Syllabus: Course Policies and Procedures

Instructor:
Email:
Phone:
Office Hours:

Course Titles: Topics in Mathematics with Integrated Support and Integrated Support for Non-Algebra Pathway
Course Numbers: MATH154S and MATH061
Semester:
Class Meetings:
Classroom:

Course Descriptions and Prerequisites:

- *MATH154S Topics in Mathematics with Integrated Support:* This course is provided for students who wish to know what mathematics is all about but who do not wish to be mathematicians. Possible topics are: elementary logic, set theory, number systems, mathematical systems, number theory, voting coalitions, geometry, mathematics of finance, topology, linear programming, game theory, and cryptography. A selection of three or more such topics are offered each semester. Corequisite: MATH061 Integrated Preparation for Non-Algebra Pathway.
- *MATH061 Integrated Support for Non-Algebra Pathway*: This course is designed to be paired with a college-level non-algebra sequence mathematics course to support underprepared students. Students review the skills necessary for success in the associated college-level course in an ongoing as-needed just-in-time fashion. Topics include: numeracy, basic data analysis, proportional reasoning, an introduction to algebraic expressions and algebraic reasoning, and linear functions. Note: credits earned in this course cannot be applied toward graduation. Corequisite: MATH154S Topics in Mathematics with Integrated Support or MATH158S Introduction to Statistics with Integrated Support.

Required Materials:

- For this course we will use the following textbook: Angel, Abbot, and Runde, *A Survey of Mathematics With Applications*, 12th edition, Pearson, 18-week MyMathLab Code: 9780138306519.
- A scientific calculator is required for this course. I recommend the Texas Instruments TI-30XIIS.

Instructional Objectives:

MATH154S Topics in Mathematics with Integrated Support:

COURSE OUTCOMES	OUTCOMES ACTIVITIES
Upon successful completion of this course students should:	To achieve these outcomes students may engage in the following activities:
Demonstrate an understanding of the language and basic definitions of set theory in order to apply them to solve related problems involving set operations.	1. Use set notation. 2. Indicate a set using description, roster, and set-builder notation. 3. Distinguish between 'is an element of' and 'is a subset of.' 4. Identify the empty set. 5. Identify the universal set for a given problem. 6. Distinguish between subset and proper subset. 7. Determine the number of distinct subsets of a set.
Solve problems using basic set operations and Venn diagrams to develop the skills needed to solve related problems in this and other courses.	1. Identify a compound statement as a negation, conjunction, disjunction, conditional, or biconditional. 2. Translate statements from symbolic logic to English and from English to symbolic logic. 3. Use DeMorgan's Laws. 4. Write the converse, inverse, and contrapositive of a statement. 5. Translate arguments into symbolic form. 6. Write the negation of statements involving all, some, some … not, and none.
Construct truth tables in order to use them to solve related problems	1. Determine the basic truth tables for negation, conjunction, disjunction, conditional, and biconditional. 2. Construct truth tables for compound statements. 3. Use truth tables to determine if compound statements are equivalent. 4. Determine the truth value of a compound statement. 5. Use truth tables and comparison to standard forms to determine the validity of an argument.
Demonstrate an understanding of additive, multiplicative, positional, and ciphered systems of numeration in order to gain an appreciation for numeration systems other that the Hindu-Arabic system.	1. Convert back and forth between an additive system, such as the Egyptian or Roman numeration system, and the Hindu-Arabic system of numeration. 2. Convert back and forth between a multiplicative system, such as the traditional

