MATH ADVISEMENT GUIDE

Recommendations for math courses are based on your placement results,
degree program and career interests

Math Placement: MAT 001 or MAT 003 or MAT 013
- If you plan to take MAT 109 (College Algebra & Trigonometry), you must register for MAT 003
- If your major does NOT require MAT 109, you can register for MAT 013 or MAT 003
- If you plan to register for MAT 013 **AND** have a RDG 001 placement, RDG 001 must be completed before or be taken while taking MAT 013

Math Placement: MAT 002 or MAT 012
- If you plan to take MAT 109 (College Algebra & Trigonometry), you must register for MAT 002
- If your major does NOT require MAT 109, you can register for MAT 012 or MAT 002
- If you plan to register for MAT 012 **AND** have a RDG 001 placement, RDG 001 must be completed before or be taken while taking MAT 012

Math Placement: MAT 100 OR successful completion of MAT 002/MAT 003/MAT 012/MAT 013
- You may enroll in any of the following credit math courses and these courses can be taken in any order:
    - **MAT 100** - A Topical Approach to Mathematics (4 credits)
    - **MAT 101** - Concepts of Mathematics (3 credits)
    - **MAT 102** - Introduction to Statistics (3 credits)
    - **MAT 118** - Finite Mathematics: Quantitative Analysis (3 credits)

    For students in selected teacher education transfer programs:
    - **MAT 114** - Foundations of Mathematics for Educators (3 credits)
      (You may not receive credit for both MAT 100 **and** MAT 114)
- If you have a placement for ENG 001 or RDG 001, you must successfully complete these courses before taking a credit math course

Math Placement: MAT 109 OR successful completion of MAT 002/MAT 003
- You may take any of the courses listed above as well as the following and these courses can be taken in any order:
    - **MAT 109** – College Algebra & Trigonometry (4 credits)
            or
    - **MAT 116** – Engineering Technical Math I (4 credits)
      (You may not receive credit for both MAT 109 **and** MAT 116)
- If you have a placement for ENG 001 or RDG 001, you must successfully complete these courses before taking a credit math course
- If you want to register for Pre-Calculus or Calculus I, you may go to the Placement Testing Center to take the Advanced Algebra and Functions Test to determine your highest math placement

Math Placement: MAT 111 OR a grade of C or higher in MAT 109
- You may take any of the courses listed above as well as the following and these courses can be taken in any order:
    - **MAT 111** – Pre-Calculus (4 credits)
            or
    - **MAT 117** – Engineering Technical Math II (4 credits)
      (You may not receive credit for both MAT 111 **and** MAT 117)

Math Placement: MAT 112 OR a grade of C or higher in MAT 111 or MAT 117
- You may take any of the courses listed above as well as the following and these courses can be taken in any order:
    - **MAT 112** - Calculus with Applications in Business and Social Sciences (4 credits)
            or
    - **MAT 122** - Calculus I (4 credits)
      (You may not receive credit for both MAT 112 **and** MAT 122)

Look inside for detailed descriptions of all courses

Students should carefully consider the descriptions below to decide which courses are most appropriate for them. Some descriptions include information that supplements the college catalog.

DEVELOPMENTAL MATH COURSES

For frequently asked questions, visit http://matcmp.ncc.edu/index.php?loc=mathpath

MAT 003 - Integrated Arithmetic and Basic Algebra (0 credits - 6 contact hours)

Math Placement: MAT 001/MAT 003/MAT 013.

Course Description: Arithmetic and algebra will be integrated throughout the semester. Emphasis will be placed on the fundamental operations of integers and rational numbers, ratio and proportion, percentage, factoring, linear and fractional equations, exponents, radicals, quadratic equations, and right triangles. Various relationships will be explored both graphically and analytically. Hand-held calculators will be used.

This course satisfies the prerequisite for MAT 109 (College Algebra & Trigonometry).

This course combines the basics of arithmetic with the essentials of algebra to prepare students for credit math courses. Topics include:

- arithmetic operations including applications involving proportions, ratios, and percent
- solving linear equations
- graphing linear equations
- solving systems of linear equations
- operations on polynomials
- factoring polynomials
- solving polynomial equations

MAT 013 - Integrated Arithmetic and Quantitative Reasoning 1 (0 credits - 6 contact hours)

Math Placement: MAT 001/MAT 013/MAT 003.

