrook.edu/programs/fire-safety/emergency-evacuation/evacuation-guide-disabilities> and search Fire Safety and Evacuation and Disabilities.

Academic Integrity Statement: Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty is required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology & Management, Nursing, Social Welfare, Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty please refer to the academic judiciary website at http://www.stonybrook.edu/commcms/academic_integrity/index.html

Critical Incident Management: Critical Incident Management: Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Student Conduct and Community Standards any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Until/unless the [latest COVID guidance](#) is explicitly amended by SBU, during Spring 2022 "disruptive behavior" will include refusal to wear a mask during classes.