CT State Community College Course Outline Template

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COURSE TITLE: Title to appear in the catalog (note: Banner has a 30-character limit)	***Quantitative Reasoning Support***
COURSE CODE: 3-letter subject code and number (include cross-listed code & number if applicable)	MATH 0901
CREDIT HOURS: Number of credits awarded for successful completion of course	3
CONTACT HOURS: Number of hours of instruction time (i.e., hours of contact between students and instructor)	Lecture: 3 Lab: Clinical: Other (e.g., studio):
BILLING HOURS: Number of credits for which students are charged	3
ADDITIONAL FEES Check all that apply	☐ Supplemental Course Fee Level 1 ☐ Supplemental Course Fee Level 2 ☐ Advanced Manufacturing Course Fee ☐ Material Fee ☐ Other: ☒ None
WORKLOAD HOURS: Number of hours used to determine faculty workload	3
PREREQUISITES: Courses for which students must be eligible and/or courses that must be completed (with minimum grade specified) to enroll	None

COREQUISITES: Courses in which students must be concurrently enrolled	MATH 1100 Quantitative Reasoning
COURSE DESCRIPTORS: For example: General Education course (include category), Clinical, Lab, Studio, Distance Learning, Seminar, Practicum. Use designated codes: (once developed)	Corequisite Developmental
CATALOG COURSE DESCRIPTION: The description to appear in the catalog	**This customized support course is intended to maximize the student's potential for success in MATH 1100 Quantitative Reasoning.** In this course, students will engage in active and collaborative learning which will promote critical thinking and a deeper understanding of mathematical concepts. Students will be given support to develop effective strategies for success and confidence in learning mathematics. Taken with MATH 1100, this course emphasizes quantitative skills needed to be an engaged citizen. Critical thinking and problem solving are emphasized along with the application of mathematics to real-world scenarios requiring reasoning from evidence. Students will learn to communicate effectively with numbers and use technology to enhance their quantitative reasoning ability. *Credit does not fulfill degree requirements and is not transferable outside the Connecticut Community College system.*
STUDENT LEARNING OUTCOMES: The student learning outcomes for the course should be assessable (e.g., consistent with Bloom's taxonomy) and aligned with program outcomes (where applicable).	This course supports the successful completion of the student learning outcomes in MAT 1100, which are: 1. Interpret and communicate quantitative information and mathematical concepts using language appropriate to the context 2. Understand problems, develop strategies to find solutions, and persevere in solving them 3. Reason, model, and draw conclusions or make decisions with quantitative information 4. Critique and evaluate quantitative arguments 5. Use appropriate technology to solve quantitative problems

	Upon successful completion of this support course, the student will: 1. Demonstrate mastery of essential learning strategies

TOPICS OUTLINE:
The instructional units in which the above outcomes will be taught and assessed.
	MATH 0901 is a corequisite course that **must** run concurrently with MATH 1100. **The topics below are not in chronological order.** The instructor **must** implement just-in-time teaching of supporting topics that is fully aligned and carefully coordinated with the delivery of the college-level topics in MATH 1100. The supporting topics include learning strategies, prerequisite topics that directly support the college-level topics currently being taught, and extra support for the college-level topics currently being taught. **The alignment and coordination of topics between MATH 0901 and MAT 1100 is fully detailed in the master syllabus for this course.**
	
	• Numeracy
	  ○ Perform arithmetic on integers
	  ○ Apply the order of operations
	  ○ Simplify fractions
	  ○ Understand and create equivalent fractions
	  ○ Convert numbers among fractions, decimals, and percents
	  ○ Calculate and simplify square roots
	  ○ Apply the rules of exponents
	  ○ Evaluate exponential expressions
	  ○ Use calculators appropriately
	
	• Problem Solving Skills
	  ○ Translate quantities in a contextual problem into a mathematical equation
	  ○ Perform calculations with fractions, decimals, and percents in contextual problems and interpret results
	  ○ Solve proportional reasoning problems in context and interpret results
	  ○ Recognize unit equivalencies

	○ Round quantities to a specified place value according to a contextual problem and interpret the results ○ Adhere to the precision required in contextual problems ○ Estimate the reasonableness of answers to contextual problems ○ Express mathematical ideas both orally and in writing • Tables, Graphs, and Visual Representations ○ Use a rectangular coordinate system ○ Read and create tables with appropriate scale ○ Create and interpret pie graphs, bar graphs, histograms, scatterplots, dotplots, and circle graphs • Algebraic Skills ○ Evaluate linear, quadratic, and exponential expressions ○ Solve algebraic equations ○ Identify and interpret the slope and y-intercept in the context of the variables within a problem ○ Identify linear patterns between two variables and make inferences based on the identified pattern ○ Graph linear equations in the Cartesian coordinate system using the slope-intercept form of the line ○ Construct linear equations from a graph, describe the relationship between two variables or two input-output pairs ○ Construct a linear equation from a scatter plot and describe the relationship between the variables ○ Distinguish between linear, quadratic, and exponential patterns in data sets • Learning Strategies ○ Study habits (including technical reading, note-taking, exam prep, etc.)

	○ Metacognition and learning theory (including growth mindset, math anxiety, etc.) ○ Task management & effective planning (including goal setting, scheduling, proactive planning, etc.)
	☒ Fall ☐ Winter ☒ Spring ☒ Summer
COURSE MODALITY Please check all that apply	☒ On-ground ☐ Online ☒ Hybrid ☒ Other (specify): LRON (Live Remote Online)
ADDITIONAL INFORMATION: If applicable, include any special instructions or requirements (e.g., field work or background check required) as well as any recommended texts or materials (e.g., open-source materials)	Quantitative Reasoning textbook and/or open education resources The use of mathematics specific technology to support understanding of the concepts is required.
CLASSROOM REQUIREMENTS (e.g., Computer lab, Kitchen, Science lab, Studio, Lecture)	Movable desks or tables so that students may work in groups. Plenty of board space. Appropriate technology.

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COURSE TITLE: Title to appear in the catalog (note: Banner has a 30-character limit)	***Statistics I Support***
COURSE CODE: 3-letter subject code and number (include cross-listed code & number if applicable)	MATH 0902
CREDIT HOURS: Number of credits awarded for successful completion of course	3
CONTACT HOURS: Number of hours of instruction time (i.e., hours of contact between students and instructor)	Lecture: 3 Lab: Clinical: Other (e.g., studio):
BILLING HOURS: Number of credits for which students are charged	3
ADDITIONAL FEES Check all that apply	☐ Supplemental Course Fee Level 1 ☐ Supplemental Course Fee Level 2 ☐ Advanced Manufacturing Course Fee ☐ Material Fee ☐ Other: ☒ None
WORKLOAD HOURS: Number of hours used to determine faculty workload	3
PREREQUISITES: Courses for which students must be eligible and/or courses that must be completed (with minimum grade specified) to enroll	None

COREQUISITES: Courses in which students must be concurrently enrolled	MATH 1200 Statistics I or MATH 1201 Statistics I with Computer Applications
COURSE DESCRIPTORS: For example: General Education course (include category), Clinical, Lab, Studio, Distance Learning, Seminar, Practicum. Use designated codes: (once developed)	Corequisite Developmental
CATALOG COURSE DESCRIPTION: The description to appear in the catalog	**This customized support course is intended to maximize the student's potential for success in MATH 1200 Statistics I or MATH 1201 Statistics I with Computer Applications.** In this course, students will engage in active and collaborative learning which will promote critical thinking and a deeper understanding of statistical concepts. Students will be given support to develop effective strategies for success and confidence in learning mathematics. Taken with MATH 1200 or MATH 1201, this course develops students' numeracy, proportional reasoning, algebra, critical reading, statistical reasoning, and problem-solving skills. Activities will center on data analysis and enhance students' ability to use mathematics to solve problems and provide students just-in-time support for statistics concepts. This course requires the use of computer-based statistical software. *Credit does not fulfill degree requirements and is not transferable outside the Connecticut Community College system.*
STUDENT LEARNING OUTCOMES: The student learning outcomes for the course should be assessable (e.g., consistent with Bloom's taxonomy) and aligned with program outcomes (where applicable).	This course supports the successful completion of the student learning outcomes in MATH 1200 and MATH 1201 which are: 1) Apply the statistical problem-solving process (formulate a problem that involves the collection of data, collect data, perform statistical analysis, and interpret the results) 2) Describe data types, methods of data collection, and how the analysis and interpretation of data depends on the type of data and how data are collected

	3) Apply descriptive statistics techniques to describe characteristics of data (e.g., measures of center, measures of variability, and measures of position, outliers) and create and interpret graphical displays of data 4) Apply probability concepts and probability distributions to model real-world situations and solve problems 5) Perform statistical inference via confidence intervals and hypothesis tests and explain the role of randomness in the inference process 6) Use technology to investigate and analyze data and solve statistical problems; and interpret and draw conclusions from the output of statistical software Upon successful completion of this support course, the student will: 1. Demonstrate mastery of essential learning strategies
TOPICS OUTLINE: The instructional units in which the above outcomes will be taught and assessed.	MATH 0902 is a corequisite course that **must** run concurrently with MATH 1200 or MATH 1201. **The topics below are not in chronological order.** The instructor **must** implement just-in-time teaching of supporting topics that is fully aligned and carefully coordinated with the delivery of the college-level topics in MATH 1200 and MATH 1201. The supporting topics include learning strategies, prerequisite topics that directly support the college-level topics currently being taught, and extra support for the college-level topics currently being taught. **The alignment and coordination of topics between MATH 0902 and MATH 1200/MATH 1201 is fully detailed in the master syllabus for this course.** Required Topics: • Numeracy Skills ○ Order of operations ○ Evaluating expressions ○ Number conversions (fractions, decimals, percentages) ○ Scientific notation

	• Proportional Reasoning Skills
	  ○ Simplifying rates, fractions, and ratios
	  ○ Problem solving with rates, fractions, and ratios
	  ○ Problem solving with two-way tables
	
	• Linear Expressions and Linear Models
	  ○ Solving linear equations
	  ○ Graphing lines
	  ○ Evaluating expressions
	  ○ Computing and interpreting slopes
	  ○ Finding equations of lines
	  ○ Using lines to make predictions
	
	• Functions and Mathematical Models
	  ○ Using mathematical models to solve problems
	  ○ Translating mathematics to statements in English
	  ○ Translating statements in English to mathematics
	  ○ Constructing expressions and equations from real-world situations
	  ○ Multiple representations of functions (verbal, graphical, tabular, symbolic)
	
	• Just-in-time Statistics Topics
	  ○ Interpreting graphs
	  ○ Computing and interpreting measures of center, variability, and position
	  ○ Comparing distributions based on center, shape, and spread
	  ○ Discrete probability distributions
	  ○ Continuous probability distributions
	  ○ Sampling distributions
	  ○ Critical values
	  ○ Computing and interpreting margins of error
	  ○ Problem solving with confidence intervals
	  ○ Determining hypotheses
	  ○ Interpreting *P*-values
	  ○ Problem solving with hypothesis tests

	• Learning Strategies (embedded throughout)
	  ○ Study habits (including technical reading, note-taking, exam prep, etc.)
	  ○ Metacognition and learning theory (including growth mindset, math anxiety, etc.)
	  ○ Task management & effective planning (including goal setting, scheduling, proactive planning, etc.)

TERMS OFFERED Please check all that apply	☒ Fall ☐ Winter ☒ Spring ☒ Summer
COURSE MODALITY Please check all that apply	☒ On-ground ☐ Online ☒ Hybrid ☒ Other (specify): LRON (Live Remote Online)
ADDITIONAL INFORMATION: If applicable, include any special instructions or requirements (e.g., field work or background check required) as well as any recommended texts or materials (e.g., open-source materials)	The use of mathematics specific technology to support understanding of this course and MATH 1200/MATH 1201 is required.
CLASSROOM REQUIREMENTS (e.g., Computer lab, Kitchen, Science lab, Studio, Lecture)	Movable desks or tables so that students may work in groups. Plenty of board space. Computer Access (via a personal computer, computer lab, or laptop cart) Students must have access to a computer during class to complete computer-based activities.

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COURSE TITLE: Title to appear in the catalog (note: Banner has a 30-character limit)	***College Algebra Support***
COURSE CODE: 3-letter subject code and number (include cross-listed code & number if applicable)	MATH 0906
CREDIT HOURS: Number of credits awarded for successful completion of course	3
CONTACT HOURS: Number of hours of instruction time (i.e., hours of contact between students and instructor)	Lecture: 3 Lab: Clinical: Other (e.g., studio):
BILLING HOURS: Number of credits for which students are charged	3
ADDITIONAL FEES Check all that apply	☐ Supplemental Course Fee Level 1 ☐ Supplemental Course Fee Level 2 ☐ Advanced Manufacturing Course Fee ☐ Material Fee ☐ Other: ☒ None
WORKLOAD HOURS: Number of hours used to determine faculty workload	3
PREREQUISITES: Courses for which students must be eligible and/or courses that must be completed (with minimum grade specified) to enroll	None

COREQUISITES: Courses in which students must be concurrently enrolled	MATH 1600
COURSE DESCRIPTORS: For example: General Education course (include category), Clinical, Lab, Studio, Distance Learning, Seminar, Practicum. Use designated codes: (once developed)	Corequisite Developmental
CATALOG COURSE DESCRIPTION: The description to appear in the catalog	**This customized support course is intended to maximize the student's potential for success in MATH 1600 College Algebra.** In this course, students will engage in active and collaborative learning which will promote critical thinking and a deeper understanding of algebraic concepts. Students will be given support to develop effective strategies for success and confidence in learning mathematics. Taken with MATH 1600, this course provides an in-depth study of the properties of algebraic, exponential, and logarithmic functions as needed for calculus. Emphasis is on using algebraic and graphical techniques for solving problems involving linear, quadratic, piece-wise defined, rational, polynomial, exponential and logarithmic functions. The use of mathematics specific technology to support understanding of the College Algebra course is required. *Credit does not fulfill degree requirements and is not transferable outside the Connecticut Community College system.*
STUDENT LEARNING OUTCOMES: The student learning outcomes for the course should be assessable (e.g., consistent with Bloom's taxonomy) and aligned with program outcomes (where applicable).	This course supports the successful completion of the student learning outcomes in MATH 1600 which are: For function types including linear, quadratic, piece-wise defined, rational, polynomial, exponential, and logarithmic: 1. Use multiple representations of these function types to investigate quantities, describe relationships between quantities, and attend to how two quantities change together

	2. Describe characteristics of these function types and convert between different representations and algebraic forms to analyze, model, and solve meaningful problems 3. Develop procedural fluency to support the understanding, analysis, and modeling of these function types and calculation with related expressions Upon successful completion of this support course, the student will: 1. Demonstrate mastery of essential learning strategies
TOPICS OUTLINE: The instructional units in which the above outcomes will be taught and assessed.	MATH 0906 is a corequisite course that **must** run concurrently with MATH 1600. **The topics below are not in chronological order.** The instructor **must** implement just-in-time teaching of supporting topics that is fully aligned and carefully coordinated with the delivery of the college-level topics in MATH 1600. The supporting topics include learning strategies, prerequisite topics that directly support the college-level topics currently being taught, and extra support for the college-level topics currently being taught. **The alignment and coordination of topics between MATH 0906 and MATH 1600 is fully detailed in the master syllabus for this course.** List of instructional topics: • Relations and Functions ○ Find the values of functions ○ Interval notation (union and intersection of two or more sets) ○ Graphs of functions ○ Graph quadratic functions using transformations ○ Domain and range of functions ○ Find values of functions ○ Simplify fractional expressions

	○ Find and evaluate composite functions and one-to-one functions • Quadratic Functions ○ Graph quadratic functions using properties ○ Recognize and use the appropriate method to factor a polynomial completely ○ Solve a quadratic equation by factoring ○ General strategy for factoring quadratic functions ○ Use the complex number system ○ Recognize and use the appropriate method to factor a polynomial completely (degree<=2) ○ Solve a quadratic equation by using technology • Higher Order Polynomial Functions ○ Determine the degree of polynomials ○ Simplify expressions using properties of exponents ○ Recognize and use the appropriate method to factor a polynomial completely ○ Solve a quadratic equation by factoring • Rational Functions ○ Multiply and divide rational expressions • Radical Functions ○ Simplify radical expressions • Exponential and Logarithmic Functions ○ Find the value of a function (exponential) ○ Graph exponential functions and function transformations

	○ Convert between exponential and logarithmic form ○ Evaluate logarithmic functions ○ Solve exponential and logarithmic equations • Learning Strategies (embedded throughout) ○ Study habits (including technical reading, note-taking, exam prep, etc.) ○ Metacognition and learning theory (including growth mindset, math anxiety, etc.) ○ Task management & effective planning (including goal setting, scheduling, proactive planning, etc.)
TERMS OFFERED Please check all that apply	☒ Fall ☐ Winter ☒ Spring ☒ Summer
COURSE MODALITY Please check all that apply	☒ On-ground ☐ Online ☒ Hybrid ☒ Other (specify): LRON (Live Remote Online)
ADDITIONAL INFORMATION: If applicable, include any special instructions or requirements (e.g., field work or background check required) as well as any recommended texts or materials (e.g., open-source materials)	The use of mathematics specific technology to support understanding of this course and MATH 1600 is required.
CLASSROOM REQUIREMENTS (e.g., Computer lab, Kitchen, Science lab, Studio, Lecture)	Movable desks or tables so that students may work in groups. Plenty of board space. Appropriate technology.