Prerequisite: RDG 001, may be taken concurrently.

Course Description: This course integrates arithmetic and quantitative literacy with mathematical concepts such as fluency with numbers, proportional reasoning, data interpretation, algebraic reasoning, graphing lines, and modeling. Group work and class discussions will be used to investigate mathematical concepts based on real-life examples. Some examples include: social justice, home repair, population growth and density, and congressional structure. Students who intend to major in science, technology, engineering or mathematics must take MAT 003. Hand-held calculators will be used.

This course does not satisfy the prerequisite for MAT 109 (College Algebra & Trigonometry). If you need MAT 109 as a degree requirement, you must successfully complete MAT 003 before registering for MAT 109.

This course combines the basics of arithmetic with the essentials of quantitative reasoning to prepare students for credit math courses. Topics include:

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- arithmetic operations including applications involving proportions, ratios, and percent
- estimation and solving applications involving large numbers
- estimation using fractions, percent and ratios
- unit conversions
- analyzing measures of central tendency
- reading, interpreting, and analyzing quantitative data from graphs
- using formulas and algebraic expressions in realistic applications
- creating and solving equations that relate to quantitative reasoning applications
- graphing and analyzing linear models by focusing on rate of change of parameters

MAT 002 - Introductory Algebra (0 credits – 4.5 contact hours)

Math Placement: MAT 002/MAT 012.
Course Description: Topics include: fundamental processes of arithmetic and algebra, factoring, linear and fractional equations, exponents, radicals, quadratic equations and right triangle trigonometry. Hand-held calculators will be used.

This course satisfies the prerequisite for MAT 109 (College Algebra & Trigonometry).

This course prepares students for algebra intensive credit math courses by teaching the essentials of algebra. Topics include:

- solving linear equations
- graphing linear equations
- solving systems of linear equations
- operations on polynomials
- factoring polynomials
- solving polynomial equations

MAT 012 - Quantitative Reasoning 1 (0 credits – 4.5 contact hours)

Math Placement: MAT 012/MAT 002.
Prerequisite: RDG 001, may be taken concurrently.
Course Description: This course integrates quantitative literacy with mathematical concepts such as fluency with numbers, proportional reasoning, data interpretation, algebraic reasoning, graphing lines, and modeling. Group work and class discussions will be used to investigate mathematical concepts based on real-life examples. Some examples include: social justice, home repair, population growth and density, and congressional structure. Students who intend to major in science, technology, engineering or mathematics must take MAT 002. Hand-held calculators will be used.

This course does not satisfy the prerequisite for MAT 109 (College Algebra & Trigonometry). If you need MAT 109 as a degree requirement, you must successfully complete MAT 002 before registering for MAT 109.

This course focuses on real-world contextualized applications of quantitative reasoning to prepare students for credit math courses. Topics include:

- estimation and solving applications involving large numbers
- estimation using fractions, percent and ratios
- unit conversions
- analyzing measures of central tendency
- reading, interpreting, and analyzing quantitative data from graphs
- using formulas and algebraic expressions in realistic applications
- creating and solving equations that relate to quantitative reasoning applications
- graphing and analyzing linear models by focusing on rate of change of parameters

CREDIT MATH COURSES

MAT 100 - A Topical Approach to Mathematics (4 credits)

Math Placement: MAT 100.
Prerequisite: Successful completion of MAT, ENG 001 and RDG 001 developmental course requirements prior to starting the course.
Course Description: Fundamental mathematics topics and their applications. Topics include problem solving, number systems, geometry, consumer mathematics, mathematical modeling, management science, and social choice and decision making. Students will NOT receive credit for both MAT 100 and MAT 114. MAT 100 satisfies SUNY GEN ED-GMAT; NCC GEN ED-MATH.

This course includes a variety of different mathematical topics and their applications. Some of the topics are:

- critical thinking skills: mastering the skills of reasoning, estimating and problem solving
- number theory and real number system: arithmetic, geometric and Fibonacci sequences
- algebra, graphs, and functions: using systems of linear inequalities to find optimal solutions of business applications with limited resources
- metric system: conversions to/from metric system in real-life examples
- consumer mathematics: simple and compound interest in applications such as credit card debt, mortgages and savings plans
- graph theory: solving Euler and Hamiltonian circuits, spanning trees in real-world applications, such as the traveling salesman problem, by brute force, nearest neighbor and Kruskal's Algorithm methods
- voting methods: plurality, majority, Borda Count, Pairwise with Elimination and Arrow's Impossibility Theorem, and importance of deciding on voting method and its flaws before ballots are cast

This course may be of particular interest to students interested in banking, information technology, business or government.

