

## Course Overview

### ■ Course Description

The objective of Proficiency Algebra is to establish a strong algebraic foundation for pre-calculus and calculus. Students will not only learn problem-solving skills and conceptual understandings; but also develop critical thinking and apply mathematical properties in new ways. Additionally, students will formulate, analyze, solve, and interpret real-world mathematical problems, strengthening their ability to approach complex mathematical challenges with confidence.

Note: This course is not for credit and does not count towards one's cumulative GPA, but the grade does appear on one's transcript. It is necessary to pass this course with a grade of C or better to move onto advanced math courses.

### ■ Required Textbook

Lynn Marecek, Intermediate Algebra, OpenStrax.

The book is available for free at <https://openstax.org/details/books/intermediate-algebra>

We will cover selected chapters, although not necessarily in the same order.

### ■ Grading Scheme

Your grade for the course will be based on the exams results, weekly assignments, quizzes and class participation. Your regular attendance and active class participation will be considered in making the final decision about your course grade.

Grading will be based on: Midterm 30%, Final Exam 35%, Class Participation and quizzes 20%, Assignment 15%

Grading Scale:

93-100% A  
68-72% C+

87-92% A-  
63-67% C

83-86% B+

<63% Fail

78-82% B 73-77% B-

\*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. If your final total points in the course equal 87%, you will not earn less than an A-; however, the threshold for a A- may be lower.
- ✓ Calculators will not be permitted on the exams.

### ■ Assignments

Assignments will be given out on a weekly basis and will be collected by posting the assignment on the Brightspace should be handed back with grades and within a week of submission.

- ✓ All your work should be done by you and nobody else. Submitting somebody's else work is a serious violation of university integrity policy and will be treated respectively. See Academic Integrity Statement below.
- ✓ The instructor may validate your work on a private meeting. If you will have difficulties in explaining how the submitted problems were solved, then your course grade may be affected.

### ■ Retake Policy

No make-up is allowed if you miss an exam without serious and documented reasons.

<b>Weekly Schedule</b>	
Week 1 (Feb 24-Feb 28)	Properties of Numbers, and Basic Operations. Order of Operations and Expressions with Multiple Operations. Algebraic expressions.
Week 2 (Mar 3 - Mar 7)	Properties of Integer Exponents. <b>Mar 4 Substitute of Independence Movement Day: No classes in session</b>
Week 3 (Mar 10 - Mar 14)	Exponents, Roots, Radicals
Week 4 (Mar 17 - Mar 21)	Polynomials and Operations with Them
Week 5 (Mar 24 - Mar 28)	Factoring
Week 6 (Mar 31- Apr 4)	Rational expressions
Week 7 (Apr 7- Apr 11)	Continue Rational Expressions <b>Mid-term</b>
Week 8 (Apr 14- Apr 18)	Linear Equations and Absolute Value Equations.
Week 9 (Apr 21- Apr 25)	Linear inequalities
Week 10 (Apr 28- May 2)	Linear Equations in Two Variables
Week 11 (May 5- May 9)	Linear Systems <b>May 5 Children's Day: No classes in session</b>
Week 12 (May 12- May16)	Continue Linear Systems
Week 13 (May 19- May 23)	Quadratic Equations
Week 14 (May 26- May 30)	Graphing quadratic functions (parabolas) <b>May 30 Correction Day—Classes follow Monday's schedule</b>
Week 15 (Jun 2)	Quadratic Inequalities Review for Final Exam
<b>June 9 (Mon)</b>	<b>Final Exam</b>

## ■ Course Goals

### **Week 1:**

- Classify Numbers and Describe the Number Sets: Natural, Whole, Integers, Rational, Irrational, and Real Numbers

Understand that the properties of commutativity and associativity of addition and multiplication

- Explain why division by 0 does not make sense
- Explain why subtraction and division are neither commutative nor associative
- Introduce a letter and how it follows the same properties as numbers.
- Understand Elementary Operations of Addition, Multiplication, and their inverses: Subtraction (adding a negative) and Division (multiplying by the reciprocal)
- Identify the Identity Elements of Addition, 0, and Multiplication, 1, how they are used in simplifying and solving many problems (including operating with fractions).
- Understanding fractions and operating with fractions using addition, subtraction, multiplication, division, and reducing fractions

### **Week 2:**

- Understand that an exponent is a symbol used to describe repeated multiplication.
- Understand the properties that result from operating with exponents and use the product/quotient rule of exponents and the power rule of exponents.
- Explore negative and zero exponent.
- Understand properties of exponents with fractional bases or letter bases.