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COURSE TITLE: Title to appear in the catalog (note: Banner has a 30-character limit)	***Intermediate Algebra Support***
COURSE CODE: 3-letter subject code and number (include cross-listed code & number if applicable)	MATH 0987 (formerly MAT* 100)
CREDIT HOURS: Number of credits awarded for successful completion of course	0
CONTACT HOURS: Number of hours of instruction time (i.e., hours of contact between students and instructor)	Lecture: 2 Lab: Clinical: Other (e.g., studio):
BILLING HOURS: Number of credits for which students are charged	0
ADDITIONAL FEES Check all that apply	☐ Supplemental Course Fee Level 1 ☐ Supplemental Course Fee Level 2 ☐ Advanced Manufacturing Course Fee ☐ Material Fee ☐ Other: ☒ None
WORKLOAD HOURS: Number of hours used to determine faculty workload	2
PREREQUISITES: Courses for which students must be eligible and/or courses that must be completed (with minimum grade specified) to enroll	A grade of C or higher in MATH 0988 (formerly MAT 095I) *Elementary Algebra Intensive* or MATH 0989 (formerly MAT 095) *Elementary Algebra Foundations* or placement using multiple measures

COREQUISITES: Courses in which students must be concurrently enrolled	MATH 1010 (formerly MAT 137 Intermediate Algebra)
COURSE DESCRIPTORS: For example: General Education course (include category), Clinical, Lab, Studio, Distance Learning, Seminar, Practicum. Use designated codes: (once developed)	Non-credit Corequisite Support Course
CATALOG COURSE DESCRIPTION: The description to appear in the catalog	This course provides corequisite support in mathematics for students enrolled in MATH 1010 (formerly MAT 137) *Intermediate Algebra*. Topics will parallel topics being studied in MATH 1010 and the course will provide support for the essential quantitative skills needed to be successful in MATH 1010. Taken with MATH 1010, the course will provide support for algebra and mathematical modeling of functions and relations represented by tables, graphs, words, and symbols. Polynomial functions and expressions with special attention to linear, quadratic, exponential, rational, and radical functions are studied. There is an emphasis on modeling and applications for all topics. It will also provide additional instruction as well as structured support for study skills, time management, and technology skills. *This course cannot be taken alone and does not fulfill the mathematics general education requirement nor can it be used for the mathematics requirement of any program or certificate.*
STUDENT LEARNING OUTCOMES: The student learning outcomes for the course should be assessable (e.g., consistent with Bloom's taxonomy) and aligned with program outcomes (where applicable).	Upon successful completion of this course, students will: 1) Develop study skills required to succeed in math 2) Identify and use techniques to reduce math anxiety 3) Demonstrate use of math specific technology 4) Identify and review prerequisite material necessary for success in intermediate algebra 5) Demonstrate an understanding of algebra and mathematical modeling of functions and relations

	The successful student will also complete MATH 1010.
TOPICS OUTLINE: The instructional units in which the above outcomes will be taught and assessed.	None
TERMS OFFERED Please check all that apply	☒ Fall ☒ Winter ☒ Spring ☒ Summer
COURSE MODALITY Please check all that apply	☒ On-ground ☒ Online ☒ Hybrid ☒ Other (specify): LRON
ADDITIONAL INFORMATION: If applicable, include any special instructions or requirements (e.g., field work or background check required) as well as any recommended texts or materials (e.g., open-source materials)	The use of mathematics specific technology to support understanding of the concepts is required.
CLASSROOM REQUIREMENTS (e.g., Computer lab, Kitchen, Science lab, Studio, Lecture)	Lecture or Computer lab that has instructor access to TI Graphing Calculator Emulator

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COURSE TITLE: Title to appear in the catalog (note: Banner has a 30-character limit)	***Elementary Algebra Intensive***
COURSE CODE: 3-letter subject code and number (include cross-listed code & number if applicable)	MATH 0988 (formerly MAT* 095I)
CREDIT HOURS: Number of credits awarded for successful completion of course	6
CONTACT HOURS: Number of hours of instruction time (i.e., hours of contact between students and instructor)	Lecture: 6 Lab: Clinical: Other (e.g., studio):
BILLING HOURS: Number of credits for which students are charged	6
ADDITIONAL FEES Check all that apply	☐ Supplemental Course Fee Level 1 ☐ Supplemental Course Fee Level 2 ☐ Advanced Manufacturing Course Fee ☐ Material Fee ☐ Other: ☒ None
WORKLOAD HOURS: Number of hours used to determine faculty workload	6
PREREQUISITES: Courses for which students must be eligible and/or courses that must be completed (with minimum grade specified) to enroll	None

COREQUISITES: Courses in which students must be concurrently enrolled	None
COURSE DESCRIPTORS: For example: General Education course (include category), Clinical, Lab, Studio, Distance Learning, Seminar, Practicum. Use designated codes: (once developed)	Developmental
CATALOG COURSE DESCRIPTION: The description to appear in the catalog	This course embeds additional support into the MATH 0989 (formerly MAT 095) *Elementary Algebra Foundations* course, including a concentrated arithmetic review. This course includes a study of the basic properties and theorems of rational numbers, expressions and equations with polynomials, rational and radical expressions, linear equations and inequalities in one variable, graphing linear equations in two variables, formulating equations of lines in two variables, an introduction to functions, rules of integral exponents, operations on polynomials, and applications in geometry and algebra. *Credit does not fulfill degree requirements and is not transferable outside the Connecticut Community College system.*
STUDENT LEARNING OUTCOMES: The student learning outcomes for the course should be assessable (e.g., consistent with Bloom's taxonomy) and aligned with program outcomes (where applicable).	Upon successful completion of this course, the student will: 1. Exhibit perseverance, ability, and confidence to use mathematics to make sense of and solve problems 2. Perform mental arithmetic and use reasoning 3. Analyze problem situations through numerical, graphical, symbolic and/or verbal approaches and modeling 4. Use appropriate tools strategically in solving problems 5. Recognize patterns, draw inferences, and communicate and interpret results
TOPICS OUTLINE: The instructional units in which the above outcomes will be taught and assessed.	List Instructional units: 1) Rational Numbers a) Perform operations on rational numbers, including fractions, decimals, and integers

	b) Identify and distinguish between rational and irrational numbers c) Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2) 2) Expressions and Equations with Polynomials, Rational and Radical Expressions, and Integer Exponents a) Interpret parts of an expression, such as terms, factors, and coefficients b) Add, subtract, and multiply polynomials; divide polynomials by a monomial c) Manipulate formulas to highlight a quantity of interest, using the same reasoning as in solving equations; for example, rearrange Ohm's Law V=IR to highlight resistance R d) Know and apply the properties of integer exponents to generate equivalent numerical expressions; for example, $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$ e) Use square root symbols to represent solutions to equations of the form $x^2 = p$, where p is a positive rational number f) Evaluate square roots of perfect squares g) Know that numbers such as √2 are irrational h) Express very large or very small quantities in scientific notation 3) Linear Equations in One Variable a) Solve linear equations in one variable b) Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms c) Create linear equations in one variable and use them to solve real world applications d) Recognize examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions e) Apply geometrical formulas for two and three-

	dimensional figures such as rectangles, circles, rectangular solids, cylinders, spheres, etc. f) Write and graph linear inequalities in one variable and use interval notation 4) Linear Equations in Two Variables: a) Interpret the rate and unit rate as the slope of the graph b) Derive the equation y = mx for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b c) Graph a linear equation in two variables d) Construct a linear equation to model a linear relationship between two quantities. Determine and interpret the rate of change and initial value from a description of a relationship or from two (x, y) values, including reading these from a table or graph e) Construct linear equations given a graph, a description of a relationship, or two input-output pairs (include reading these from a table) using point-slope form and slope-intercept form 5) Functions a) Understand that a function is a rule that assigns to each input exactly one output and that the graph of a function is the set of ordered pairs consisting of an input and the corresponding output b) Interpret the equation $y = mx + b$ as defining a linear function whose graph is a straight line c) Use functions to model relationships between quantities d) Use function notation and evaluate functions for inputs in their domains e) Graph linear functions and show intercepts f) Recognize that linear functions have a constant rate of change and interpret the rate of change in the context of the problem
TERMS OFFERED	☒ Fall ☒ Winter

Please check all that apply	☒ Spring ☒ Summer
COURSE MODALITY Please check all that apply	☒ On-ground ☒ Online ☒ Hybrid ☒ Other (specify): LRON
ADDITIONAL INFORMATION: If applicable, include any special instructions or requirements (e.g., field work or background check required) as well as any recommended texts or materials (e.g., open-source materials)	The use of mathematics specific technology to support understanding of the concepts is required.
CLASSROOM REQUIREMENTS (e.g., Computer lab, Kitchen, Science lab, Studio, Lecture)	Lecture or Computer lab with instructor access to TI Graphing Calculator Emulator

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COURSE TITLE: Title to appear in the catalog (note: Banner has a 30-character limit)	***Elementary Algebra Foundations***
COURSE CODE: 3-letter subject code and number (include cross-listed code & number if applicable)	MATH 0989 (formerly MAT* 095)
CREDIT HOURS: Number of credits awarded for successful completion of course	3
CONTACT HOURS: Number of hours of instruction time (i.e., hours of contact between students and instructor)	Lecture: 3 Lab: Clinical: Other (e.g., studio):
BILLING HOURS: Number of credits for which students are charged	3
ADDITIONAL FEES Check all that apply	☐ Supplemental Course Fee Level 1 ☐ Supplemental Course Fee Level 2 ☐ Advanced Manufacturing Course Fee ☐ Material Fee ☐ Other: ☒ None
WORKLOAD HOURS: Number of hours used to determine faculty workload	3
PREREQUISITES: Courses for which students must be eligible and/or courses that must be completed (with minimum grade specified) to enroll	None

COREQUISITES: Courses in which students must be concurrently enrolled	None
COURSE DESCRIPTORS: For example: General Education course (include category), Clinical, Lab, Studio, Distance Learning, Seminar, Practicum. Use designated codes: (once developed)	Developmental
CATALOG COURSE DESCRIPTION: The description to appear in the catalog	This course includes a study of the basic properties and theorems of rational numbers, expressions and equations with polynomials, rational and radical expressions, linear equations and inequalities in one variable, graphing linear equations in two variables, formulating equations of lines in two variables, an introduction to functions, rules of integral exponents, operations on polynomials, and applications in geometry and algebra. *Credit does not fulfill degree requirements and is not transferable outside the Connecticut Community College system.*
STUDENT LEARNING OUTCOMES: The student learning outcomes for the course should be assessable (e.g., consistent with Bloom's taxonomy) and aligned with program outcomes (where applicable).	Upon successful completion of this course, the student will: 1. Exhibit perseverance, ability, and confidence to use mathematics to make sense of and solve problems 2. Perform mental arithmetic and use reasoning 3. Analyze problem situations through numerical, graphical, symbolic and/or verbal approaches and modeling 4. Use appropriate tools strategically in solving problems 5. Recognize patterns, draw inferences, and communicate and interpret results
TOPICS OUTLINE: The instructional units in which the above outcomes will be taught and assessed.	List Instructional units: 1) Rational Numbers a) Identify and distinguish between rational and irrational numbers b) Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2)

	2) Expressions and Equations with Polynomials, Rational and Radical Expressions, and Integer Exponents a) Interpret parts of an expression, such as terms, factors, and coefficients b) Add, subtract, and multiply polynomials; divide polynomials by a monomial c) Manipulate formulas to highlight a quantity of interest, using the same reasoning as in solving equations; for example, rearrange Ohm's Law V=IR to highlight resistance R d) Know and apply the properties of integer exponents to generate equivalent numerical expressions; for example, $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$ e) Use square root symbols to represent solutions to equations of the form $x^2 = p$, where p is a positive rational number f) Evaluate square roots of perfect squares g) Know that numbers such as √2 are irrational h) Express very large or very small quantities in scientific notation 3) Linear Equations in One Variable a) Solve linear equations and inequalities in one variable b) Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms c) Create linear equations in one variable and use them to solve real world applications d) Recognize examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions e) Apply geometrical formulas for two and three-dimensional figures such as rectangles, circles, rectangular solids, cylinders, spheres, etc. f) Write and graph linear inequalities in one variable and use interval notation

	4) Linear Equations in Two Variables a) Interpret the rate and unit rate as the slope of the graph b) Derive the equation y = mx for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b c) Graph a linear equation in two variables d) Construct a linear equation to model a linear relationship between two quantities. Determine and interpret the rate of change and initial value from a description of a relationship or from two (x, y) values, including reading these from a table or graph e) Construct linear equations given a graph, a description of a relationship, or two input-output pairs (include reading these from a table) using point-slope form and slope-intercept form 5) Functions a) Understand that a function is a rule that assigns to each input exactly one output and that the graph of a function is the set of ordered pairs consisting of an input and the corresponding output b) Interpret the equation $y = mx + b$ as defining a linear function whose graph is a straight line c) Use functions to model relationships between quantities d) Use function notation and evaluate functions for inputs in their domains e) Graph linear functions and show intercepts f) Recognize that linear functions have a constant rate of change and interpret the rate of change in the context of the problem
TERMS OFFERED Please check all that apply	☒ Fall ☒ Winter ☒ Spring ☒ Summer
COURSE MODALITY Please check all that apply	☒ On-ground ☒ Online ☒ Hybrid

	☒ Other (specify): LRON
ADDITIONAL INFORMATION: If applicable, include any special instructions or requirements (e.g., field work or background check required) as well as any recommended texts or materials (e.g., open-source materials)	The use of mathematics specific technology to support understanding of the concepts is required.
CLASSROOM REQUIREMENTS (e.g., Computer lab, Kitchen, Science lab, Studio, Lecture)	Lecture or Computer lab with instructor access to TI Graphing Calculator Emulator

CT State Community College Course Outline Template

This template should be used by faculty to create an official record of a course for inclusion in the CT State Community College catalog. A completed template must be submitted for every course to be moved to the single college catalog.

COURSE TITLE: Title to appear in the catalog (note: Banner has a 30-character limit)	***Mathematics of Finance***
COURSE CODE: 3-letter subject code and number (include cross-listed code & number if applicable)	MATH 1000 (formerly MAT* 103)
CREDIT HOURS: Number of credits awarded for successful completion of course	3
CONTACT HOURS: Number of hours of instruction time (i.e., hours of contact between students and instructor)	Lecture: 3 Lab: Clinical: Other (e.g., studio):
BILLING HOURS: Number of credits for which students are charged	3
ADDITIONAL FEES Check all that apply	☐ Supplemental Course Fee Level 1 ☐ Supplemental Course Fee Level 2 ☐ Advanced Manufacturing Course Fee ☐ Material Fee ☐ Other: ☒ None
WORKLOAD HOURS: Number of hours used to determine faculty workload	3
PREREQUISITES: Courses for which students must be eligible and/or courses that must be completed (with minimum grade specified) to enroll	None

COREQUISITES: Courses in which students must be concurrently enrolled	None
COURSE DESCRIPTORS: For example: General Education course (include category), Clinical, Lab, Studio, Distance Learning, Seminar, Practicum. Use designated codes: (once developed)	General Education - Math/Quantitative Reasoning
CATALOG COURSE DESCRIPTION: The description to appear in the catalog	An elementary course covering a wide range of mathematics commonly used in business and personal finance. Topics include simple and compound interest, present value, wages, taxes, insurance, and marketing and retailing mathematics. *This course may not transfer but can be used to satisfy the mathematical requirements for certain programs and certificates.*
STUDENT LEARNING OUTCOMES: The student learning outcomes for the course should be assessable (e.g., consistent with Bloom's taxonomy) and aligned with program outcomes (where applicable).	Upon successful completion of this course, the student will: 1. Perform computations related to taxes, insurance, and wages 2. Perform the computations related to interest 3. Perform the computations related to marketing and retail math 4. Evaluate the results obtained from quantitative methods for accuracy and/or reasonableness by solving problems analytically
TOPICS OUTLINE: The instructional units in which the above outcomes will be taught and assessed.	List Instructional units: 1) Taxes a) Sales Tax b) Property Tax 2) Insurance a) Business Insurance b) Motor Vehicle Insurance c) Life Insurance 3) Checkbook and Cash Records a) Checkbook Reconciliation

	4) Wages and Payrolls a) Salary b) Commission c) Hourly Rate Basis d) Production Basis e) Net Weekly Payrolls 5) Simple Interest a) Basic Simple Interest b) Ordinary Time and Exact Time c) Ordinary Interest and Exact Interest d) Simple Interest Notes e) Present Value 6) Compound Interest a) Compound Interest (by Computation) b) Compound Amount (using Tables) c) Interest Compounded Daily OPTIONAL TOPICS: 1) Annuities a) Amount of an Annuity b) Present Value of an Annuity 2) Markup a) Markup Based on Cost b) Markup Based on Selling Price c) Marking Perishables 3) Markdown a) Actual Selling Price b) Markdown vs. Loss
TERMS OFFERED Please check all that apply	☒ Fall ☒ Winter ☒ Spring ☒ Summer
COURSE MODALITY Please check all that apply	☒ On-ground ☒ Online ☒ Hybrid ☒ Other (specify): LRON

ADDITIONAL INFORMATION: If applicable, include any special instructions or requirements (e.g., field work or background check required) as well as any recommended texts or materials (e.g., open-source materials)	The use of mathematics specific technology to support understanding of the concepts is required.
CLASSROOM REQUIREMENTS (e.g., Computer lab, Kitchen, Science lab, Studio, Lecture)	Lecture

CT State Community College Course Outline Template

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COURSE TITLE: Title to appear in the catalog (note: Banner has a 30-character limit)	***Quantitative Literacy*** *(formerly Quantitative Reasoning)*
COURSE CODE: 3-letter subject code and number (include cross-listed code & number if applicable)	MATH 1001 (formerly MAT* 104)
CREDIT HOURS: Number of credits awarded for successful completion of course	3
CONTACT HOURS: Number of hours of instruction time (i.e., hours of contact between students and instructor)	Lecture: 3 Lab: Clinical: Other (e.g., studio):
BILLING HOURS: Number of credits for which students are charged	3
ADDITIONAL FEES Check all that apply	☐ Supplemental Course Fee Level 1 ☐ Supplemental Course Fee Level 2 ☐ Advanced Manufacturing Course Fee ☐ Material Fee ☐ Other: ☒ None
WORKLOAD HOURS: Number of hours used to determine faculty workload	3
PREREQUISITES: Courses for which students must be eligible and/or courses that must be completed (with minimum grade specified) to enroll	None