MAT 101 - Concepts of Mathematics (3 credits)

Math Placement: MAT 100.
Prerequisite: Successful completion of MAT, ENG 001 and RDG 001 developmental course requirements prior to starting the course.
Course Description: Topics include formal symbolic logic, arguments, methods of proof, basic concepts of sets, and set operations. MAT 101 satisfies SUNY GEN ED-GMAT; NCC GEN ED-MATH.

This is a logic course, so it may seem very different from other math courses. This course looks at the language of arguments and proofs, rather than focusing on numbers and calculations. Topics include:
- formal symbolic logic: symbolic logic rules
- validity of arguments: use written information to draw valid conclusions
- formal proof
- set theory

Other possible topics include:
- circuits theory
- strategies for simple games (like tic-tac-toe)
- basic decision theory

This course may be of particular interest to students interested in journalism, information technology, education, English, philosophy or law.

MAT 102 - Introduction to Statistics (3 credits)

Math Placement: MAT 100.
Prerequisite: Successful completion of MAT, ENG 001 and RDG 001 developmental course requirements prior to starting the course.
Course Description: Topics include appropriate and inappropriate uses of statistics, measures of central tendency and variability, basic concepts of probability, the binomial, normal and 't' distributions, testing hypotheses, estimation, chi-square, linear regression, and correlation. MAT 102 satisfies SUNY GEN ED-GMAT; NCC GEN ED-MATH. MAT 102 serves as a perquisite for MAT 103 (Applied Statistics) and MAT 119 (Data Science/Analytics).

In newspapers, television, magazines and on the Internet, we see graphs and figures that are presented to us as facts. It is useful to know how this information is gathered and organized, and to determine whether these claims seem accurate or misleading. Introductory statistics is an important course for understanding such data and achieving success in many professional careers. In this course, topics include:
- appropriate and inappropriate uses of statistics
- the organization and presentation of data
- descriptive statistics
- linear correlation and regression
- probability applications
- discrete and continuous probability distributions
- sampling distributions
- estimation
- hypothesis testing
- the chi-square distribution

This course may be of particular interest to students interested in criminal justice, data science, government, leadership careers, business, psychology, sociology, education or nursing.

MAT 109 - College Algebra & Trigonometry (4 credits)

<u>Math Placement</u>: MAT 109.

<u>Prerequisite</u>: Successful completion of MAT002 or MAT 003, ENG 001 and RDG 001 developmental course requirements prior to starting the course.

<u>Course Description</u>: This course considers fundamental ideas from algebra, trigonometry and functions including exponentials and logarithms. A problem-solving approach is used. MAT 109 satisfies SUNY GEN ED-GMAT; NCC GEN ED-MATH.

This course is intended to prepare students for MAT 111 (Pre-Calculus) and may be of particular interest to students interested in science, technology, engineering or mathematics careers.

It further develops the algebra from MAT 002 (Introductory Algebra) or MAT 003 (Integrated Arithmetic and Basic Algebra).

If you plan to take MAT 109, some of the skills you are expected to know before entering the class are listed below. If this material is unfamiliar to you, then you should consider taking MAT 002 before registering for MAT 109.

- Express $-8^0 + 3^{-1}$ as a single fraction.

  Answer: $-\dfrac{2}{3}$

- Find the product of $(2x-4)(3x+5)$.

  Answer: $6x^2 - 2x - 20$

- Solve for r: $2\pi r = c$.

  Answer: $r = \dfrac{c}{2\pi}$

- Solve for x: $\dfrac{14}{6x} = \dfrac{3}{2}$.

  Answer: $x = \dfrac{14}{9}$

- Factor completely: $25x^2 - 36y^2$.

  Answer: $(5x+6y)(5x-6y)$

- If $y - 3x = -2$, find the slope and the y-intercept.