### **Week 3**

- Understand that a root is a rational exponent and is the inverse of raising to an integer power.
- Understand that fractional and integer exponents operate the same.
- Contrast the difference between repeated division (negative exponents) and roots (rational exponents).
- Understand the principal root results in a positive number.
- Find the simplest radical form.
- Operate roots with multiplication and addition.
- Rationalize a denominator
- Contrast the result of odd-ordered and even-ordered roots of negative numbers

### **Week 4**

- Identify polynomial expressions.
- Operate with variables and constants (addition, multiplication, and exponents).
- Evaluate an expression and its contrast to solving an equation (substitute by understanding equivalency).
- Multiply polynomials & using the short multiplication formulas (squaring binomials and multiplying conjugates).

### **Week 5**

- Factor out the greatest common factor.
- Identify a polynomial in the form of the difference of two squares and factor it.
- Factor using Vieta's Theorem.
- Factor a polynomial completely.

### **Week 6 & Week 7**

- Define a rational expression.
- Evaluate a rational expression.
- Use factoring and properties of fractions to simplify rational expressions.
- Perform multiplication, division, addition, and subtraction of rational expressions.
- Rationalize a denominator using the product of conjugates

**Week 8**

- Distinguish between an expression and an equation and understand the number of solutions of a linear equation and why that is so.
- Understand absolute value as an operation that describes the distance from zero
- Solve absolute value equations and understand the number of possible solutions.

**Week 9**

- Describe the concept of an inequality.
- Solve linear inequalities and understand that these solution(s) yield a solution set.
- Explain why multiplying/dividing both sides of the inequality by negative results in changing the direction of the solution(s) on the number line.
- Represent the solution(s) geometrically (on the number line).
- Represent the solution(s) in interval notation to describe a segment, ray, or union of intervals on the number line
- Understand the difference between including/excluding an endpoint and the concept of positive and negative infinity.
- Solving compound linear inequalities and absolute value inequalities and the connection to the idea of the intersection of solutions.

**Week 10**

- Use the Cartesian/Rectangular coordinate plane to graph points and lines.
- Understand that points are locations identified by their coordinates.
- Identify linear equations as equations of first degree.
  - Graph lines: using slope and a point and using two points
  - Recognize the equations of vertical and horizontal lines, graph these lines, and describe their slope.
- Understand lines can be represented in general form, slope-intercept form, and point-slope form and how each is useful and can be transformed into the others.
- Understand what the intercepts of a line are and how to find their coordinates.
- Understand the algebraic and geometric description of the slope of a line.

**Week 11 and Week12**

- Graph a system and identify the solution geometrically
- Check if a coordinate pair is a solution to a system.
- Explain why parallel lines have the same slope and provide no solutions to the system.
- Identify parallel lines algebraically/geometrically.
- Explore why perpendicular lines have negative reciprocal slopes and identify perpendicular lines algebraically.
- Solve systems by substitution and by elimination.
- Understand linear systems that yield infinite solutions are the same line

**Week 13:**

- Identify a quadratic equation.
- Solve quadratics through factoring using the zero product property.
- Solve using the square root property.
- Solve using the quadratic formula.
- Solve by completing the square.
- Solve polynomial equations reducible to quadratic form

**Week 14:**

- Find the vertex, zeroes, y-intercept, axis of symmetry, and other points to graph a parabola.
- Understand what the discriminant is and how it affects the roots of the equation
- Use the formula for the vertex and axis of symmetry of a parabola from memory

## University Policies

- **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](http://www.stonybrook.edu/commcms/academic_integrity/index.html)

- **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. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures. Further information about most academic matters can be found in the Undergraduate Bulletin, the Undergraduate Class Schedule, and the Faculty-Employee Handbook.

- **Student Accessibility Support Center 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](mailto:sasc@stonybrook.edu). They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential.

- **Drop/Swap/Add Policies**

If you need to drop or withdraw from the course, it is your responsibility to be aware of the tuition liability deadlines listed on the Academic Calendar. Before deciding to drop/withdraw, you may want to contact me or refer to the University policies.

- **Technical Requirements and Assistance**

Brightspace is the Stony Brook University digital learning environment. It is used for the facilitation of communications between faculty and students, submission of assignments, and secure posting of grades and feedback in your courses. Technical Requirements and Assistance: D2L Brightspace is the Stony Brook University digital learning environment. It is used for the facilitation of communications between faculty and students, submission of assignments, and secure posting of grades and feedback in your courses