COREQUISITES: Courses in which students must be concurrently enrolled	None
COURSE DESCRIPTORS: For example: General Education course (include category), Clinical, Lab, Studio, Distance Learning, Seminar, Practicum. Use designated codes: (once developed)	General Education - Math/Quantitative Reasoning
CATALOG COURSE DESCRIPTION: The description to appear in the catalog	A survey course to develop the abilities to interpret and reason with information that involves mathematical ideas or numbers. This course will prepare students for the mathematics they will encounter in other college courses and in their career, as well as help develop critical thinking and problem-solving skills needed in all areas of life. Topics include principles of reasoning, problem-solving techniques, statistical reasoning, numbers in the real world, and personal financial management. *This course may not transfer but can be used to satisfy the mathematical requirements for certain programs and certificates.*
STUDENT LEARNING OUTCOMES: The student learning outcomes for the course should be assessable (e.g., consistent with Bloom's taxonomy) and aligned with program outcomes (where applicable).	Upon successful completion of this course, the student will: 1. Demonstrate quantitative reasoning to analyze problems, critique arguments, and draw and justify conclusions 2. Interpret the numbers encountered in their daily lives 3. Understand and apply key issues in personal finance management 4. Understand and reason with basic statistics 5. Use technology appropriately to gather, research, and analyze quantitative information
TOPICS OUTLINE: The instructional units in which the above outcomes will be taught and assessed.	List Instructional units: 1) Numbers in the Real World a) Percent b) Pie Charts and Bar Graphs c) Estimation and Number Sense

	d) Dimensional Analysis e) Scientific Notation 2) Managing Your Money a) Simple and Compound Interest b) Education and Home Loans c) Income Taxes 3) Probability and Statistics a) Basic Probability b) Gathering and Organizing Data c) Measures of Average d) Measures of Variation e) Misuses of Statistics
TERMS OFFERED Please check all that apply	☒ Fall ☒ Winter ☒ Spring ☒ Summer
COURSE MODALITY Please check all that apply	☒ On-ground ☒ Online ☒ Hybrid ☒ Other (specify): LRON
ADDITIONAL INFORMATION: If applicable, include any special instructions or requirements (e.g., field work or background check required) as well as any recommended texts or materials (e.g., open-source materials)	The use of mathematics specific technology to support understanding of the concepts is required.
CLASSROOM REQUIREMENTS (e.g., Computer lab, Kitchen, Science lab, Studio, Lecture)	Lecture

CT State Community College Course Outline Template

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COURSE TITLE: Title to appear in the catalog (note: Banner has a 30-character limit)	***Mathematics for Science and Technology***
COURSE CODE: 3-letter subject code and number (include cross-listed code & number if applicable)	MATH 1002 (formerly MAT* 115)
CREDIT HOURS: Number of credits awarded for successful completion of course	3
CONTACT HOURS: Number of hours of instruction time (i.e., hours of contact between students and instructor)	Lecture: 3 Lab: Clinical: Other (e.g., studio):
BILLING HOURS: Number of credits for which students are charged	3
ADDITIONAL FEES Check all that apply	☐ Supplemental Course Fee Level 1 ☐ Supplemental Course Fee Level 2 ☐ Advanced Manufacturing Course Fee ☐ Material Fee ☐ Other: ☒ None
WORKLOAD HOURS: Number of hours used to determine faculty workload	3
PREREQUISITES: Courses for which students must be eligible and/or courses that must be completed (with minimum grade specified) to enroll	None

COREQUISITES: Courses in which students must be concurrently enrolled	None
COURSE DESCRIPTORS: For example: General Education course (include category), Clinical, Lab, Studio, Distance Learning, Seminar, Practicum. Use designated codes: (once developed)	General Education - Math/Quantitative Reasoning
CATALOG COURSE DESCRIPTION: The description to appear in the catalog	This is a first course covering topics from intermediate algebra and trigonometry with technical applications. Topics include units of measurement and dimensional analysis, fundamental concepts of algebra, functions and graphs, right triangle trigonometry and applications. *This course may not transfer but can be used to satisfy the mathematical requirements for certain programs and certificates.*
STUDENT LEARNING OUTCOMES: The student learning outcomes for the course should be assessable (e.g., consistent with Bloom's taxonomy) and aligned with program outcomes (where applicable).	Upon successful completion of this course, the student will: 1. Understand basic workplace quantitative problems and provide structured solutions to them 2. Apply quantitative skills to reason through problems and come up with measurable solutions 3. Effectively communicate ideas using quantitative reasoning and technical vocabulary
TOPICS OUTLINE: The instructional units in which the above outcomes will be taught and assessed.	List Instructional units: 1) Apply Exponent Laws a) Apply the rules of exponents including i. multiplication property ii. division property iii. power-to-power property iv. zero exponent property v. negative exponent property b) Simplify and evaluate expressions involving exponents and radicals 2) Understand the Concepts of Scientific Notation a) Conversion between standard form and scientific notation by hand and with technology b) Perform operations on numbers written in scientific notation

	c) Evaluate expressions involving scientific notation 3) Solve Problems Involving Variation a) Solve problems direct, inverse, and joint variation 4) Understand the Concept of Significant Digits a) Define precision and accuracy b) Perform arithmetic operations and round results to the correct precision and appropriate number of significant digits 5) Understand Dimensional Analysis a) Convert units within a system b) Convert units between systems c) Determine units of a result given units of intermediate factors d) Apply unit prefixes such as nano, kilo, etc. 6) Evaluate Formulas a) Substitute values and evaluate a formula b) Round result of an evaluation to the correct number of significant digits 7) Determine the correct units of a formula Understand the Concept of Function a) Identify a function from a set of ordered pairs or a graph b) Evaluate a function c) Determine the domain and range of a function d) Define a function based on an applied problem 8) Sketch the graph of a function Analyze Linear Functions a) Define linear function b) Plot a linear function using a table of values c) Plot a linear function by computing its intercepts d) Find the slope of a linear function given two points e) Identify slope and y-intercept of a linear function f) Plot a linear function using the slope and y-intercept g) Find the equations of the line passing through a point and parallel or perpendicular to a given line h) Derive a linear relationship based on an applied problem 9) Evaluate Trigonometric Functions a) Define the six trigonometric functions in terms of a right triangle

	b) Perform conversions between degrees and radians c) Evaluate the trigonometric functions of an angle using a calculator 10) Solve Right Triangles a) Solve a right triangle given two sides b) Solve a right triangle given an acute angle and one side c) Solve applied right triangle problems
TERMS OFFERED Please check all that apply	☒ Fall ☒ Winter ☒ Spring ☒ Summer
COURSE MODALITY Please check all that apply	☒ On-ground ☒ Online ☒ Hybrid ☒ Other (specify): LRON
ADDITIONAL INFORMATION: If applicable, include any special instructions or requirements (e.g., field work or background check required) as well as any recommended texts or materials (e.g., open-source materials)	The use of mathematics specific technology to support understanding of the concepts is required.
CLASSROOM REQUIREMENTS (e.g., Computer lab, Kitchen, Science lab, Studio, Lecture)	Lecture

CT State Community College Course Outline Template

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COURSE TITLE: Title to appear in the catalog (note: Banner has a 30-character limit)	***Elementary Statistics***
COURSE CODE: 3-letter subject code and number (include cross-listed code & number if applicable)	MATH 1003 (formerly MAT* 123)
CREDIT HOURS: Number of credits awarded for successful completion of course	3
CONTACT HOURS: Number of hours of instruction time (i.e., hours of contact between students and instructor)	Lecture: 3 Lab: Clinical: Other (e.g., studio):
BILLING HOURS: Number of credits for which students are charged	3
ADDITIONAL FEES Check all that apply	☐ Supplemental Course Fee Level 1 ☐ Supplemental Course Fee Level 2 ☐ Advanced Manufacturing Course Fee ☐ Material Fee ☐ Other: ☒ None
WORKLOAD HOURS: Number of hours used to determine faculty workload	3
PREREQUISITES: Courses for which students must be eligible and/or courses that must be completed (with minimum grade specified) to enroll	None

COREQUISITES: Courses in which students must be concurrently enrolled	None
COURSE DESCRIPTORS: For example: General Education course (include category), Clinical, Lab, Studio, Distance Learning, Seminar, Practicum. Use designated codes: (once developed)	General Education - Math/Quantitative Reasoning
CATALOG COURSE DESCRIPTION: The description to appear in the catalog	This course will demonstrate the fundamental nature of mathematics and its applications in modern life through an introduction to the concepts of statistics. Topics include random sampling, design of surveys and experiments, information from samples, confidence intervals, elementary probability, examining numbers and data critically, graphing and data analysis, written discussion of numerical analysis, and simulation. The use of mathematics specific technology to support understanding is required. *This course may not transfer but can be used to satisfy the mathematical requirements for certain programs and certificates.*
STUDENT LEARNING OUTCOMES: The student learning outcomes for the course should be assessable (e.g., consistent with Bloom's taxonomy) and aligned with program outcomes (where applicable).	Upon successful completion of this course the student will: 1) Apply the statistical problem-solving process (formulate a problem that involves the collection of data, collect data, perform statistical analysis, and interpret the results) 2) Describe data types, methods of data collection, and how the analysis and interpretation of data depends on the type of data and how data are collected. 3) Apply descriptive statistics techniques to describe characteristics of data (e.g., measures of center, measures of variability, and measures of position, outliers) and create and interpret graphical displays of data. 4) Apply probability concepts and probability distributions to model real-world situations and solve problems.

	5) Use technology to investigate and analyze data and solve statistical problems; and interpret and draw conclusions from the output of statistical software.
TOPICS OUTLINE: The instructional units in which the above outcomes will be taught and assessed.	Instructional units: 1) Surveys, Samples and Experiments a) Random sampling and random numbers b) Design of surveys and samples c) Confidence statements, margin of error, precision, bias d) Design of a comparative, controlled experiment e) Ethical issues in surveys and experiments f) Critical examination of newspaper, magazine, journal, and internet research reports 2) Probability and Simulation a) Theoretical probability models b) Empirical probability models c) Compound events d) Modeling real situations using simulation 3) Data Analysis a) Validity of data b) Critical examination of data and plots c) Graphs of single variable data – line plots, stem plots, histograms, box plots, bar charts, pie charts d) Statistical measures a. Measures of center including mean, median, mode b. Measures of spread including standard deviation c. Measures of relative position, five-number summary, quartiles, potential outliers e) Bivariate data – scatter plots, time plots

	f) Prediction, interpolation, extrapolation, interpretation of correlation measures 4) Project a) Design a Survey b) Collect Data c) Analyze data d) Present Results
TERMS OFFERED Please check all that apply	☒ Fall ☒ Winter ☒ Spring ☒ Summer
COURSE MODALITY Please check all that apply	☒ On-ground ☒ Online ☒ Hybrid ☒ Other (specify): LRON
ADDITIONAL INFORMATION: If applicable, include any special instructions or requirements (e.g., field work or background check required) as well as any recommended texts or materials (e.g., open-source materials)	The use of mathematics specific technology to support understanding of the concepts is required.
CLASSROOM REQUIREMENTS (e.g., Computer lab, Kitchen, Science lab, Studio, Lecture)	Lecture/Computer Lab

CT State Community College Course Outline Template

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COURSE TITLE: Title to appear in the catalog (note: Banner has a 30-character limit)	***Intermediate Algebra***
COURSE CODE: 3-letter subject code and number (include cross-listed code & number if applicable)	MATH 1010 (formerly MAT* 137)
CREDIT HOURS: Number of credits awarded for successful completion of course	3
CONTACT HOURS: Number of hours of instruction time (i.e., hours of contact between students and instructor)	Lecture: 3 Lab: Clinical: Other (e.g., studio):
BILLING HOURS: Number of credits for which students are charged	3
ADDITIONAL FEES Check all that apply	☐ Supplemental Course Fee Level 1 ☐ Supplemental Course Fee Level 2 ☐ Advanced Manufacturing Course Fee ☐ Material Fee ☐ Other: ☒ None
WORKLOAD HOURS: Number of hours used to determine faculty workload	3
PREREQUISITES: Courses for which students must be eligible and/or courses that must be completed (with minimum grade specified) to enroll	MATH 0988 (formerly MAT 095I) *Elementary Algebra Intensive* or MATH 0989 (formerly MAT 095) *Elementary Algebra Foundations* with a grade of C or higher or placement using multiple measures

COREQUISITES: Courses in which students must be concurrently enrolled	MATH 0987 (formerly MAT 100*) Intermediate Algebra Support* based on placement
COURSE DESCRIPTORS: For example: General Education course (include category), Clinical, Lab, Studio, Distance Learning, Seminar, Practicum. Use designated codes: (once developed)	General Education - Math/Quantitative Reasoning
CATALOG COURSE DESCRIPTION: The description to appear in the catalog	This course is a further study of algebra and mathematical modeling of functions and relations represented by tables, graphs, words, and symbols. Polynomial functions and expressions with special attention to linear, quadratic, exponential, rational, and radical functions are studied. There is an emphasis on modeling and applications for all topics. The use of mathematics specific technology to support understanding of the concepts is required.
STUDENT LEARNING OUTCOMES: The student learning outcomes for the course should be assessable (e.g., consistent with Bloom's taxonomy) and aligned with program outcomes (where applicable).	Upon successful completion of this course, the student will: 1. Exhibit perseverance, ability, and confidence to use mathematics to make sense of and solve problems 2. Perform mental arithmetic and use proportional reasoning 3. Analyze problem situations through numerical, graphical, symbolic and/or verbal approaches and modeling 4. Use appropriate tools strategically in solving problems 5. Recognize patterns, draw inferences 6. Communicate and interpret results

	7. Demonstrate an understanding and appreciation of the usefulness of mathematics in everyday life
TOPICS OUTLINE: The instructional units in which the above outcomes will be taught and assessed.	List Instructional units: 1) Linear Functions a) Provide multiple representations (e.g., words, symbols, graphs, tables) of linear functions by hand and/or using technology b) Determine identifying characteristics of linear functions including domain and range (algebraically and graphically) c) Model and solve real world applications with linear functions (e.g., car depreciation) and systems of linear equations 2) Quadratic Functions and/or Expressions a) Provide multiple representations (e.g., words, symbols, graphs, tables) of quadratic functions or expressions by hand and/or using technology b) Determine identifying characteristics of quadratic functions or expressions (e.g., factors) including domain and range (algebraically and graphically) c) Evaluate, simplify, and perform operations on quadratic functions or expressions d) Solve quadratic equations algebraically (e.g., factoring, completing the square, and quadratic formula with rational solutions) and/or graphically e) Solve real world applications involving quadratic equations and functions 3) Exponential Functions and/or Expressions a) Provide multiple representations (e.g., tables, graphs, symbols) of exponential functions or expressions by hand and/or using technology b) Determine identifying characteristics of exponential functions or expressions including domain and range (algebraically and graphically) c) Evaluate, simplify, and perform operations on exponential functions or expressions

	d) Identify exponential functions within real world applications 4) Rational Functions and/or Expressions a) Provide multiple representations (e.g., words, symbols, graphs, tables) of simple rational functions or expressions by hand and/or using technology b) Determine identifying characteristics of rational functions or expressions including domain and range (algebraically and graphically) c) Evaluate, simplify, and perform operations on simple rational functions or expressions d) Solve simple rational equations algebraically and/or graphically e) Solve real world applications involving rational functions 5) Radical Functions and/or Expressions a) Provide multiple representations of simple radical functions or expressions by hand and/or using technology, with primary emphasis on square root b) Determine identifying characteristics of radical functions or expressions including domain and range (algebraically and graphically) c) Evaluate, simplify, and perform operations on simple radical functions or expressions d) Solve simple radical equations algebraically and/or graphically e) Solve real world applications involving radical functions f) Identify imaginary numbers
TERMS OFFERED Please check all that apply	☒ Fall ☒ Winter ☒ Spring ☒ Summer
COURSE MODALITY	☒ On-ground ☒ Online

Please check all that apply	☒ Hybrid ☒ Other (specify): LRON
ADDITIONAL INFORMATION: If applicable, include any special instructions or requirements (e.g., field work or background check required) as well as any recommended texts or materials (e.g., open-source materials)	The use of mathematics specific technology to support understanding of the concepts is required.
CLASSROOM REQUIREMENTS (e.g., Computer lab, Kitchen, Science lab, Studio, Lecture)	Lecture

CT State Community College Course Outline Template

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COURSE TITLE: Title to appear in the catalog (note: Banner has a 30-character limit)	***Applied Algebra with Modeling*** *(formerly Intermediate Algebra for Liberal Arts)*
COURSE CODE: 3-letter subject code and number (include cross-listed code & number if applicable)	MATH 1011 (formerly MAT* 137L)
CREDIT HOURS: Number of credits awarded for successful completion of course	3
CONTACT HOURS: Number of hours of instruction time (i.e., hours of contact between students and instructor)	Lecture: 3 Lab: Clinical: Other (e.g., studio):
BILLING HOURS: Number of credits for which students are charged	3
ADDITIONAL FEES Check all that apply	☐ Supplemental Course Fee Level 1 ☐ Supplemental Course Fee Level 2 ☐ Advanced Manufacturing Course Fee ☐ Material Fee ☐ Other: ☒ None
WORKLOAD HOURS: Number of hours used to determine faculty workload	3
PREREQUISITES: Courses for which students must be eligible and/or courses that must be completed (with minimum grade specified) to enroll	None

COREQUISITES: Courses in which students must be concurrently enrolled	None
COURSE DESCRIPTORS: For example: General Education course (include category), Clinical, Lab, Studio, Distance Learning, Seminar, Practicum. Use designated codes: (once developed)	General Education - Math/Quantitative Reasoning
CATALOG COURSE DESCRIPTION: The description to appear in the catalog	An introduction to algebraic reasoning through quantitative analysis, problem solving, and modeling with linear, exponential, and quadratic functions. A C- or better will transfer as 3 Skill Area II credits. The use of mathematics specific technology to support understanding of the concepts is required.
STUDENT LEARNING OUTCOMES: The student learning outcomes for the course should be assessable (e.g., consistent with Bloom's taxonomy) and aligned with program outcomes (where applicable).	Upon successful completion of this course, the student will: 1. Define growth mindset and use flexible thinking to solve problems 2. Analyze situations and create algebraic models 3. Apply quantitative methods to analyze and solve problems 4. Use symbolic algebra to express relationships. 5. Reason and problem-solve with proportions and percentages 6. Evaluate and apply appropriate units of measurement 7. Create tables, graphs, and equations to model mathematical situations 8. Evaluate mathematical models and determine valid domain and range values 9. Apply algebra to model and solve a wide variety of real-world applications
TOPICS OUTLINE:	List Instructional units: 1) Variables and Functions

The instructional units in which the above outcomes will be taught and assessed.	a) Variables vs Constants b) Algebraic Relationships (translating) c) Algebraic Problem Solving (Linear and Power systems) d) Relations and Functions e) Functions as Models 2) Linear Models a) Linear Patterns b) Analyzing Linear Graphs ($y = mx + b$) c) Problem Solving with Linear Models 3) Exponential Models a) Exponential Patterns b) Analyzing Exponential Graphs ($y = ab^x$) c) Problem Solving with Exponential Models 4) Quadratic Models a) Quadratic Patterns b) Analyzing Quadratic Graphs ($y = ax^2 + bx = c$) c) Problem Solving with Quadratic Models
TERMS OFFERED Please check all that apply	☒ Fall ☒ Winter ☒ Spring ☒ Summer
COURSE MODALITY Please check all that apply	☒ On-ground (preferred) ☒ Online ☒ Hybrid ☒ Other (specify): LRON
ADDITIONAL INFORMATION: If applicable, include any special instructions or requirements (e.g., field work or background	The suggested textbook for this class is Algebra with Models, A Guided Inquiry Approach by Marian Anton and Karen Santoro. This textbook can be supplied free of charge to students on Blackboard as a PDF. There is also a workbook to accompany this textbook.

check required) as well as any recommended texts or materials (e.g., open-source materials)	The use of mathematics specific technology to support understanding of the concepts is required.
CLASSROOM REQUIREMENTS (e.g., Computer lab, Kitchen, Science lab, Studio, Lecture)	Lecture: Groupwork is essential, and therefore, a classroom where desks or tables can be rearranged is desirable.