	Chinese numeration system, and the Hindu-Arabic system of numeration. 3. Convert back and forth between a positional system, such as the Babylonian or Mayan numeration system, and the Hindu-Arabic system of numeration. 4. Convert back and forth between a ciphered system, such as the classical Greek numeration system, and the Hindu-Arabic system of numeration. 5. Add and subtract in some or all of the numeration systems mentioned above.
Perform conversions within base ten and between base ten and other bases and perform computations in other bases in order to better understand the Hindu-Arabic system of numeration.	1. Convert among standard form, expanded form, and written form. 2. Multiply using some or all of the following methods: a. Successive duplication, b. Mediation and duplation, c. Lattice method, d. Napier's rods. 3. Convert between base ten and other bases, 4. Add, subtract, multiply, and divide in bases other than ten.
Determine which properties of a mathematical system are satisfied in a given system in order to better understand these properties as they apply to the Hindu-Arabic numeration system	1. Identify the set of elements and the binary operations of a given mathematical system. 2. Perform calculations using a binary operation defined by a table. 3. Determine whether or not the following properties are satisfied in either a given finite or a given infinite mathematical system: a. Closure property, b. Commutative property, c. Associative property, d. Identity property, e. Inverse property, f. Distributive property for a system with two binary operations. 4. Determine if a given mathematical system is a group or an abelian group.
Perform calculations, solve problems, and analyze properties of modulo systems in order to better understand finite mathematical systems.	1. Determine if two numbers are congruent modulo *m*. 2. Add, subtract, and multiply modulo *m*. 3. Solve linear equations in modulo systems. 4. Determine whether or not a given modulo system is an abelian group.

	5. Solve applications problems involving modulo systems.
Demonstrate an understanding of some of the basic results in number theory in order to gain an appreciation of number and numeracy.	1. Apply the rules of divisibility. 2. Find all the divisors of a given number. 3. Determine if a given number is prime or composite. 4. Write the prime factorization of a given composite number. 5. Find the greatest common divisor of two numbers. 6. Find the least common multiple of two numbers. 7. Determine if a number is abundant, deficient, or perfect. 8. Determine if two numbers are friendly numbers.
Demonstrate an understanding of sequences in order to gain an appreciation of number and numeracy.	1. Determine the next term of a given sequence. 2. Determine if a given sequence is arithmetic, geometric, Fibonacci, or neither. 3. For an arithmetic sequence whose first term and common difference are known, find a. The next several terms, b. The general term, c. The sum of the first *n* terms. 4. For a geometric sequence whose first term and common ratio are known, find a. The next several terms, b. The general term, c. The sum of the first *n* terms. 5. For a Fibonacci sequence whose first two terms are known, a. Find the next several terms, b. Find the ratios of successive terms and compare this sequence of ratios with the 'golden ratio.'
Demonstrate an understanding of various voting methods and various apportionment methods in order to gain an appreciation of these methods as seen in real-life applications.	1. Solve election problems using the plurality method, the Borda count method, the plurality with elimination method, the pairwise comparison method, the sequential pairwise comparison method, and/or the approval voting method. 2. Determine if a given voting method violates the majority criterion, the Condorcet criterion, the monotonicity criterion, and/or the independence of irrelevant alternatives method.

	3. Explain Arrow's Impossibility Theorem. 4. Solve apportionment problems using the Hamilton method, the Jefferson method, and the Webster method. 5. Explain the quota rule, the Alabama paradox, the population paradox, and the new states paradox. 6. Verify that a specified paradox occurs for a given apportionment scenario. 7. Explain the Balinski and Young Impossibility Theorem.
Demonstrate an understanding of basic definitions and properties of Euclidean geometry and measurement formulas in order to solve related problems.	1. Correctly identify lines, rays, half-lines, and line segments. 2. Correctly identify acute angles, right angles, obtuse angles, and straight angles. 3. Correctly identify triangles as obtuse, right, or obtuse, and as scalene, isosceles, or equilateral. 4. Correctly identify a given quadrilateral as a trapezoid, parallelogram, rhombus, rectangle, or square. 5. Correctly identify a polygon by the number of its sides. 6. Solve problems involving vertical angles, complementary angles, and supplementary angles. 7. Solve problems involving parallel lines cut by a transversal. 8. Solve problems involving the sum of the angles in a polygon. 9. Solve problems involving similar triangles and congruent triangles. 10. Solve problems involving right triangles and the Pythagorean Theorem. 11. Use measurement formulas to find a. Perimeter of polygons, b. Area of triangles and quadrilaterals, c. Circumference and area of circles, d. Volume of rectangular solids, pyramids, cylinders, cones, and spheres, e. Surface area of three-dimensional objects.
Use simple and compound interest formulas in order to solve applications problems involving interest rates.	1. Calculate simple interest and maturity value. 2. Calculate compound interest and maturity value. 3. Calculate present value. 4. Understand and compute effective annual yield. 5. Find the value of an annuity.