CT State Community College Course Outline Template

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COURSE TITLE: Title to appear in the catalog (note: Banner has a 30-character limit)	***Trigonometry with Embedded Algebra***
COURSE CODE: 3-letter subject code and number (include cross-listed code & number if applicable)	MATH 1012 (formerly MAT* 184)
CREDIT HOURS: Number of credits awarded for successful completion of course	4
CONTACT HOURS: Number of hours of instruction time (i.e., hours of contact between students and instructor)	Lecture: 4 Lab: Clinical: Other (e.g., studio):
BILLING HOURS: Number of credits for which students are charged	4
ADDITIONAL FEES Check all that apply	☐ Supplemental Course Fee Level 1 ☐ Supplemental Course Fee Level 2 ☐ Advanced Manufacturing Course Fee ☐ Material Fee ☐ Other: ☒ None
WORKLOAD HOURS: Number of hours used to determine faculty workload	4
PREREQUISITES: Courses for which students must be eligible and/or courses that must be completed (with minimum grade specified) to enroll	C- or better in MATH 0988 (formerly MAT 095I*) Elementary Algebra Intensive*, MATH 0989 (formerly MAT 095) *Elementary Algebra Foundations*, or MATH 1001 (formerly MAT 104) *Quantitative Literacy*, or placement using multiple measures

COREQUISITES: Courses in which students must be concurrently enrolled	None
COURSE DESCRIPTORS: For example: General Education course (include category), Clinical, Lab, Studio, Distance Learning, Seminar, Practicum. Use designated codes: (once developed)	General Education – Math/Quantitative Reasoning
CATALOG COURSE DESCRIPTION: The description to appear in the catalog	This course introduces trigonometry through a functional approach. Trigonometric functions are defined through the unit circle and then applied to triangulation problems. Topics include trigonometric identities, inverse trigonometric functions, oblique triangle trigonometry and the graphs of the trigonometric functions, vectors and the polar coordinate system. Linear, rational, and quadratic functions will be explored in support of the learning of trigonometry. The use of mathematics specific technology to support understanding of the concepts is required.
STUDENT LEARNING OUTCOMES: The student learning outcomes for the course should be assessable (e.g., consistent with Bloom's taxonomy) and aligned with program outcomes (where applicable).	Upon successful completion of this course, the student will: 1) Demonstrate understanding of the fundamental concepts and properties of functions (particularly trigonometric functions), angles, and vectors 2) Use trigonometric identities to simplify expressions, solve equations, and find exact angles 3) Graph functions, particularly trigonometric functions, using rectangular and polar coordinates 4) Demonstrate understanding of relationships between algebraic and graphical representations 5) Model and solve contextualized problems using functions, particularly trigonometric functions, angles, and vectors 6) Interpret quantitative results for accuracy and reasonableness

TOPICS OUTLINE: The instructional units in which the above outcomes will be taught and assessed.	List Instructional units: 1) Linear, Rational and Quadratic Functions a) Evaluating using Graphs, Formulas, and Tables b) Domain and Range c) Graphing d) Modeling 2) Angles and the Six Trigonometric Functions a) Angles - Units and Conversion b) Angles - Arc length, Linear and Angular Velocity c) Evaluating Trigonometric Functions d) Reference Angles e) Circular Function Concept 3) Graphs of Trigonometric Functions a) Properties of Graphs b) Simple Harmonic Motion 4) Trigonometric Identities and Equations a) Verifying Identities b) Simplifying Expressions c) Solving Equations 5) Inverse Trigonometric Functions a) Finding Angles b) Graphing 6) Oblique Triangles & Vectors a) Law of Sines and Law of Cosines b) Vector Operations 7) Polar Coordinates a) Graphing of Points and Equations Including Conic Equations b) Transformations of Points and Equations Between Coordinate Systems

TERMS OFFERED Please check all that apply	☒ Fall ☒ Winter ☒ Spring ☒ Summer
COURSE MODALITY Please check all that apply	☒ On-ground ☒ Online ☒ Hybrid ☒ Other (specify): LRON
ADDITIONAL INFORMATION: If applicable, include any special instructions or requirements (e.g., field work or background check required) as well as any recommended texts or materials (e.g., open-source materials)	MATH 1012 (formerly MAT 184) is a required course in Capital's Construction Management degree program, and it was created specifically to support students in this program to complete a college-level, transferable course in trigonometry with an embedded algebra prerequisite. The use of mathematics specific technology to support understanding of the concepts is required.
CLASSROOM REQUIREMENTS (e.g., Computer lab, Kitchen, Science lab, Studio, Lecture)	Lecture

CT State Community College Course Outline Template

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COURSE TITLE: Title to appear in the catalog (note: Banner has a 30-character limit)	***Applied Algebra with Modeling*** *(formerly Intermediate Algebra for Liberal Arts)*
COURSE CODE: 3-letter subject code and number (include cross-listed code & number if applicable)	MATH 1011 (formerly MAT* 137L)
CREDIT HOURS: Number of credits awarded for successful completion of course	3
CONTACT HOURS: Number of hours of instruction time (i.e., hours of contact between students and instructor)	Lecture: 3 Lab: Clinical: Other (e.g., studio):
BILLING HOURS: Number of credits for which students are charged	3
ADDITIONAL FEES Check all that apply	☐ Supplemental Course Fee Level 1 ☐ Supplemental Course Fee Level 2 ☐ Advanced Manufacturing Course Fee ☐ Material Fee ☐ Other: ☒ None
WORKLOAD HOURS: Number of hours used to determine faculty workload	3
PREREQUISITES: Courses for which students must be eligible and/or courses that must be completed (with minimum grade specified) to enroll	None

COREQUISITES: Courses in which students must be concurrently enrolled	None
COURSE DESCRIPTORS: For example: General Education course (include category), Clinical, Lab, Studio, Distance Learning, Seminar, Practicum. Use designated codes: (once developed)	General Education - Math/Quantitative Reasoning
CATALOG COURSE DESCRIPTION: The description to appear in the catalog	An introduction to algebraic reasoning through quantitative analysis, problem solving, and modeling with linear, exponential, and quadratic functions. A C- or better will transfer as 3 Skill Area II credits. The use of mathematics specific technology to support understanding of the concepts is required.
STUDENT LEARNING OUTCOMES: The student learning outcomes for the course should be assessable (e.g., consistent with Bloom's taxonomy) and aligned with program outcomes (where applicable).	Upon successful completion of this course, the student will: 1. Define growth mindset and use flexible thinking to solve problems 2. Analyze situations and create algebraic models 3. Apply quantitative methods to analyze and solve problems 4. Use symbolic algebra to express relationships. 5. Reason and problem-solve with proportions and percentages 6. Evaluate and apply appropriate units of measurement 7. Create tables, graphs, and equations to model mathematical situations 8. Evaluate mathematical models and determine valid domain and range values 9. Apply algebra to model and solve a wide variety of real-world applications
TOPICS OUTLINE:	List Instructional units: 1) Variables and Functions

The instructional units in which the above outcomes will be taught and assessed.	a) Variables vs Constants b) Algebraic Relationships (translating) c) Algebraic Problem Solving (Linear and Power systems) d) Relations and Functions e) Functions as Models 2) Linear Models a) Linear Patterns b) Analyzing Linear Graphs ($y = mx + b$) c) Problem Solving with Linear Models 3) Exponential Models a) Exponential Patterns b) Analyzing Exponential Graphs ($y = ab^x$) c) Problem Solving with Exponential Models 4) Quadratic Models a) Quadratic Patterns b) Analyzing Quadratic Graphs ($y = ax^2 + bx = c$) c) Problem Solving with Quadratic Models
TERMS OFFERED Please check all that apply	☒ Fall ☒ Winter ☒ Spring ☒ Summer
COURSE MODALITY Please check all that apply	☒ On-ground (preferred) ☒ Online ☒ Hybrid ☒ Other (specify): LRON
ADDITIONAL INFORMATION: If applicable, include any special instructions or requirements (e.g., field work or background	The suggested textbook for this class is Algebra with Models, A Guided Inquiry Approach by Marian Anton and Karen Santoro. This textbook can be supplied free of charge to students on Blackboard as a PDF. There is also a workbook to accompany this textbook.

check required) as well as any recommended texts or materials (e.g., open-source materials)	The use of mathematics specific technology to support understanding of the concepts is required.
CLASSROOM REQUIREMENTS (e.g., Computer lab, Kitchen, Science lab, Studio, Lecture)	Lecture: Groupwork is essential, and therefore, a classroom where desks or tables can be rearranged is desirable.

CT State Community College Course Outline Template

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COURSE TITLE: Title to appear in the catalog (note: Banner has a 30-character limit)	***Quantitative Reasoning***
COURSE CODE: 3-letter subject code and number (include cross-listed code & number if applicable)	MATH 1100 (formerly MAT* 146)
CREDIT HOURS: Number of credits awarded for successful completion of course	3
CONTACT HOURS: Number of hours of instruction time (i.e., hours of contact between students and instructor)	Lecture: 3 Lab: Clinical: Other (e.g., studio):
BILLING HOURS: Number of credits for which students are charged	3
ADDITIONAL FEES Check all that apply	☐ Supplemental Course Fee Level 1 ☐ Supplemental Course Fee Level 2 ☐ Advanced Manufacturing Course Fee ☐ Material Fee ☐ Other: ☒ None
WORKLOAD HOURS: Number of hours used to determine faculty workload	3
PREREQUISITES: Courses for which students must be eligible and/or courses that must be completed (with minimum grade specified) to enroll	None

COREQUISITES: Courses in which students must be concurrently enrolled	MATH 0901 Quantitative Reasoning Support (Unless student places out)
COURSE DESCRIPTORS: For example: General Education course (include category), Clinical, Lab, Studio, Distance Learning, Seminar, Practicum. Use designated codes: (once developed)	General Education-Math/Quantitative Reasoning
CATALOG COURSE DESCRIPTION: The description to appear in the catalog	This course provides a comprehensive overview of the quantitative skills needed to be an engaged citizen. Critical thinking and problem solving are emphasized along with the application of mathematics to real-world scenarios requiring reasoning from evidence. Students will learn to communicate effectively with numbers and use appropriate technology to enhance their quantitative reasoning ability.
STUDENT LEARNING OUTCOMES: The student learning outcomes for the course should be assessable (e.g., consistent with Bloom's taxonomy) and aligned with program outcomes (where applicable).	Upon successful completion of this course, the student will: 1. Interpret and communicate quantitative information and mathematical concepts using language appropriate to the context 2. Understand problems, develop strategies to find solutions, and persevere in solving them 3. Reason, model, and draw conclusions or make decisions with quantitative information 4. Critique and evaluate quantitative arguments 5. Use appropriate technology to solve quantitative problems
TOPICS OUTLINE: The instructional units in which the above outcomes will be taught and assessed.	There are three broad categories of instructional units: Logical and Proportional Reasoning, Modeling, and Probability and Statistics. The topics under each category will allow students to demonstrate the learning outcomes above. Students will make use of appropriate technology and will be asked to explain their thinking both orally and in writing. 1) Logical and Proportional Reasoning (30%) a) Analyze and solve problems involving absolute and relative change

	b) Interpret and compare ratios in authentic contexts (e.g., news articles or advertisements) c) Use laws of logic to evaluate the validity of arguments **Sample Topics:** Sets and Logic, Geometry (Symmetry, Fractals, Tessellations), Number Theory 2) Modeling (35%) a) Create, use, and interpret graphs and equations that model real-world situations b) Identify assumptions, parameters, and limitations in creating and assessing real-world models c) Choose, create, and interpret linear, exponential, logarithmic and logistic models of real-world problems **Sample Topics:** Financial and Business Applications (credit cards, mortgage, retirement savings), Graph Theory, Data Modeling, Mathematics of Voting 3) Probability and Statistics (35%) a) Evaluate claims based on empirical, theoretical, and subjective probabilities b) Use data displays and models to determine probabilities, including conditional probabilities, and use them to draw conclusions c) Use statistical information from studies, surveys, and polls to make informed decisions d) Summarize and interpret datasets with regard to shape, center and spread. Be able to compare data sets e) Use technology to summarize and interpret univariate, bivariate, and multivariable data using appropriate graphical displays and numerical summary statistics. Be able to describe strengths, limitations, and bias in graphical displays **Sample Topics:** U.S. Census Data, Risk and Expected Value, Equity and Social Justice

	☒ Fall ☒ Winter ☒ Spring ☒ Summer
COURSE MODALITY Please check all that apply	☒ On-ground ☒ Online ☒ Hybrid ☒ Other (specify): LRON (Live Remote Online)
ADDITIONAL INFORMATION: If applicable, include any special instructions or requirements (e.g., field work or background check required) as well as any recommended texts or materials (e.g., open-source materials)	Quantitative Reasoning textbooks and/or open education resources Use of group work and projects is encouraged. The use of mathematics specific technology to support understanding of the concepts is required.
CLASSROOM REQUIREMENTS (e.g., Computer lab, Kitchen, Science lab, Studio, Lecture)	Movable desks or tables so that students may work in groups. Plenty of board space. Appropriate technology.

CT State Community College Course Outline Template

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COURSE TITLE: Title to appear in the catalog (note: Banner has a 30-character limit)	***Statistics I***
COURSE CODE: 3-letter subject code and number (include cross-listed code & number if applicable)	MATH 1200 (formerly MAT* 167)
CREDIT HOURS: Number of credits awarded for successful completion of course	3
CONTACT HOURS: Number of hours of instruction time (i.e., hours of contact between students and instructor)	Lecture: 3 Lab: Clinical: Other (e.g., studio):
BILLING HOURS: Number of credits for which students are charged	3
ADDITIONAL FEES Check all that apply	☐ Supplemental Course Fee Level 1 ☐ Supplemental Course Fee Level 2 ☐ Advanced Manufacturing Course Fee ☐ Material Fee ☐ Other: ☒ None
WORKLOAD HOURS: Number of hours used to determine faculty workload	3
PREREQUISITES: Courses for which students must be eligible and/or courses that must be completed (with minimum grade specified) to enroll	None

COREQUISITES: Courses in which students must be concurrently enrolled	MATH 0902 Statistics I Support (Unless student places out)
COURSE DESCRIPTORS: For example: General Education course (include category), Clinical, Lab, Studio, Distance Learning, Seminar, Practicum. Use designated codes: (once developed)	General Education - Math/Quantitative Reasoning
CATALOG COURSE DESCRIPTION: The description to appear in the catalog	This course covers fundamental concepts in descriptive and inferential statistics, probability, and probability distributions. Descriptive statistics topics include: the concept of population versus sample, frequency distributions, measures of central tendency, measures of variation, measures of position, and correlation and linear regression. Inferential statistics topics include confidence intervals and hypothesis testing. This course requires the use of computer-based statistical software.
STUDENT LEARNING OUTCOMES: The student learning outcomes for the course should be assessable (e.g., consistent with Bloom's taxonomy) and aligned with program outcomes (where applicable).	Upon successful completion of this course the student will: 1) Apply the statistical problem-solving process (formulate a problem that involves the collection of data, collect data, perform statistical analysis, and interpret the results) 2) Describe data types, methods of data collection, and how the analysis and interpretation of data depends on the type of data and how data are collected 3) Apply descriptive statistics techniques to describe characteristics of data (e.g., measures of center, measures of variability, and measures of position, outliers) and create and interpret graphical displays of data 4) Apply probability concepts and probability distributions to model real-world situations and solve problems 5) Perform statistical inference via confidence intervals and hypothesis tests and explain the role of randomness in the inference process

	6) Use technology to investigate and analyze data and solve statistical problems; and interpret and draw conclusions from the output of statistical software
TOPICS OUTLINE: The instructional units in which the above outcomes will be taught and assessed.	REQUIRED TOPICS: 1) Introduction to Data & Statistics a) Types of data b) Levels of measurement c) Population vs. sample d) Parameter vs. statistic e) Experiments vs. observational studies f) Sampling techniques g) Types of conclusions based on type of statistical study h) Ethical issues in surveys and experiments i) Critical examination of newspaper, magazine, journal, and internet research reports 2) Describing Quantitative and Categorical Data a) Frequency distributions, relative frequencies, cumulative frequencies b) Graphs of single variable and multi-variable data – line plots, stem plots, histograms, box plots, bar charts, pie charts, multi-variable graphs c) Measures of center (mean, median, mode) d) Measures of spread (range, variance, standard deviation, IQR) e) Measures of relative position (z-scores, quartiles, percentiles) f) Empirical Rule 3) Correlation & Linear Regression a) Scatterplots b) Correlation coefficient c) Least squares regression line d) Prediction, extrapolation 4) Probability & Probability Rules a) Classical probability b) Empirical probability c) Addition and multiplication rules

	d) Two-way tables e) Conditional probability f) Counting problems 5) Discrete Random Variables a) Discrete probability distribution b) Mean, expected value, variance, standard deviation c) Binomial random variables 6) Continuous Random Variables a) Standard normal distribution b) Any normal distribution, cutoff values c) Central Limit Theorem d) Normal approximation of binomial distribution 7) Confidence Intervals a) Point estimate vs. interval estimate b) Critical values & margin of error c) Estimating a population mean (sigma known, sigma unknown) d) *T*-distributions e) Estimating a population proportion 8) Hypothesis Testing a) Hypothesis tests for a population mean (sigma known, sigma unknown) b) Hypothesis tests for a population proportion c) Determining hypotheses from claims or research questions d) Calculating and interpreting test statistics e) Calculating and interpreting *P*-values and/or critical values f) Making decisions g) Type 1 & Type II errors h) Statistical significance 9) Optional Topics a) Hypothesis tests for differences in population means (independent and dependent samples) b) Confidence intervals for the difference in population means (independent and dependent samples) c) Hypothesis tests for differences in population proportions

	d) Confidence intervals for the difference in population proportions e) Hypothesis test for the population correlation coefficient or slope of the regression line f) Confidence intervals using bootstrap samples g) Hypothesis tests using randomizations
TERMS OFFERED Please check all that apply	☒ Fall ☒ Winter ☒ Spring ☒ Summer
COURSE MODALITY Please check all that apply	☒ On-ground ☒ Online ☒ Hybrid ☒ Other (specify): LRON (Live Remote Online)
ADDITIONAL INFORMATION: If applicable, include any special instructions or requirements (e.g., field work or background check required) as well as any recommended texts or materials (e.g., open-source materials)	
CLASSROOM REQUIREMENTS (e.g., Computer lab, Kitchen, Science lab, Studio, Lecture)	Computer Access (via a personal computer, computer lab, or laptop cart) Students must have access to a computer during class to complete computer-based activities.