Use formulas involved in installment buying in order to make informed decisions in real-life situations involving buying on credit.	1. Determine the amount financed, the installment price, and the finance charge for a fixed loan. 2. Determine the APR. 3. Compute unearned interest and the payoff amount for a loan paid off early. 4. Find the interest, the balance due, and the minimum monthly payment for credit card loans. 5. Calculate interest on credit cards using the unpaid balance method, the previous balance method and/or the average daily balance method.
Examine the cost of home ownership in order to make decisions as an educated consumer.	1. Compare and contrast fixed-rate mortgages and variable-rate mortgages. 2. Given information on income and monthly payments due, determine the maximum mortgage amount a given home buyer is qualified to borrow. 3. Compute interest costs for a fixed-rate mortgage. 4. Compute the down payment. 5. Prepare a partial loan amortization schedule for a fixed-rate mortgage. 6. Compute closing costs.
Demonstrate an understanding of investing in stocks, bonds, and mutual funds in order to make decisions as an educated consumer.	1. Compare and contrast stocks, bonds, and mutual funds as investments. 2. Get information from stock tables. 3. Calculate the basic cost for a given number of shares of a specific stock using stock tables. 4. Calculate broker fees. 5. For a given investment scenario, find the total purchase price, the total dividend amount, the capital gain or loss, the total return, and the percentage return. 6. Find the total return earned by a given bond investment. 7. Find the effective rate of return for a given mutual fund scenario.
Demonstrate an understanding of the basic definitions and properties of network theory, topology, hyperbolic geometry, elliptic geometry, and fractals in order to develop an appreciation for the nature of non-Euclidean geometry.	1. In a given network determine which vertices are even and which are odd. 2. Determine if a given network is traversable or not. 3. Find a path that traces a traversable network. 4. Solve related network problems. 5. Identify the genus of an object.

	6. Determine if two objects are topologically equivalent. 7. For hyperbolic and elliptic geometry a. Identify at least one mathematician responsible for its development. b. Identify the surface required for this type of geometry. c. Explain how Euclid's parallel postulate is changed. d. Explain why the sum of the measures of the angles in a triangle is not 180°. 8. Describe what a fractal is. 9. Use iteration techniques to demonstrate the construction of a fractal.
Use linear programming methods in order to solve maximum and minimum problems.	1. Solve a linear programming problem by a. Writing the appropriate inequalities subject to the given restrictions or constraints and the objective equation. b. Graphing the inequalities to find the region of feasible solutions. c. Determine the corner points of the feasible region. d. Use the objective equation to determine which of these points gives a maximum or minimum value. 2. Solve related applications problems.
Demonstrate an understanding of the basic definitions and rules of game theory in order to gain an appreciation of the applications of game theory in business, economics, and the sciences.	1. Construct the game matrix for a given two-person game. 2. Determine whether or not a game matrix represents a strictly determined game. 3. Given the matrix for a strictly determined game, identify the saddle point, find the optimal pure strategy for each player, and the value of the game. 4. Given the matrix for a game that is not strictly determined, find the optimal mixed strategy and the value of the game for the row player. 5. Solve related application problems.
To strengthen Core Competencies** in order to increase success in this and other courses and in the workplace.	Referenced above

MATH061 Integrated Support for Non-Algebra Pathway:

COURSE OUTCOMES	OUTCOMES ACTIVITIES
At the end of this course, students will be able to	
Successfully complete MATH154S Topics in Mathematics with Integrated Support or MATH158S Introduction to Statistics with Integrated Support.	1. Review prerequisite knowledge in an as needed, just-in-time fashion.
Explain information presented in mathematical forms (e.g., equations, graphs, diagrams, tables, words)	1. Interpret the graph of a linear function. 2. Solve appropriate real-world application problems.
Convert relevant information into various mathematical forms (e.g., equations, graphs, diagrams, tables, words)	1. Translate English statements into algebraic expressions and equations. 2. Connect the table-of-values, graph, and equation representations of linear equations. 3. Model real-world problems using equations and graphs.
Perform arithmetic and algebraic calculations (e.g., adding fractions, factoring quadratic expressions, solving quadratic equations).	1. Review arithmetic and prealgebra calculations such as adding fractions. 2. Review introductory algebra concepts such as solving and graphing linear equations. 3. Review intermediate algebra concepts such as factoring quadratic expressions and solving quadratic equations.
Make judgements and draw appropriate conclusions based on the quantitative analysis of data, while recognizing the limits of this analysis.	1. Solve real world applications problems.
Make and evaluate important assumptions in estimation, modeling, and data analysis	1. Solve real world applications problems.
Express quantitative evidence in support of the argument or purpose of work (in terms of what evidence is used and how it is formatted, presented, and contextualized)	1. Solve real world applications problems.

Teaching Procedures: This course will be taught in a lecture/discussion format with ample opportunity for student questions. Generally, class will begin with a question and answer session on the most recent homework assignment. New material will then be presented in a lecture format and homework be assigned to reinforce the topics covered in class.

Course Topics, Assignments, and Readings:

Topics
3.1 Statements and Logical Connectives
3.2 Truth Tables for Negation, Conjunction, and Disjunction
3.3 Truth Tables for the Conditional and Biconditional
3.4 Equivalent Statements
3.5 Symbolic Arguments
Exam 1
10.1 Percent
10.2 Personal Loans and Simple Interest
10.3 Compound Interest
10.4 Installment Buying
10.5 Buying a House with a Mortgage
10.6 Ordinary Annuities, Sinking Funds, and Retirement Investments
Exam 2
14.1 Voting Methods
14.2 Flaws of Voting Methods
14.3 Apportionment Methods
14.4 Flaws of Apportionment Methods
Exam 3

Tentative Test Schedule:

- Exam 1:
- Exam 2:
- Exam 3:

Basis for Student Grading: Grades for these courses will be assigned as follows based on the percentages. You will be assigned the same grade for both courses.

A	93% - 100%
A-	90% - 92%
B+	87% - 89%
B	83% - 86%
B-	80% - 82%
C+	77% - 79%
C	73% - 76%
C-	70% - 72%

D+	67% - 69%
D	63% - 66%
D-	60% - 62%
F	0% - 59%

Basis for Evaluating Student Performance: The grade for this course will be determined by the percentage of points earned to total points available, based on the following categories:

- Exams (100%): There will be three in-class exams given during the semester. Each exam will account for 33% of your final grade.

Attendance Policy: Attendance for this course is mandatory and students are expected to attend all class meetings.

Academic Dishonesty:

Academic Dishonesty is defined in the Massasoit Student Code of Conduct to include cheating, falsification of information, working on assignments with classmates without permission, plagiarism, purchasing or submitting assignments from others, or theft of materials. If there is information that academic dishonesty occurred, a faculty member may choose to act as outlined in the course syllabus, including issuing a failing grade for the assignment or the course.

Students may also be referred to the Dean of Students Office for disciplinary action under the Massasoit Student Code of Conduct. If the student believes that there is substantial evidence of error or injustice associated with a failing grade issued because of academic dishonesty, the student may file a grievance under the Grade Appeal Process.

Where the issuance of a failing grade by a faculty member for academic dishonesty will result in a student's dismissal from a program (for example in nursing and other health care programs), the charge of academic dishonesty shall be directly referred to the Dean of Students Office for administration under the Student Code of Conduct.

Affirmative Action, Equal Opportunity, and Sexual Harassment:

Massasoit Community College prohibits discriminatory harassment and sexual harassment, including sexual violence. Inquiries or complaints concerning discrimination, harassment, retaliation, or sexual violence shall be referred to the Title IX Coordinator and Compliance Officer, Amee Synnott, Office of the President, 508-588- 9100, x1304, Brockton Campus, Administration Building, Room 219, asynnott@massasoit.mass.edu. A complaint can also be filed online at www.massasoit.edu/report. For more information about Title IX, visit www.massasoit.edu/title-ix.