CT State Community College Course Outline Template

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COURSE TITLE: Title to appear in the catalog (note: Banner has a 30-character limit)	***Statistics I with Computer Applications***
COURSE CODE: 3-letter subject code and number (include cross-listed code & number if applicable)	MATH 1201 (formerly MAT* 165)
CREDIT HOURS: Number of credits awarded for successful completion of course	4
CONTACT HOURS: Number of hours of instruction time (i.e., hours of contact between students and instructor)	Lecture: 4 Lab: Clinical: Other (e.g., studio):
BILLING HOURS: Number of credits for which students are charged	4
ADDITIONAL FEES Check all that apply	☐ Supplemental Course Fee Level 1 ☐ Supplemental Course Fee Level 2 ☐ Advanced Manufacturing Course Fee ☐ Material Fee ☐ Other: ☒ None
WORKLOAD HOURS: Number of hours used to determine faculty workload	4
PREREQUISITES: Courses for which students must be eligible and/or courses that must be completed (with minimum grade specified) to enroll	None

COREQUISITES: Courses in which students must be concurrently enrolled	MAT 0902 Statistics I Support (Unless student places out)
COURSE DESCRIPTORS: For example: General Education course (include category), Clinical, Lab, Studio, Distance Learning, Seminar, Practicum. Use designated codes: (once developed)	General Education - Math/Quantitative Reasoning
CATALOG COURSE DESCRIPTION: The description to appear in the catalog	This course covers fundamental concepts in descriptive and inferential statistics, probability, and probability distributions. Descriptive statistics topics include: the concept of population versus sample, frequency distributions, measures of central tendency, measures of variation, measures of position, and correlation and linear regression. Inferential statistics topics include confidence intervals and hypothesis testing. Use of software for data analysis and data exploration is an integral part of the course. This course requires the use of computer-based statistical software.
STUDENT LEARNING OUTCOMES: The student learning outcomes for the course should be assessable (e.g., consistent with Bloom's taxonomy) and aligned with program outcomes (where applicable).	Upon successful completion of this course the student will: 1) Apply the statistical problem-solving process (formulate a problem that involves the collection of data, collect data, perform statistical analysis, and interpret the results) 2) Describe data types, methods of data collection, and how the analysis and interpretation of data depends on the type of data and how data are collected 3) Apply descriptive statistics techniques to describe characteristics of data (e.g., measures of center, measures of variability, and measures of position, outliers) and create and interpret graphical displays of data 4) Apply probability concepts and probability distributions to model real-world situations and solve problems 5) Perform statistical inference via confidence intervals and hypothesis tests and explain the role of randomness in the inference process

	6) Use technology to investigate and analyze data and solve statistical problems; and interpret and draw conclusions from the output of statistical software
TOPICS OUTLINE: The instructional units in which the above outcomes will be taught and assessed.	REQUIRED TOPICS: 1) Introduction to Data & Statistics a) Types of data b) Levels of measurement c) Population vs. sample d) Parameter vs. statistic e) Experiments vs. observational studies f) Sampling techniques g) Types of conclusions based on type of statistical study h) Ethical issues in surveys and experiments i) Critical examination of newspaper, magazine, journal and internet research reports 2) Describing Quantitative and Categorical Data a) Frequency distributions, relative frequencies, cumulative frequencies b) Graphs of single variable and multi-variable data – line plots, stem plots, histograms, box plots, bar charts, pie charts, multi-variable graphs c) Measures of center (mean, median, mode) d) Measures of spread (range, variance, standard deviation, IQR) e) Measures of relative position (z-scores, quartiles, percentiles) f) Empirical Rule 3) Correlation & Linear Regression a) Scatterplots b) Correlation coefficient c) Least squares regression line d) Prediction, extrapolation 4) Probability & Probability Rules a) Classical probability b) Empirical probability c) Addition and multiplication rules

	d) Two-way tables e) Conditional probability f) Counting problems 5) Discrete Random Variables a) Discrete probability distribution b) Mean, expected value, variance, standard deviation c) Binomial random variables 6) Continuous Random Variables a) Standard normal distribution b) Any normal distribution, cutoff values c) Central Limit Theorem d) Normal approximation of binomial distribution 7) Confidence Intervals a) Point estimate vs. Interval estimate b) Critical values & margin of error c) Estimating a population mean (sigma known, sigma unknown) d) *T*-distributions e) Estimating a population proportion 8) Hypothesis Testing a) Hypothesis tests for a population mean (sigma known, sigma unknown) b) Hypothesis tests for a population proportion c) Determining hypotheses from claims or research questions d) Calculating and interpreting test statistics e) Calculating and interpreting *P*-values and/or critical values f) Making decisions g) Type 1 & Type II errors h) Statistical significance 9) Optional Topics a) Hypothesis tests for differences in population means (independent and dependent samples) b) Confidence intervals for the difference in population means (independent and dependent samples) c) Hypothesis tests for differences in population proportions

	d) Confidence intervals for the difference in population proportions e) Hypothesis test for the population correlation coefficient, or slope of the regression line f) Confidence intervals using bootstrap samples g) Hypothesis tests using randomizations
TERMS OFFERED Please check all that apply	☒ Fall ☒ Winter ☒ Spring ☒ Summer
COURSE MODALITY Please check all that apply	☒ On-ground ☒ Online ☒ Hybrid ☒ Other (specify): LRON (Live Remote Online)
ADDITIONAL INFORMATION: If applicable, include any special instructions or requirements (e.g., field work or background check required) as well as any recommended texts or materials (e.g., open-source materials)	Requirement for student use of computer-based statistical software: • Students are required to spend one contact hour per week completing computer-based activities. Activities can be completed individually or in groups and must count towards students' overall course grade. Required learning objectives for computer-based activities: • Import data from different file types (e.g., csv, excel files) into statistical software for analysis • Compute summary statistics and construct graphs of distributions of quantitative data and use the statistics and graphs to describe the distributions' characteristics • Compare multiple distributions of quantitative data using summary statistics and graphs • Construct and interpret multi-variable graphs that display relationships between qualitative and quantitative variables (e.g., stacked dotplots, stacked boxplots, overlapped histograms, scatterplots with grouping by color, etc.) • Examine how outliers affect statistics (e.g., how outliers in a univariate distribution impact measures of center, variation and position; how outliers in a

	bivariate distribution impact the correlation coefficient and least-squares regression line) • Use statistical software to plot discrete and continuous probability distributions, compare binomial distributions to normal distributions, and use probability distributions to solve problems • Create simulations of distributions of sample statistics (e.g., distributions of sample means and distributions of sample proportions) to explore the Central Limit Theorem • Use statistical software to assess normality, construct confidence intervals, and perform hypothesis tests • Filter observations in a dataset according to specific criteria to obtain subgroups of data; and compute statistics and construct visualizations on the subgroups of data • Given a real-world dataset with multiple quantitative and qualitative variables, generate a set of research questions that can be posed and answered involving the data and perform the appropriate statistical analysis on the data to answer the research questions • (Optional) Use statistical software to recreate data visualizations
CLASSROOM REQUIREMENTS (e.g., Computer lab, Kitchen, Science lab, Studio, Lecture)	Computer Access (via a personal computer, computer lab, or laptop cart) Students must have access to a computer during class to complete computer-based activities. Students must spend a minimum of 1-hour per week completing computer-based activities.

CT State Community College Course Outline Template

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COURSE TITLE: Title to appear in the catalog (note: Banner has a 30-character limit)	***Mathematics for Elementary Education: Algebra/Number Systems***
COURSE CODE: 3-letter subject code and number (include cross-listed code & number if applicable)	MATH 1400 (formerly MAT* 143)
CREDIT HOURS: Number of credits awarded for successful completion of course	3
CONTACT HOURS: Number of hours of instruction time (i.e., hours of contact between students and instructor)	Lecture: 3 Lab: Clinical: Other (e.g., studio):
BILLING HOURS: Number of credits for which students are charged	3
ADDITIONAL FEES Check all that apply	☐ Supplemental Course Fee Level 1 ☐ Supplemental Course Fee Level 2 ☐ Advanced Manufacturing Course Fee ☐ Material Fee ☐ Other: ☒ None
WORKLOAD HOURS: Number of hours used to determine faculty workload	3
PREREQUISITES: Courses for which students must be eligible and/or courses that must be completed (with minimum grade specified) to enroll	Placement using multiple measures or MATH 1010 (formerly MAT 137) *Intermediate Algebra* with a grade of C or higher, and eligible for ENG 101

COREQUISITES: Courses in which students must be concurrently enrolled	None
COURSE DESCRIPTORS: For example: General Education course (include category), Clinical, Lab, Studio, Distance Learning, Seminar, Practicum. Use designated codes: (once developed)	General Education - Math/Quantitative Reasoning
CATALOG COURSE DESCRIPTION: The description to appear in the catalog	This course presents mathematical reasoning for problem solving, sets, whole numbers, numeration systems, number theory, and integers. The use of mathematics specific technology to support understanding of the concepts is required.
STUDENT LEARNING OUTCOMES: The student learning outcomes for the course should be assessable (e.g., consistent with Bloom's taxonomy) and aligned with program outcomes (where applicable).	Upon successful completion of this course, the student will: 1. Identify and apply problem solving strategies to solve routine and novel math problems, build new mathematics knowledge, and reflect on the problem-solving process 2. Use appropriate technology to solve routine and novel math problems 3. Examine and analyze patterns and develop mathematical models to represent and understand quantitative relationships symbolically, graphically, numerically, and verbally, analyze relations, and functions of one and two variables 4. Develop the meaning and use of whole number operations, set operations, and elementary logic 5. Demonstrate proficiency to perform, evaluate, and explain multi-digit whole number computation using algorithms, mental mathematics, and estimation 6. Recognize the meaning and use of place value in the base 10 numeration system and experience numeration systems from different cultures and operations in different bases (two through twelve)

	7. Develop the meaning and use of integers and integer operations 8. Apply the fundamental ideas of number theory including prime and composite numbers, least common multiple, greatest common factor, and divisibility
TOPICS OUTLINE: The instructional units in which the above outcomes will be taught and assessed.	List Instructional units: 1) An Introduction to Problem Solving 2) Mathematics and Problem Solving 3) Explorations with Patterns 4) Reasoning and Logic: An Introduction 5) Numeration Systems and Sets 6) Numeration Systems 7) Describing Sets 8) Other Set Operations and Their Properties 9) Whole Numbers and Their Operations 10) Addition and Subtraction of Whole Numbers 11) Algorithms for Whole-Number Addition and Subtraction 12) Multiplication and Division of Whole Numbers 13) Algorithm for Whole-Number Multiplication and Division 14) Mental Mathematics and Estimation for Whole-Number Operations 15) Number Theory 16) Divisibility 17) Prime and Composite Numbers 18) Greatest Common Divisor and Least Common Multiple 19) Integers 20) Integers and the Operations of Addition and Subtraction 21) Multiplication and Division of Integers
TERMS OFFERED Please check all that apply	☒ Fall ☒ Winter ☒ Spring ☒ Summer

COURSE MODALITY Please check all that apply	☒ On-ground ☒ Online ☒ Hybrid ☒ Other (specify): LRON
ADDITIONAL INFORMATION: If applicable, include any special instructions or requirements (e.g., field work or background check required) as well as any recommended texts or materials (e.g., open-source materials)	The use of mathematics specific technology to support understanding of the concepts is required.
CLASSROOM REQUIREMENTS (e.g., Computer lab, Kitchen, Science lab, Studio, Lecture)	Lecture

CT State Community College Course Outline Template

This template should be used by faculty to create an official record of a course for inclusion in the CT State Community College catalog. A completed template must be submitted for every course to be moved to the single college catalog.

COURSE TITLE: Title to appear in the catalog (note: Banner has a 30-character limit)	***Mathematics for Elementary Education: Geometry/Data***
COURSE CODE: 3-letter subject code and number (include cross-listed code & number if applicable)	MATH 1410 (formerly MAT* 144)
CREDIT HOURS: Number of credits awarded for successful completion of course	3
CONTACT HOURS: Number of hours of instruction time (i.e., hours of contact between students and instructor)	Lecture: 3 Lab: Clinical: Other (e.g., studio):
BILLING HOURS: Number of credits for which students are charged	3
ADDITIONAL FEES Check all that apply	☐ Supplemental Course Fee Level 1 ☐ Supplemental Course Fee Level 2 ☐ Advanced Manufacturing Course Fee ☐ Material Fee ☐ Other: ☒ None
WORKLOAD HOURS: Number of hours used to determine faculty workload	3
PREREQUISITES: Courses for which students must be eligible and/or courses that must be completed (with minimum grade specified) to enroll	A grade of C or higher in MATH 1400 (formerly MAT* 143) *Mathematics for Elementary Education: Algebra/Number Systems*

COREQUISITES: Courses in which students must be concurrently enrolled	None
COURSE DESCRIPTORS: For example: General Education course (include category), Clinical, Lab, Studio, Distance Learning, Seminar, Practicum. Use designated codes: (once developed)	General Education - Math/Quantitative Reasoning
CATALOG COURSE DESCRIPTION: The description to appear in the catalog	Presents geometry, measurement, rational numbers, irrational numbers, ratio and proportions, problem-solving, mathematical reasoning and connections, probability, and statistics. The use of mathematics specific technology to support understanding of the concepts is required.
STUDENT LEARNING OUTCOMES: The student learning outcomes for the course should be assessable (e.g., consistent with Bloom's taxonomy) and aligned with program outcomes (where applicable).	Upon successful completion of this course, the student will: 1. Identify basic geometric shapes 2. Be proficient in the art of measuring 3. Understand the basic properties of rational and irrational numbers 4. Demonstrate mastery working with ratios, proportions and precents in a problem-solving context 5. Use mathematical reasoning and connections effectively 6. Demonstrate an understanding of basic probability and statistics
TOPICS OUTLINE: The instructional units in which the above outcomes will be taught and assessed.	List Instructional units: 1) Rational Numbers and Proportional Reasoning 2) The Set of Rational Numbers 3) Addition, Subtraction, and Estimation with Rational Numbers 4) Multiplication, Division, and Estimation with Rational Numbers 5) Proportional Reasoning 6) Rational Numbers as Decimals and Percent 7) Introduction to Finite Decimals 8) Operations on Decimals

	9) Repeating Decimals 10) Percents and Interest 11) Real Numbers and Algebraic Thinking 12) Real Numbers 13) Probability 14) Determining Probability 15) Multistage Experiments and Modeling Games 16) Simulations and Applications in Probability 17) Permutations and Combinations in Probability 18) Data Analysis/Statistics: An Introduction 19) Displaying Data: Part I 20) Displaying Data: Part II 21) Measures of Central Tendency and Variation 22) Abuses of Statistics 23) Introductory Geometry 24) Basic Notions 25) Curves, Polygons, and Symmetry 26) More About Angles 27) Geometry in Three Dimensions 28) Area, Pythagorean Theorem, and Volume 29) Areas of Polygons and Circles 30) The Pythagorean Theorem, Distance Formula, and Equation of a Circle
TERMS OFFERED Please check all that apply	☒ Fall ☒ Winter ☒ Spring ☒ Summer
COURSE MODALITY Please check all that apply	☒ On-ground ☒ Online ☒ Hybrid ☒ Other (specify): LRON
ADDITIONAL INFORMATION: If applicable, include any special instructions or requirements (e.g., field work or background check required) as well as any recommended texts or materials (e.g., open-source materials)	The use of mathematics specific technology to support understanding of the concepts is required. A TI–84 Graphing Calculator is recommended.

CLASSROOM REQUIREMENTS (e.g., Computer lab, Kitchen, Science lab, Studio, Lecture)	Lecture

CT State Community College Course Outline Template

This template should be used by faculty to create an official record of a course for inclusion in the CT State Community College catalog. A completed template must be submitted for every course to be moved to the single college catalog.

COURSE TITLE: Title to appear in the catalog (note: Banner has a 30-character limit)	***Applied Business Mathematics***
COURSE CODE: 3-letter subject code and number (include cross-listed code & number if applicable)	MATH 1500 (formerly MAT* 158)
CREDIT HOURS: Number of credits awarded for successful completion of course	3
CONTACT HOURS: Number of hours of instruction time (i.e., hours of contact between students and instructor)	Lecture: 3 Lab: Clinical: Other (e.g., studio):
BILLING HOURS: Number of credits for which students are charged	3
ADDITIONAL FEES Check all that apply	☐ Supplemental Course Fee Level 1 ☐ Supplemental Course Fee Level 2 ☐ Advanced Manufacturing Course Fee ☐ Material Fee ☐ Other: ☒ None
WORKLOAD HOURS: Number of hours used to determine faculty workload	3
PREREQUISITES: Courses for which students must be eligible and/or courses that must be completed (with minimum grade specified) to enroll	C- or higher in MATH 1010 (formerly MAT 137) *Intermediate Algebra* or MATH 1011 (formerly MAT 137L) *Applied Algebra with Modeling* or MATH 1200 (formerly MAT 167) *Statistics I*, or placement using multiple measures.

COREQUISITES: Courses in which students must be concurrently enrolled	None
COURSE DESCRIPTORS: For example: General Education course (include category), Clinical, Lab, Studio, Distance Learning, Seminar, Practicum. Use designated codes: (once developed)	General Education - Math/Quantitative Reasoning
CATALOG COURSE DESCRIPTION: The description to appear in the catalog	A course in select topics from contemporary mathematics with applications for students in business, economics, and social science. Topics include: the concept of function and its rate of change; mathematical modeling with polynomial, exponential and logarithmic functions; financial applications; systems of linear equations; matrices; and linear programming. The use of mathematics specific technology to support understanding is required.
STUDENT LEARNING OUTCOMES: The student learning outcomes for the course should be assessable (e.g., consistent with Bloom's taxonomy) and aligned with program outcomes (where applicable).	Upon successful completion of this course, the student will: 1. Use linear and non-linear mathematical models to investigate and solve real world problems in business, economics and finance 2. Model contextual problems using systems of equations and matrices, apply matrix operations, and use systems of equations and matrices to solve problems 3. Apply linear programming concepts to model and solve optimization problems involving a set of constraints and an objective function 4. Solve finance problems involving interest, compound interest, present and future values, and annuities 5. Solve select problems in finite mathematics including basic set theory, probability, and combinatorics

TOPICS OUTLINE: The instructional units in which the above outcomes will be taught and assessed.	List Instructional units: 1) Functions & Mathematical Models a. Function definition and notation b. Rate of change c. Instantaneous rate of change (optional) d. Graphs of quadratic functions, other selected polynomial functions, exponential functions, and logarithmic functions e. Characteristics of a function: critical values, including maxima, minima, intercepts and zeros. f. Modeling data with linear, quadratic, cubic, quartic, exponential, logarithmic, and logistic models for raw data g. Interpolation and extrapolation h. Technology literacy - Familiarity and facility with graphing technology as a tool for understanding mathematical concepts and solving mathematical problems 2) Systems of Linear Equations a. Modeling contextual situations b. Solving systems of linear equations c. Types of solutions 3) Matrices and Matrix Algebra a. Using matrices to solve linear systems b. Matrix operations c. Finding the transpose of a matrix d. Finding the inverse of a matrix using elementary row operations e. Using matrices as a tool for representing and solving real life problems f. Applied matrix problems: Leontfif economic models, traffic flow/networking models 4) Linear Inequalities & Linear Programming a. Solving systems linear inequalities b. Solving linear programming problems c. Special cases of linear programming solutions: infinitely many solutions or no solution

	5) Financial Mathematics a. Simple & compound interest b. Exponential growth and decay c. Present value and future value d. Annuities 6) Set Theory, Probability, and Combinatorics a. Elementary set theory problems (sample space, union, intersection) b. Probability basics c. Conditional probability d. Permutations e. Combinations
TERMS OFFERED Please check all that apply	☒ Fall ☒ Winter ☒ Spring ☒ Summer
COURSE MODALITY Please check all that apply	☒ On-ground ☒ Online ☒ Hybrid ☒ Other (specify): LRON
ADDITIONAL INFORMATION: If applicable, include any special instructions or requirements (e.g., field work or background check required) as well as any recommended texts or materials (e.g., open-source materials)	The use of mathematics specific technology to support understanding of the concepts is required.
CLASSROOM REQUIREMENTS (e.g., Computer lab, Kitchen, Science lab, Studio, Lecture)	Lecture

CT State Community College Course Outline Template

This template should be used by faculty to create an official record of a course for inclusion in the CT State Community College catalog. A completed template must be submitted for every course to be moved to the single college catalog.

COURSE TITLE: Title to appear in the catalog (note: Banner has a 30-character limit)	***Pathway to Calculus: College Algebra***
COURSE CODE: 3-letter subject code and number (include cross-listed code & number if applicable)	MATH 1600 (formerly MAT* 172)
CREDIT HOURS: Number of credits awarded for successful completion of course	3
CONTACT HOURS: Number of hours of instruction time (i.e., hours of contact between students and instructor)	Lecture: 3 Lab: Clinical: Other (e.g., studio):
BILLING HOURS: Number of credits for which students are charged	3
ADDITIONAL FEES Check all that apply	☐ Supplemental Course Fee Level 1 ☐ Supplemental Course Fee Level 2 ☐ Advanced Manufacturing Course Fee ☐ Material Fee ☐ Other: ☒ None
WORKLOAD HOURS: Number of hours used to determine faculty workload	3
PREREQUISITES: Courses for which students must be eligible and/or courses that must be completed (with minimum grade specified) to enroll	None

COREQUISITES: Courses in which students must be concurrently enrolled	MATH 0906 College Algebra Support (unless student places out)
COURSE DESCRIPTORS: For example: General Education course (include category), Clinical, Lab, Studio, Distance Learning, Seminar, Practicum. Use designated codes: (once developed)	General Education – Math/Quantitative Reasoning
CATALOG COURSE DESCRIPTION: The description to appear in the catalog	This course offers the development of numerical, algebraic, and graphical problem-solving techniques to be used in calculus. Techniques are developed to solve equations involving polynomial, radical and rational functions. Polynomial, inverse, rational, exponential, and logarithmic functions are studied, and their applications are explored both algebraically and graphically. Whenever possible, learning of mathematical concepts is embedded in contextualized situations relevant to STEM majors. The use of mathematics specific technology to support understanding of the College Algebra course is required. This course is designed for STEM majors and fulfills the prerequisite requirement for MATH 1610 (formerly MAT* 186) Precalculus.
STUDENT LEARNING OUTCOMES: The student learning outcomes for the course should be assessable (e.g., consistent with Bloom's taxonomy) and aligned with program outcomes (where applicable).	Upon successful completion of this course the student will: For function types including linear, quadratic, piece-wise defined, rational, radical, polynomial, exponential, and logarithmic: 1) Use multiple representations of these function types to investigate quantities, describe relationships between quantities, and attend to how two quantities change together

	2) Describe characteristics of these function types and convert between different representations and algebraic forms to analyze, model, and solve meaningful problems 3) Develop procedural fluency to support the understanding, analysis, and modeling of these function types and calculation with related expressions
TOPICS OUTLINE: The instructional units in which the above outcomes will be taught and assessed.	List Instructional units: 1) Relations and Functions (15% of time) a) Graphs of functions, domain, and range of functions b) Transformations of functions: translations, stretches, compressions, and reflections c) Piecewise functions (e.g., absolute value function) d) Compositions of functions e) Difference quotients f) Inverse functions 2) Quadratic Functions (25% of time) a) Provide multiple representations of quadratic functions or expressions by hand and/or using technology b) Determine identifying characteristics of quadratic functions or expressions (e.g., factors) c) Evaluate, simplify, and perform operations on quadratic functions or expressions d) Complex numbers, perform arithmetic operations, compute powers of i e) Solve quadratic equations algebraically (e.g., factoring, completing the square, and quadratic formula with rational, irrational, complex solutions, and use of the discriminant) and/or graphically f) Solve real world applications involving quadratic equations and functions 3) Higher Order Polynomial Functions (15% of time)

	a) Analyze power functions and higher degree polynomials b) End behavior c) Graphs of polynomial functions 4) Rational Functions (20% of time) a) Graphs of rational functions b) Find domain, removable discontinuities, vertical, horizonal and slant asymptotes c) Solve rational equations 5) Radical Functions (10% of time) a) Find domain, x and y intercepts b) Graph radical functions c) Solve radical equations 6) Exponential and Logarithmic Functions (15% of time) a) Graph exponential and logarithmic functions b) Domain, range, vertical and horizontal intercepts c) Properties of logarithms d) Solve exponential and log equations
TERMS OFFERED Please check all that apply	☒ Fall ☒ Winter ☒ Spring ☒ Summer
COURSE MODALITY Please check all that apply	☒ On-ground ☒ Online ☒ Hybrid ☒ Other (specify): LRON (Live Remote Online)
ADDITIONAL INFORMATION: If applicable, include any special instructions or requirements (e.g., field work or background check required) as well as any recommended texts or materials (e.g., open-source materials)	The use of mathematics specific technology to support understanding of the College Algebra course is required.

CLASSROOM REQUIREMENTS (e.g., Computer lab, Kitchen, Science lab, Studio, Lecture)	Movable desks or tables so that students may work in groups. Plenty of board space. Appropriate technology.

CT State Community College Course Outline Template

COURSE TITLE: Title to appear in the catalog (note: Banner has a 30-character limit)	***Precalculus***
COURSE CODE: 3-letter subject code and number (include cross-listed code & number if applicable)	MATH 1610 (formerly MAT* 186)
CREDIT HOURS: Number of credits awarded for successful completion of course	4
CONTACT HOURS: Number of hours of instruction time (i.e., hours of contact between students and instructor)	Lecture: 4 Lab: Clinical: Other (e.g., studio):
BILLING HOURS: Number of credits for which students are charged	4
ADDITIONAL FEES Check all that apply	☐ Supplemental Course Fee Level 1 ☐ Supplemental Course Fee Level 2 ☐ Advanced Manufacturing Course Fee ☐ Material Fee ☐ Other: ☒None
WORKLOAD HOURS: Number of hours used to determine faculty workload	4
PREREQUISITES: Courses for which students must be eligible and/or courses that must be completed (with minimum grade specified) to enroll	C or higher in MATH 1600 (formerly MAT 172) *College Algebra* or placement using multiple measures or by permission of the Math Department.
COREQUISITES:	None

Courses in which students must be concurrently enrolled	
COURSE DESCRIPTORS: For example: General Education course (include category), Clinical, Lab, Studio, Distance Learning, Seminar, Practicum. Use designated codes: (once developed)	General Education - Math/Quantitative Reasoning
CATALOG COURSE DESCRIPTION: The description to appear in the catalog	This is an intensive preparatory course for the Calculus course sequence. Topics include a study of functions and their graphs; polynomial functions and their zeros including complex solutions. This also covers rational, trigonometric, exponential, and logarithmic functions and equations. The use of mathematics specific technology to support understanding of the *Precalculus* course is required.
STUDENT LEARNING OUTCOMES: The student learning outcomes for the course should be assessable (e.g., consistent with Bloom's taxonomy) and aligned with program outcomes (where applicable).	Upon successful completion of this course, the student will: 1) Sketch polynomial, rational, trigonometric, logarithmic, and exponential functions, apply transformations, and identify key characteristics 2) Solve equations involving polynomial, rational, trigonometric, logarithmic, and exponential equations and evaluate for reasonableness 3) Solve applications involving polynomial, rational, trigonometric, logarithmic, and exponential expressions or functions and evaluate for reasonableness 4) Verify and apply trigonometric identities 5) Simplify and manipulate polynomial, rational, trigonometric, logarithmic, and exponential expressions 6) Solve inequalities and write the solutions in interval notation and on a number line 7) Perform Polynomial division
TOPICS OUTLINE: The instructional units in which the above outcomes will be taught and assessed.	List Instructional units: 1) Functions and Graphs (15% of time) a. Introduction b. Graphs

	c. Average Rate of Change d. Review of Linear Function and Models e. Transformations and Even/Odd f. Combining Functions g. Inverses 2) Polynomial and Rational (20% of time) a. Polynomial Graphs b. Real Zeros and Polynomials Division c. Remainder, Factor, and Rational Zeros Theorem d. Complex Number Arithmetic e. Complex Zeros f. The Fundamental Theorem of Algebra g. Solving Polynomial Inequalities h. Rational Functions and Their Graphs i. Solving Rational Inequalities 3) Trigonometry (45% of time) a. Right Triangle Trigonometry b. Introduction to the Unit Circle c. Unit Circle Approach to Trigonometric Functions and Graphs d. Transformations e. Inverse Functions and their Graphs f. Trigonometric Identities and Equations including Sum and Difference, Double-Angle, Half-Angle, and Reduction Formulas g. Solving Equations and Applications h. Law of Sines and Cosines 4) Exponential and Logarithms (20% of time) a. Exponential Functions and their Graphs b. Natural Exponentials Function c. Logarithmic Functions and their Graphs d. Properties of Logarithms e. Solving Equations and Applications f. Modeling with Exponential and Logarithms

TERMS OFFERED Please check all that apply	☒ Fall ☒ Winter ☒ Spring ☒ Summer
COURSE MODALITY Please check all that apply	☒ On-ground ☒ Online ☒ Hybrid ☒ Other (specify): LRON
ADDITIONAL INFORMATION: If applicable, include any special instructions or requirements (e.g., field work or background check required) as well as any recommended texts or materials (e.g., open-source materials)	The use of mathematics specific technology to support understanding of the *Precalculus* course is required.
CLASSROOM REQUIREMENTS (e.g., Computer lab, Kitchen, Science lab, Studio, Lecture)	Lecture

CT State Community College Course Outline Template

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COURSE TITLE: Title to appear in the catalog (note: Banner has a 30-character limit)	***Statistics II*** *(formerly Statistics II with Technology Applications)*
COURSE CODE: 3-letter subject code and number (include cross-listed code & number if applicable)	MATH 2200 (formerly MAT* 222)
CREDIT HOURS: Number of credits awarded for successful completion of course	3
CONTACT HOURS: Number of hours of instruction time (i.e., hours of contact between students and instructor)	Lecture: 3 Lab: Clinical: Other (e.g., studio):
BILLING HOURS: Number of credits for which students are charged	3
ADDITIONAL FEES Check all that apply	☐ Supplemental Course Fee Level 1 ☐ Supplemental Course Fee Level 2 ☐ Advanced Manufacturing Course Fee ☐ Material Fee ☐ Other: ☒ None
WORKLOAD HOURS: Number of hours used to determine faculty workload	3
PREREQUISITES: Courses for which students must be eligible and/or courses that must be completed (with minimum grade specified) to enroll	MATH 1200 (formerly MAT 167) *Statistics I* or MATH 1201 (formerly MAT 165) *Statistics I with Computer Applications* with a C- or higher or placement using multiple measures

COREQUISITES: Courses in which students must be concurrently enrolled	None
COURSE DESCRIPTORS: For example: General Education course (include category), Clinical, Lab, Studio, Distance Learning, Seminar, Practicum. Use designated codes: (once developed)	General Education - Math/Quantitative Reasoning
CATALOG COURSE DESCRIPTION: The description to appear in the catalog	This course includes an in-depth study of inferential statistics. Topics include hypothesis testing, statistical inference about means, proportions and variances with one and two populations; tests for goodness of fit, independence, and homogeneity; analysis of variance and experimental design, linear regression and correlation, multiple regression, and nonparametric methods. This course requires the use of computer-based statistical technology.
STUDENT LEARNING OUTCOMES: The student learning outcomes for the course should be assessable (e.g., consistent with Bloom's taxonomy) and aligned with program outcomes (where applicable).	Upon successful completion of this course the student will: 1. Utilize appropriate methodology to test hypotheses about means, proportions, and variances, with one and two populations 2. Understand and use ANOVA to analyze and interpret data 3. Understand and use the chi-square distribution to perform goodness-of-fit, independence, and homogeneity tests 4. Derive and interpret linear and multiple regression formulas to model data, solve problems, and investigate relationships in data 5. Understand and use nonparametric methods to draw statistical inferences from data 6. Utilize technology to analyze data and establish statistical conclusions

TOPICS OUTLINE: The instructional units in which the above outcomes will be taught and assessed.	List Instructional units: 1) Hypothesis Testing a) Hypothesis tests with one or two populations for means, proportions, and variances b) Applying the normal distribution, *t*-distribution, chi-square distribution, and *F*-distribution to analyze test statistics c) Interpreting Type I and Type II errors d) Probability of making a Type II error in a statistical test e) Power of a statistical test 2) ANOVA (Analysis of Variance) a) Requirements to perform one-way and two-way analysis of variance (ANOVA) b) Testing a hypothesis involving three or more means using one-way and two-way ANOVA c) Post-hoc tests to make comparisons between means (e.g., perform the Tukey test) d) ANOVA on randomized block designs e) ANOVA on factorial designs, identify and interpret interaction effects and main effects, and draw interaction plots 3) Statistical Tests for Categorical Data a) Goodness-of-fit test b) Chi-square test for independence c) Chi-square test for homogeneity of proportions 4) Inference on Least-Squares Regression and Multiple Regression Equations a) Requirements to perform inference on a least-squares regression equation b) Hypothesis test using the *t*-distribution for the significance of the slope of a simple least-squares regression equation c) Constructing and interpreting a correlation matrix in a multiple regression model to examine multicollinearity among explanatory variables

	d) Interpreting coefficients of a simple least-squares regression equation and multiple regression equation e) Hypothesis test using the *F*-distribution for overall significance between the response variable and the set of all independent variables f) Evaluating the appropriateness of simple least-squares regression equations and multiple regression equations using residual plots, coefficient of determination, and adjusted coefficient of determination 5) Nonparametric Methods a) Difference between parametric and nonparametric statistical procedures b) One-sample sign test to test a hypothesis about a population median c) Wilcoxon signed-rank test to determine whether a difference exists between two populations
TERMS OFFERED Please check all that apply	☒ Fall ☒ Winter ☒ Spring ☒ Summer
COURSE MODALITY Please check all that apply	☒ On-ground ☒ Online ☒ Hybrid ☒ Other (specify): LRON
ADDITIONAL INFORMATION: If applicable, include any special instructions or requirements (e.g., field work or background check required) as well as any recommended texts or materials (e.g., open-source materials)	This course requires the use of computer-based statistical technology.
CLASSROOM REQUIREMENTS	Lecture/Computer Lab