Classroom Behavior:

Students are expected to choose behavior that does not interfere with the learning of others. In order to assure that all students have the opportunity to fulfill their educational goals, students are prohibited from engaging in substantially disruptive behavior whether they are in a face-to-face, hybrid, or an online classroom. Substantially disruptive behavior as defined by the Massasoit Student Code of Conduct includes, but it not limited to: shouting down a speaker; disrupting a faculty member's instruction such that it impedes the learning process; failing to comply with a College Official's appropriate directives or instructions; threatening harm; harassing others; fighting or committing violent acts; or engaging in conduct that places health or safety at risk. Substantial disruption or interference does not include conduct that is protected under the First Amendment. Such behavior in the classroom will result, minimally, in a request to leave class and a referral to the Dean of Students.

Participation Policy:

Federal regulations require that Massasoit verify that students are participating in classes for which they receiving aid. To fulfill this requirement, your faculty member is monitoring your participation in this course and will be required to report your participation prior to aid being disbursed. Please visit https://massasoit.edu/enrollment/paying-for-college/financial-aid/attendance-withdrawal-information/

to review the participation deadlines. Students identified as "never participated" or "stopped participating" will be notified by the Registrar that they are being withdrawn from the class.

Academic Advising:

Students should meet with their academic advisor to talk about their academic and career goals and progress in achieving them as early as possible prior to the start of each semester. Please check your Degree Works page (accessed through the Massasoit Student portal) to identify your academic advisor and their contract information.

Access & Disability Resources:

The office of Access & Disability Resources (ADR) is committed to ensuring that students with disabilities have equal, effective, and meaningful access to all academic programs, community events, goods, and services provided by the College in compliance with the Americans with Disabilities Act and Section 504 of the Rehabilitation Act. Students with disabilities interested in establishing eligibility for services and/or academic accommodations will need to voluntarily disclose their disability to ADR (a confidential process), submit qualifying documentation and complete an ADR intake meeting to determine accommodations. Once accommodations are determined, the student will need to inform their professor of their accommodations by providing the professor with a copy of an Accommodation Letter (provided by ADR) for the current semester. Students can contact ADR at 508-588-9100 x1807 or by email at adr@massasoit.mass.edu.

Visit www.massasoit.edu/adr for more information.

Basic Needs:

The Center for Basic Needs Security provides resources for students, faculty, and community members.

If a student is experiencing challenges meeting their basic needs, including clothing, food or housing insecurity as well as physical and mental health resources, there are many campus and community resources in place that can provide support. Students may email Ellyn Craig, Coordinator of Basic Needs Security, ecraig3@massasoit.mass.edu or call 508-588-9100 x 1018 for support.

Library:

The Library welcomes all visitors – students, staff, faculty, and community members – for a service- rich virtual and in-person experience. Everyone can engage in both academic research and dynamic programming that focuses on a wide range of topics and current events. Massasoit's library services include: research help, database and book access, printing, technology loans, photocopying, scanning and study spaces. The Library's Website can be accessed through a variety of options: i.e., through the Library tile shown on the MyMassasoit portal, via live chat on the Library's website, over the phone, or

in-person at both our Canton and Brockton locations. For more information, visit https://library.massasoit.edu/

Office of Health and Wellness:

The Office of Health and Wellness at Massasoit is designed to support students' holistic health and well-being. We provide health information, outreach campaigns, and programs focused on high-risk areas that impact college-aged populations, such as drugs, alcohol, stress management, mental health problems, mental health prevention strategies, and tobacco cessation.

In addition to maintaining student health and immunization records, the Office of Health and Wellness leads public health crises/emergencies efforts. Additionally, we provide referrals for students experiencing physical or mental health concerns and organize comprehensive campus-wide education and programs related to all the dimensions of health. For more information, contact the Office of Health and Wellness at HealthandWellness@massasoit.mass.edu or 508-588-9100 x1495.

Tutoring Services:

The Academic Resource Center (ARC) offers both virtual and in-person tutoring services for many courses, including mathematics, science, computer science, writing, and reading. Additionally, they offer study skill support and general computer and technology assistance. Appointments are strongly recommended.

For more information and/or make a tutoring appointment:

- Call the ARC at 508-588-9100 x1801 or x2516
- Email the ARC staff atarc@massasoit.edu or cantonarc@massasoit.edu
- Use Navigate (found in the MyMassasoit portal) to schedule an appointment