(e.g., Computer lab, Kitchen, Science lab, Studio, Lecture)	

CT State Community College Course Outline Template

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COURSE TITLE: Title to appear in the catalog (note: Banner has a 30-character limit)	***Mathematics Education in Practice I***
COURSE CODE: 3-letter subject code and number (include cross-listed code & number if applicable)	MATH 2495 (formerly MAT* 170)
CREDIT HOURS: Number of credits awarded for successful completion of course	1 or 2 or 3
CONTACT HOURS: Number of hours of instruction time (i.e., hours of contact between students and instructor)	Lecture: Lab: Clinical: Other (e.g., studio): 1-3 (internship)
BILLING HOURS: Number of credits for which students are charged	1 or 2 or 3
ADDITIONAL FEES Check all that apply	☐ Supplemental Course Fee Level 1 ☐ Supplemental Course Fee Level 2 ☐ Advanced Manufacturing Course Fee ☐ Material Fee ☐ Other: ☒ None
WORKLOAD HOURS: Number of hours used to determine faculty workload	1
PREREQUISITES: Courses for which students must be eligible and/or courses that must be completed (with minimum grade specified) to enroll	B or better in MATH 1600 (formerly MAT 172) *College Algebra*, two letters of recommendation from mathematics faculty and permission from either the Division Director, Math Coordinator/Chair, Tutor Center Supervisor, or a supervising instructor

COREQUISITES: Courses in which students must be concurrently enrolled	none
COURSE DESCRIPTORS: For example: General Education course (include category), Clinical, Lab, Studio, Distance Learning, Seminar, Practicum. Use designated codes: (once developed)	Practicum
CATALOG COURSE DESCRIPTION: The description to appear in the catalog	This practicum provides students with an early experience in math education while also reinforcing their own content background and overall skills in communicating mathematically. Students will assist and tutor peers in mathematics for a minimum of three hours per week for a full semester in the campus tutor center under the supervision of a math instructor. Each credit equates to 45 hours of experience.
STUDENT LEARNING OUTCOMES: The student learning outcomes for the course should be assessable (e.g., consistent with Bloom's taxonomy) and aligned with program outcomes (where applicable).	Upon successful completion of this course, the student will: 1. Develop the ability to discuss, explain and communicate mathematical ideas 2. Apply previously learned knowledge to assist students in the Academic Center for Excellence 3. Demonstrate and apply a variety of problem solving and critical thinking strategies 4. Work effectively with a diverse student population
TOPICS OUTLINE: The instructional units in which the above outcomes will be taught and assessed.	Responsibilities: a) Communicate mathematics in writing through a weekly report and/or tutoring log b) Communicate mathematics verbally by discussing related field experience with the supervising instructor in the campus tutor center for 15 minutes bi-weekly c) Aid and tutor students using the appropriate technology d) Explain mathematics concepts using multiple approaches e) Manage time effectively in tutoring several students in an open lab environment

	f) Suggest strategies for success in overcoming math and test anxieties resulting in an increased level of student confidence
TERMS OFFERED Please check all that apply	☒ Fall ☐ Winter ☒ Spring ☐ Summer
COURSE MODALITY Please check all that apply	☒ On-ground ☐ Online ☐ Hybrid ☒ Other (specify): LRON
ADDITIONAL INFORMATION: If applicable, include any special instructions or requirements (e.g., field work or background check required) as well as any recommended texts or materials (e.g., open-source materials)	The use of mathematics specific technology to support the demonstration and understanding of concepts is required.
CLASSROOM REQUIREMENTS (e.g., Computer lab, Kitchen, Science lab, Studio, Lecture)	Campus Tutor Center

CT State Community College Course Outline Template

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COURSE TITLE: Title to appear in the catalog (note: Banner has a 30-character limit)	***Calculus For Business and Social Sciences***
COURSE CODE: 3-letter subject code and number (include cross-listed code & number if applicable)	MATH 2500 (formerly MAT* 230)
CREDIT HOURS: Number of credits awarded for successful completion of course	3
CONTACT HOURS: Number of hours of instruction time (i.e., hours of contact between students and instructor)	Lecture: 3 Lab: Clinical: Other (e.g., studio):
BILLING HOURS: Number of credits for which students are charged	3
ADDITIONAL FEES Check all that apply	☐ Supplemental Course Fee Level 1 ☐ Supplemental Course Fee Level 2 ☐ Advanced Manufacturing Course Fee ☐ Material Fee ☐ Other: ☒ None
WORKLOAD HOURS: Number of hours used to determine faculty workload	3
PREREQUISITES: Courses for which students must be eligible and/or courses that must be completed (with minimum grade specified) to enroll	B- or higher in MATH 1011 (formerly MAT* 137L) *Applied Algebra with Modeling*, C or higher in MATH 1010 (formerly MAT 137) *Intermediate Algebra*, C- or higher in MAT 1500 (formerly MAT* 158) *Applied Business Mathematics* or

	MATH 1600 (formerly MAT 172) *College Algebra*, or placement using multiple measures
COREQUISITES: Courses in which students must be concurrently enrolled	
COURSE DESCRIPTORS: For example: General Education course (include category), Clinical, Lab, Studio, Distance Learning, Seminar, Practicum. Use designated codes: (once developed)	General Education: Math/Quantitative Reasoning
CATALOG COURSE DESCRIPTION: The description to appear in the catalog	This course introduces applications of calculus in business, economics, and social science. This course is intended for students pursuing degrees in social and behavioral sciences, business, and management. Topics include linear and non-linear functions, limits, derivatives, and integrals. The use of mathematics specific technology to support understanding of calculus concepts is required.
STUDENT LEARNING OUTCOMES: The student learning outcomes for the course should be assessable (e.g., consistent with Bloom's taxonomy) and aligned with program outcomes (where applicable).	Upon successful completion of this course, the student will: 1. Analyze linear and non-linear functions numerically, algebraically, and graphically 2. Use linear, quadratic, exponential, and logarithmic functions to solve problems in business, economics, and social science 3. Evaluate limits numerically, algebraically, and graphically and use limits to solve application problems 4. Find and interpret the average rate of change, derivative, and definite and indefinite integrals of functions 5. Use derivatives and integrals to analyze and interpret problems in business, economics, and social science

TOPICS OUTLINE: The instructional units in which the above outcomes will be taught and assessed.	List Instructional units: 1) Linear & Nonlinear Functions a) Algebraic, numerical, and graphical analysis of linear, quadratic, exponential, and logarithmic functions b) Modeling real world situations (e.g., exponential growth and decay, and profit, cost and revenue) using linear quadratic, exponential, and logarithmic functions c) Algebraically solving linear and non-linear equations d) Using technology to solve and examine characteristics of quadratic, exponential, and logarithmic equations e) (Optional) Regression lines and curves 2) Limits & Continuity a) Limits – Examined algebraically, numerically, and graphically b) Identifying discontinuities algebraically and graphically c) One-sided limits, limits at infinity d) Modeling real world situations with limits e) Piecewise defined functions 3) Average Rate of Change & Instantaneous Rate of Change a) Finding average and instantaneous rates of change of a function from its table, graph and equation b) Interpreting average and instantaneous rates of change in the context of a real-world situation c) Interpreting slopes of secant and tangent lines 4) Derivatives & Applications a) Finding derivatives using the definition of the derivative, differentiation theorems, and technology b) Interpreting the derivative in the context of real-world problems c) Units of derivatives

	d) Derivative notations e) Evaluating derivatives graphically, numerically, and algebraically f) Second derivatives g) Marginal analysis h) Local and global extrema of a function i) Optimization problems j) First and second derivative tests k) Inflection points l) Interpreting piecewise defined functions that model real world situations 5) Integrals & Applications a) Indefinite integrals of elementary functions b) Fundamental Theorem of Calculus c) Reimann sums d) Substitution rule to evaluate integrals e) Modeling real world situations using definite and indefinite integrals f) Marginal analysis
TERMS OFFERED Please check all that apply	☒ Fall ☒ Winter ☒ Spring ☒ Summer
COURSE MODALITY Please check all that apply	☒ On-ground ☒ Online ☒ Hybrid ☒ Other (specify): LRON
ADDITIONAL INFORMATION: If applicable, include any special instructions or requirements (e.g., field work or background check required) as well as any recommended texts or materials (e.g., open-source materials)	The use of mathematics specific technology to support understanding of calculus concepts is required.
CLASSROOM REQUIREMENTS	Lecture

(e.g., Computer lab, Kitchen, Science lab, Studio, Lecture)	

CT State Community College Course Outline Template

This template should be used by faculty to create an official record of a course for inclusion in the CT State Community College catalog. A completed template must be submitted for every course to be moved to the single college catalog.

COURSE TITLE: Title to appear in the catalog (note: Banner has a 30-character limit)	***Calculus I***
COURSE CODE: 3-letter subject code and number (include cross-listed code & number if applicable)	MATH 2600 (formerly MAT* 254)
CREDIT HOURS: Number of credits awarded for successful completion of course	4
CONTACT HOURS: Number of hours of instruction time (i.e., hours of contact between students and instructor)	Lecture: 4 Lab: Clinical: Other (e.g., studio):
BILLING HOURS: Number of credits for which students are charged	4
ADDITIONAL FEES Check all that apply	☐ Supplemental Course Fee Level 1 ☐ Supplemental Course Fee Level 2 ☐ Advanced Manufacturing Course Fee ☐ Material Fee ☐ Other: ☒ None
WORKLOAD HOURS: Number of hours used to determine faculty workload	4
PREREQUISITES: Courses for which students must be eligible and/or courses that must be completed (with	C or higher in MATH 1610 (formerly MAT* 186) Precalculus or placement using multiple measures

minimum grade specified) to enroll	
COREQUISITES: Courses in which students must be concurrently enrolled	None
COURSE DESCRIPTORS: For example: General Education course (include category), Clinical, Lab, Studio, Distance Learning, Seminar, Practicum. Use designated codes: (once developed)	General Education - Math/Quantitative Reasoning
CATALOG COURSE DESCRIPTION: The description to appear in the catalog	A first course in calculus with a focus on differential calculus. Topics include the study of limits, continuity, rates of change, the definition of the derivative, the Mean Value Theorem, and the Fundamental Theorem of Calculus, and techniques of differentiation of linear, polynomial, exponential, logarithmic, rational, and trigonometric functions. The course will include applications of the derivative to solve real-life problems. Characteristics of functions such as intervals of increase or decrease, concavity, extrema, and end behavior will be studied to describe, reason, interpret, and analyze relationships. The course concludes with an introduction of antiderivatives and integration techniques. The use of mathematics specific technology to support understanding of Calculus I is required.
STUDENT LEARNING OUTCOMES: The student learning outcomes for the course should be assessable (e.g., consistent with Bloom's taxonomy) and aligned with program outcomes (where applicable).	Upon successful completion of this course, the student will: 1) Demonstrate knowledge of the fundamental concepts of differential calculus, including limits, continuity, and differentiability 2) Identify and apply the appropriate rules for differentiation and integration 3) Solve applications using differential calculus including related rates and optimization 4) Demonstrate knowledge of the fundamental concepts behind definite and indefinite integration 5) Solve applications using integral calculus including computing areas
TOPICS OUTLINE: The instructional units in which the above outcomes will be taught and assessed.	REQUIRED TOPICS: 1) Limits and Their Properties (15% of time) a) Finding limits graphically and numerically b) Evaluating limits analytically

	c) An introduction to the $\varepsilon-\delta$ definition of the limit d) Continuity and one-sided limits e) Infinite limits f) Limit at infinity 2) Differentiation (35% of time) a) The definition of the derivative and the tangent line problem b) Basic differentiation rules of polynomial, exponential, logarithmic, and trigonometric functions, and rates of change c) Product and quotient rules and higher order derivatives d) Chain rule e) Implicit differentiation f) Derivatives of inverse functions 3) Applications of Derivatives (25% of time) a) Extrema on an interval b) Rolle's theorem and the Mean Value Theorem c) Increasing and decreasing functions and the first derivative test d) Concavity and second derivative test e) L'Hospital's Rule f) A summary of curve sketching g) Optimization problems h) Differentials i) Related rates 4) Integration (25% of time) a) Area b) Riemann sums and definite integrals c) Antiderivatives and indefinite integration d) The Fundamental Theorem of Calculus I & II e) Integration by substitution f) Exponential functions and the natural logarithmic function g) Trigonometric and inverse trigonometric functions OPTIONAL TOPICS: 1) Newton's method 2) Numerical integration 3) Logarithmic differentiation
TERMS OFFERED Please check all that apply	☒ Fall ☒ Winter ☒ Spring ☒ Summer
COURSE MODALITY Please check all that apply	☒ On-ground ☒ Online ☒ Hybrid ☐ Other (specify):

ADDITIONAL INFORMATION: If applicable, include any special instructions or requirements (e.g., field work or background check required) as well as any recommended texts or materials (e.g., open-source materials)	The use of mathematics specific technology to support understanding of Calculus I concepts is required.
CLASSROOM REQUIREMENTS (e.g., Computer lab, Kitchen, Science lab, Studio, Lecture)	Lecture

CT State Community College Course Outline Template

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COURSE TITLE: Title to appear in the catalog (note: Banner has a 30-character limit)	***Calculus II***
COURSE CODE: 3-letter subject code and number (include cross-listed code & number if applicable)	MATH 2610 (formerly MAT* 256)
CREDIT HOURS: Number of credits awarded for successful completion of course	4
CONTACT HOURS: Number of hours of instruction time (i.e., hours of contact between students and instructor)	Lecture: 4 Lab: Clinical: Other (e.g., studio):
BILLING HOURS: Number of credits for which students are charged	4
ADDITIONAL FEES Check all that apply	☐ Supplemental Course Fee Level 1 ☐ Supplemental Course Fee Level 2 ☐ Advanced Manufacturing Course Fee ☐ Material Fee ☐ Other: ☒ None
WORKLOAD HOURS: Number of hours used to determine faculty workload	4
PREREQUISITES: Courses for which students must be eligible and/or courses that must be completed (with	C or higher in MATH 2600 (formerly MAT* 254)

minimum grade specified) to enroll	
COREQUISITES: Courses in which students must be concurrently enrolled	None
COURSE DESCRIPTORS: For example: General Education course (include category), Clinical, Lab, Studio, Distance Learning, Seminar, Practicum. Use designated codes: (once developed)	General Education - Math/Quantitative Reasoning
CATALOG COURSE DESCRIPTION: The description to appear in the catalog	Calculus II focuses on two related topics: methods and applications of integration, and infinite series and representation of functions by power series. Topics include Riemann sums, definite and indefinite integrals, polar and parametric curves, applications to geometry (area, volume, arc length), sequences and series, convergence tests, power series, Taylor series and applications to real-life problems. The use of mathematics specific technology to support understanding of calculus is required.
STUDENT LEARNING OUTCOMES: The student learning outcomes for the course should be assessable (e.g., consistent with Bloom's taxonomy) and aligned with program outcomes (where applicable).	Upon successful completion of this course, the student will: 1) Demonstrate knowledge of the fundamental concepts behind definite and indefinite integration 2) Calculate indefinite and definite integrals for elementary functions by applying standard techniques of integration 3) Solve applications using integral calculus such as computing areas, volumes, and arc lengths 4) Demonstrate knowledge of numerical sequences and series including tests for convergence and methods of approximation of sums 5) Form power and Taylor series expansions for simple functions and determine the radius and interval of convergence 6) Demonstrate techniques of calculus using polar and parametric curves
TOPICS OUTLINE: The instructional units in which the above outcomes will be taught and assessed.	List Instructional Units: 1) Integration Techniques and Applications (40% of time) a) Basic Integration Rules b) The Natural Logarithmic Function: Integration c) Integration by Parts d) Trigonometric Integration

	e) Trigonometric Substitution f) Partial Fractions g) Simpson's Rule and Trapezoidal Rule h) Improper Integrals i) Area of a Region Between Two Curves j) Volume: The Washer Method k) Volume: The Shell Method l) Arc Length and Surfaces of Revolution m) Work 2) Infinite Series (35% of time) a) Sequences b) Series and Convergence including Telescopic and Geometric Series c) The Integral Test and P-Series d) Comparison of Series e) Alternating Series including Absolute and Conditional Convergence f) The Ratio and Root Tests g) Taylor Polynomial and Approximations h) Power Series i) Representation of Functions by Power Series j) Taylor and Maclaurin Series 3) Polar Coordinates and Parametric Curves (15% of time) a) Introduction to Parametric Equations and Polar Coordinates b) Curves Defined by Parametric Equations c) Calculus with Parametric Curves d) Areas and Lengths in Polar Coordinates ADDITIONAL TOPICS (Choose topics below representative of 10% of time): I) Additional Applications of Integration a) Moments, Center of Mass, and Centroids b) Fluid Pressure and Fluid Force c) Probability II) Additional Integration Techniques a) Hyperbolic Functions b) Integration by Tables and Other Integration Techniques III) Differential Equations a) Differential Equations: Growth and Decay b) Differential Equations: Separation of Variables IV) Vectors a) Vectors in Two and Three Dimensions b) Dot Product and Cross Product
TERMS OFFERED Please check all that apply	☒ Fall ☒ Winter ☒ Spring

	☒ Summer
COURSE MODALITY Please check all that apply	☒ On-ground ☒ Online ☒ Hybrid ☐ Other (specify):
ADDITIONAL INFORMATION: If applicable, include any special instructions or requirements (e.g., field work or background check required) as well as any recommended texts or materials (e.g., open-source materials)	The use of technology to support mathematics specific understanding of calculus concepts is required.
CLASSROOM REQUIREMENTS (e.g., Computer lab, Kitchen, Science lab, Studio, Lecture)	Lecture

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COURSE TITLE: Title to appear in the catalog (note: Banner has a 30-character limit)	***Calculus III: Multivariable***
COURSE CODE: 3-letter subject code and number (include cross-listed code & number if applicable)	MATH 2620 (formerly MAT* 268)
CREDIT HOURS: Number of credits awarded for successful completion of course	4
CONTACT HOURS: Number of hours of instruction time (i.e., hours of contact between students and instructor)	Lecture: 4 Lab: Clinical: Other (e.g., studio):
BILLING HOURS: Number of credits for which students are charged	4
ADDITIONAL FEES Check all that apply	☐ Supplemental Course Fee Level 1 ☐ Supplemental Course Fee Level 2 ☐ Advanced Manufacturing Course Fee ☐ Material Fee ☐ Other: ☒ None
WORKLOAD HOURS: Number of hours used to determine faculty workload	4
PREREQUISITES: Courses for which students must be eligible and/or courses that must be completed (with	C or higher in MATH 2610 (formerly MAT* 256) Calculus II

minimum grade specified) to enroll	
COREQUISITES: Courses in which students must be concurrently enrolled	None
COURSE DESCRIPTORS: For example: General Education course (include category), Clinical, Lab, Studio, Distance Learning, Seminar, Practicum. Use designated codes: (once developed)	General Education - Math/Quantitative Reasoning
CATALOG COURSE DESCRIPTION: The description to appear in the catalog	This is the third course in the calculus sequence for mathematics, science, and engineering majors. Topics include analytical geometry in space, vector-valued functions with applications, differentiation, and integration of multivariable functions with applications, integration in vector fields including line and surface integrals, and Green's, Stokes', and the Divergence Theorems. The use of technology to support mathematics specific understanding of calculus concepts is required.
STUDENT LEARNING OUTCOMES: The student learning outcomes for the course should be assessable (e.g., consistent with Bloom's taxonomy) and aligned with program outcomes (where applicable).	Upon successful completion of this course, the student will: 1) Demonstrate the ability to analyze and visualize curves, surfaces, and regions in 2 and 3 dimensions, in Cartesian, polar, cylindrical, and spherical coordinate systems 2) Perform calculus operations on vector-valued functions including limits, derivatives, integrals, curvature, and the description of motion in space 3) Perform calculus operations on functions of several variables including limits, partial derivatives, directional derivatives, and multiple integrals 4) Apply theorems of vector calculus, including the Fundamental Theorem of Line Integrals, Green's Theorem, the Divergence Theorem, and Stokes' Theorem, to simplify integration problems 5) Apply the computational and conceptual principles of multivariable calculus to various applications
TOPICS OUTLINE:	List Instructional Units: 1. Vectors (7% of time) a) Vectors in the Plane and in Space

The instructional units in which the above outcomes will be taught and assessed.	b) Dot Product c) Cross Product 2. Geometry of Space (18% of time) a) Curves i. Lines in space ii. Vector-valued functions iii. Differentiation and integration of vector-valued functions iv. Velocity and acceleration v. Tangent vectors and normal vectors vi. Arc length and curvature b) Surfaces i. Planes ii. Cylinders iii. Quadric surfaces iv. Implicit, explicit, parametric 3. Partial Differentiation (20% of time) a) Functions of Several Variables b) Limits and Continuity c) Partial Derivatives d) Differentials e) Multivariable Chain Rule f) Directional Derivatives and Gradients g) Tangent Planes and Normal Lines h) Extrema of Functions of Two Variables i) Lagrange Multipliers 4. Multiple Integration (27% of time) a) Double Integrals b) Area and Volume as a Double Integral c) Change of Variables: Polar Coordinates d) Surface Area e) Triple Integrals and Applications f) Cylindrical and Spherical Coordinates g) Change of Variables 5. Vector Analysis (28% of time) a) Vector Fields i. Conservative ii. Curl iii. Divergence b) Line Integrals c) Fundamental Theorem d) Green's Theorem e) Divergence Theorem

	f) Surface Integrals g) Stokes' Theorem
TERMS OFFERED Please check all that apply	☒ Fall ☒ Winter ☒ Spring ☒ Summer
COURSE MODALITY Please check all that apply	☒ On-ground ☒ Online ☒ Hybrid ☐ Other (specify):
ADDITIONAL INFORMATION: If applicable, include any special instructions or requirements (e.g., field work or background check required) as well as any recommended texts or materials (e.g., open-source materials)	The use of mathematics specific technology to support understanding of calculus concepts is required.
CLASSROOM REQUIREMENTS (e.g., Computer lab, Kitchen, Science lab, Studio, Lecture)	Lecture

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COURSE TITLE: Title to appear in the catalog (note: Banner has a 30-character limit)	***Linear Algebra***
COURSE CODE: 3-letter subject code and number (include cross-listed code & number if applicable)	MATH 2621 (formerly MAT* 274)
CREDIT HOURS: Number of credits awarded for successful completion of course	4
CONTACT HOURS: Number of hours of instruction time (i.e., hours of contact between students and instructor)	Lecture: 4 Lab: Clinical: Other (e.g., studio):
BILLING HOURS: Number of credits for which students are charged	4
ADDITIONAL FEES Check all that apply	☐ Supplemental Course Fee Level 1 ☐ Supplemental Course Fee Level 2 ☐ Advanced Manufacturing Course Fee ☐ Material Fee ☐ Other: ☒ None
WORKLOAD HOURS: Number of hours used to determine faculty workload	4
PREREQUISITES: Courses for which students must be eligible and/or courses that must be completed (with	C or higher in MATH 2610 (formerly MAT* 256) Calculus II

minimum grade specified) to enroll	
COREQUISITES: Courses in which students must be concurrently enrolled	None
COURSE DESCRIPTORS: For example: General Education course (include category), Clinical, Lab, Studio, Distance Learning, Seminar, Practicum. Use designated codes: (once developed)	General Education - Math/Quantitative Reasoning
CATALOG COURSE DESCRIPTION: The description to appear in the catalog	This is a beginning course in linear algebra intended for students in mathematics, science, and engineering. Topics include systems of linear equations, matrices, determinants, vectors and vector spaces, linear transformations, eigenvalues and eigenvectors, distance, and orthogonality. Applications from various disciplines will be considered. The use of mathematics specific technology to support the understanding of Linear Algebra is required.
STUDENT LEARNING OUTCOMES: The student learning outcomes for the course should be assessable (e.g., consistent with Bloom's taxonomy) and aligned with program outcomes (where applicable).	Upon successful completion of this course, the student will: 1) Solve and analyze systems of linear equations and analyze their solution sets 2) Demonstrate an understanding of linear transformations and their properties 3) Demonstrate an understanding of the properties of a matrix and the associated subspaces of a matrix 4) Perform and interpret matrix operations including determinants and inverses 5) Demonstrate an understanding of vector spaces, subspaces, vectors, coordinate vectors, and their properties 6) Demonstrate an understanding of eigenvalues, eigenvectors, similar matrices, and diagonalization 7) Demonstrate an understanding of inner product, length of a vector, orthogonality, and orthogonal projections, the Gram-Schmidt process, and solve least-squares problems

	8) Apply the concepts of linear algebra to solve real-world problems in engineering, computer science, demographics, economics, biology, statistics, and other areas of study
TOPICS OUTLINE: The instructional units in which the above outcomes will be taught and assessed.	List Instructional Units: 1) Linear Systems and Vectors (20% of time) a) Analyze systems of equations and write them as matrix equations and vector equations b) The Gauss-Jordan elimination method c) Solve systems of equations using the reduced echelon form d) Classify vector spaces and perform corresponding operations e) The span of a set of vectors f) Linear independence of vectors g) Solve for the dot product of two vectors and diagnose related applications. 2) Matrices and Linear Transformations (15% of time) a) Perform various operations on matrices b) Solve systems of equations by using the inverse of a matrix c) The Invertible Matrix Theorem d) Properties of a Matrix including the Column Space, Row Space, and Null Space e) Formulate and use various matrix transformations f) Properties of Linear Transformations: One-to-one, Onto, Kernel, Rank, Nullity g) Perform linear transformation 3. Determinants and Eigenvectors (15% of time) a) Categorize basic properties of determinants and perform operations on determinants b) Calculate determinants and use them to solve systems of equations c) Determine the eigenvalues using the characteristic equation d) Determine the eigenvectors of a matrix e) Diagonalization of matrices, similar matrices and their properties 4. General Vector Spaces (15% of time) a) Demonstrate and use properties of vector spaces and subspaces b) Analyze linear combinations of vectors c) Linear independence vectors, basis vectors, dimension d) Analyze other properties and applications of vector spaces, and linear transformations

	5. Coordinate Representations (15% of time) a) Solve for coordinate vectors b) Analyze linear transformations on vector spaces c) Matrix representations of linear transformations d) Change of coordinates and change of basis 6. Inner Product, Length, Orthogonality (10% of time) a) Inner product, length, and orthogonality b) Orthogonal sets and orthogonal projections c) Gram-Schmidt Process d) Least-Squares Problem 7. Additional Topics/Applications (choose at least 2 topics below representative of 10% time) a) Networks b) Computer graphics c) Leontief Input-Output Model d) Difference equations e) Markov chains f) Discrete dynamical systems g) Regression and curve fitting
TERMS OFFERED Please check all that apply	☒ Fall ☒ Winter ☒ Spring ☒ Summer
COURSE MODALITY Please check all that apply	☒ On-ground ☒ Online ☒ Hybrid ☐ Other (specify):
ADDITIONAL INFORMATION: If applicable, include any special instructions or requirements (e.g., field work or background check required) as well as any recommended texts or materials (e.g., open-source materials)	The use of mathematics specific technology to support the understanding of Linear Algebra is required.
CLASSROOM REQUIREMENTS	Lecture

(e.g., Computer lab, Kitchen, Science lab, Studio, Lecture)	

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COURSE TITLE: Title to appear in the catalog (note: Banner has a 30-character limit)	***Differential Equations***
COURSE CODE: 3-letter subject code and number (include cross-listed code & number if applicable)	MATH 2622 (formerly MAT* 286)
CREDIT HOURS: Number of credits awarded for successful completion of course	4
CONTACT HOURS: Number of hours of instruction time (i.e., hours of contact between students and instructor)	Lecture: 4 Lab: Clinical: Other (e.g., studio):
BILLING HOURS: Number of credits for which students are charged	4
ADDITIONAL FEES Check all that apply	☐ Supplemental Course Fee Level 1 ☐ Supplemental Course Fee Level 2 ☐ Advanced Manufacturing Course Fee ☐ Material Fee ☐ Other: ☒ None
WORKLOAD HOURS: Number of hours used to determine faculty workload	4
PREREQUISITES: Courses for which students must be eligible and/or courses that must be completed (with	C or higher in MATH 2610 (formerly MAT* 256) Calculus II.

minimum grade specified) to enroll	
COREQUISITES: Courses in which students must be concurrently enrolled	None
COURSE DESCRIPTORS: For example: General Education course (include category), Clinical, Lab, Studio, Distance Learning, Seminar, Practicum. Use designated codes: (once developed)	General Education - Math/Quantitative Reasoning
CATALOG COURSE DESCRIPTION: The description to appear in the catalog	This is an introductory differential equations course for mathematics, science, and engineering majors. Topics include solution methods for ordinary differential equations of the first and higher order, operators, numerical methods, systems of differential equations, Laplace transforms, and various applications. The use of mathematics specific technology to support the understanding of the Differential Equations course is required.
STUDENT LEARNING OUTCOMES: The student learning outcomes for the course should be assessable (e.g., consistent with Bloom's taxonomy) and aligned with program outcomes (where applicable).	Upon successful completion of this course, the student will: 1) Solve various types of first order and higher order ordinary differential equations using appropriate analytical and numerical methods 2) Solve systems of linear differential equations using matrix techniques 3) Approximate the behavior of nonlinear systems using analysis of linear systems 4) Consider the overall behavior of several types of differential equations by analyzing the phase plane or slope field 5) Apply the properties of Laplace transforms to solve selected differential equations and systems of equations 6) Solve modeling applications 7) Demonstrate understanding and familiarity with technology when solving selected differential equations
TOPICS OUTLINE:	List Instructional units: 1) First Order Differential Equations (35% of time)

The instructional units in which the above outcomes will be taught and assessed.	a) Modeling with differential equations such as Mixing Problems, Circuits, and Population b) Separation of Variables c) Slope Fields d) Euler's Methods e) Existence and Uniqueness of Solutions f) Equilibrium Points and Phase Lines g) Linear Equations h) Method of Undetermined Coefficients i) Method of Integrating Factors 2) Systems of Differential Equations (35% of time) a) Modeling with Systems such as Predator-Prey Models b) Solving Decoupled and Partially Decoupled Systems c) Direction Fields, Phase Planes/Portraits, and Nullclines for Linear and Nonlinear Systems d) Euler's Method for Systems e) Properties of Linear Systems and Linearity Principle f) Straight Line Solutions g) Linearization h) Second Order Linear Equations 3) Laplace Transforms (15% of time) a) Laplace Transforms b) Discontinuous Functions c) Second Order Equations 4) Higher Order Equations (15% of time) a) Homogeneous Equations with Constant Coefficients b) Method of Undetermined Coefficients c) Variation of Parameters d) Reduction of Order e) Modeling with Higher Order Equations such as Simple Harmonic Motion **OPTIONAL TOPICS:** (choose from the topics below as time permits) First Order Equations a) Runge-Kutta Method Series Solutions a) Solutions about Ordinary Points b) Solutions about (Regular) Singular Points Higher Order Equations a) Green's Function b) Nonlinear Equations c) Linear Models: Initial Value Problems d) Linear Models: Boundary Value Problems e) Cauchy-Euler Equations

TERMS OFFERED Please check all that apply	☒ Fall ☒ Winter ☒ Spring ☒ Summer
COURSE MODALITY Please check all that apply	☒ On-ground ☒ Online ☒ Hybrid ☐ Other (specify):
ADDITIONAL INFORMATION: If applicable, include any special instructions or requirements (e.g., field work or background check required) as well as any recommended texts or materials (e.g., open-source materials)	The use of mathematics specific technology to support the understanding of the Differential Equations course is required.
CLASSROOM REQUIREMENTS (e.g., Computer lab, Kitchen, Science lab, Studio, Lecture)	Lecture

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COURSE TITLE: Title to appear in the catalog (note: Banner has a 30-character limit)	***Foundations of Advanced Mathematics*** ***Discrete Mathematics and Methods of Proof (former title)***
COURSE CODE: 3-letter subject code and number (include cross-listed code & number if applicable)	MATH 2623 (formerly MAT* 287)
CREDIT HOURS: Number of credits awarded for successful completion of course	4
CONTACT HOURS: Number of hours of instruction time (i.e., hours of contact between students and instructor)	Lecture: 4 Lab: Clinical: Other (e.g., studio):
BILLING HOURS: Number of credits for which students are charged	4
ADDITIONAL FEES Check all that apply	☐ Supplemental Course Fee Level 1 ☐ Supplemental Course Fee Level 2 ☐ Advanced Manufacturing Course Fee ☐ Material Fee ☐ Other: ☒ None
WORKLOAD HOURS: Number of hours used to determine faculty workload	4
PREREQUISITES: Courses for which students must be eligible and/or courses that must be completed (with	C or higher in MATH 2610 (formerly MAT* 256) Calculus II.

minimum grade specified) to enroll	
COREQUISITES: Courses in which students must be concurrently enrolled	None
COURSE DESCRIPTORS: For example: General Education course (include category), Clinical, Lab, Studio, Distance Learning, Seminar, Practicum. Use designated codes: (once developed)	General Education - Math/Quantitative Reasoning
CATALOG COURSE DESCRIPTION: The description to appear in the catalog	A bridge between calculus and upper-level mathematics courses. Logic, sets, relations, functions, methods of proof. The course uses examples from calculus, elementary number theory, geometry, discrete mathematics, basic abstract algebra, and linear algebra. Emphasis is on concepts that will be encountered in later undergraduate courses. It is intended for Mathematics majors.
STUDENT LEARNING OUTCOMES: The student learning outcomes for the course should be assessable (e.g., consistent with Bloom's taxonomy) and aligned with program outcomes (where applicable).	Upon successful completion of this course, the student will: 1) State and apply logic and set operations, properties of number systems, and properties of functions and relations 2) Explore ideas within mathematical structures presented to form, investigate, and prove conjectures 3) Demonstrate the ability to write mathematical proofs 4) Communicate effectively and explain mathematics both verbally and in writing 5) Use acquired mathematical skills to undertake independent learning and to be a contributing member of a problem-solving team 6) Appreciate the beauty, joy and challenge in mathematics and experience mathematics as an engaging field with contemporary open questions
TOPICS OUTLINE: The instructional units in which the above outcomes will be taught and assessed.	List Instructional Units: 1) Logic (10% of time) i. Propositions and connectives ii. Conditionals and biconditionals iii. Quantifiers 2) Methods of Proof (35% of time) i. Proving universal statements

	A. Trivial proofs B. Vacuous proofs C. Direct proofs D. Proofs by contraposition E. Proofs by contradiction F. Proofs by cases ii. Disproving universal statements iii. Proving existential statements A. Constructive existential proofs B. Non-constructive existential proofs iv. Disproving existential statements v. Proving and disproving statements with both quantifiers vi. Proofs using the principle of mathematical induction 3) Set Theory (10% of time) i. Basic notations and operations ii. Set identities iii. Indexed families of sets iv. Power sets 4) Relations (20% of time) i. Properties of relations (symmetry, anti-symmetry, transitivity, reflexivity, etc.) ii. Equivalence relations iii. Ordering relations 5) Functions (20% of time) i. Terminology (domain, codomain, range, image, preimage, etc.) ii. Restrictions, extensions, projections, compositions iii. Injectivity, surjectivity, bijectivity 6) Cardinality of Sets and the Continuum Hypothesis (5% of time)
TERMS OFFERED Please check all that apply	☒ Fall ☒ Winter ☒ Spring ☒ Summer
COURSE MODALITY Please check all that apply	☒ On-ground ☒ Online ☒ Hybrid ☐ Other (specify):
ADDITIONAL INFORMATION:	None

If applicable, include any special instructions or requirements (e.g., field work or background check required) as well as any recommended texts or materials (e.g., open-source materials)	
CLASSROOM REQUIREMENTS (e.g., Computer lab, Kitchen, Science lab, Studio, Lecture)	Lecture