  Answer: slope: 3 and y-intercept: $(0, -2)$

- Simplify: $\sqrt{32}$

  Answer: $4\sqrt{2}$

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- Add: $\dfrac{1}{x} + \dfrac{1}{y}$

  Answer: $\dfrac{x+y}{xy}$

- Solve for x: $x^2 + 5x = -6$

  Answer: $x = \{-2, -3\}$

- Simplify $\dfrac{12x^7 y^8}{4x^5 y^9}$ and express the answer with positive exponents.

  Answer: $\dfrac{3x^2}{y}$

MAT 111 - Pre-Calculus (4 credits)

Math Placement: MAT 111.
Prerequisite: a grade of C or higher in MAT 109 or MAT 116.
Course Description: This is a preparatory course for the study of calculus. The function concept plays a unifying role in the study of polynomial, rational, exponential, logarithmic, and trigonometric functions. Modeling, using elementary functions, is stressed throughout the course. MAT 111 satisfies SUNY GEN ED-GMAT; NCC GEN ED-MATH.

This course may be of particular interest to students interested in science, technology, engineering or mathematics careers.

If you plan to take MAT 111, then you will be expected to have a strong foundation in intermediate algebra, with some knowledge of functions, graphing and trigonometry. Below are some concepts your instructor will expect you to be familiar with before you enter the course. If this material is unfamiliar to you, then you should consider taking MAT 109 before registering for MAT 111.

- Express $\dfrac{5}{x} - \dfrac{3}{x-2}$ as a single fraction.

  Answer: $\dfrac{2x-10}{x^2 - 2x}$

- Find an equation of the line passing through the points $(2, -6)$ and $(5, -12)$.

  Answer: $y = -2x - 2$

- Simply the expression $\dfrac{\sqrt{x} \cdot x^2}{x^4}$ and express the answer with positive exponents.

  Answer: $\dfrac{1}{x^{\frac{3}{2}}}$

- What is the exact value of $\sin 60°$?

  Answer: $\dfrac{\sqrt{3}}{2}$

- Solve $3x^2 - 5x + 1 = 0$ for x.

  Answer: $x = \dfrac{5 \pm \sqrt{13}}{6}$

- Solve for x: $5 = ax + xy$

  Answer: $x = \dfrac{5}{a + y}$

- If $f(x) = x^2$ then what is $f(x + h)$?

  Answer: $f(x + h) = x^2 + 2xh + h^2$

- Remove the parentheses and simplify the expression $9a^2 - \left[7a^2 - 12a - (a^2 - 3a)\right]$.

  Answer: $3a^2 + 9a$

- Factor completely: $3x^3 + 27x^2 - 156x$.

  Answer: $3x(x + 13)(x - 4)$

- Factor completely: $x^4 - 2bx^2 + b^2$.

  Answer: $\left(x^2 - b\right)^2$

MAT 112 - Calculus with Applications in Business and Social Sciences (4 credits)

This course is intended for students enrolled in non-science programs.

Math Placement: MAT 112.
Prerequisite: a grade of C or higher in MAT 111 or MAT 117.
Course Description: This course is NOT recommended for Math, Engineering, Science or Computer Science students and it does not satisfy the prerequisite for MAT 123 (Calculus II). This course is intended to introduce the fundamental concepts and techniques of calculus to the non-science students. Special emphasis is given to applications in Business and Social Sciences. Topics include functions and graphs, the derivative and differentiation techniques of algebraic, exponential and logarithmic functions of a single variable, the concept of margin in economics, elasticity of demand, differentials, related rates and optimization problems, growth and decay applications, integrals and integration techniques, application of integrals, including producer and consumer surplus, income streams, probability. Students will NOT receive credit for both MAT 112 and MAT 122. MAT 112 satisfies SUNY GEN ED-GMAT; NCC GEN ED-MATH.

If you plan to take MAT 112, you will be expected to have a strong foundation in pre-calculus. Below are some concepts your instructor will expect you to be familiar with before you enter the course.

If this material is unfamiliar to you, then you should consider taking MAT 111 before registering for MAT 112.

- Find the solution set for the inequality $x^2 - 2x - 8 < 0$.

  Answer: $-2 < x < 4$

- Simplify the expression $\sqrt{2^{4x} \cdot 5^{4x}}$.

  Answer: 100^x

- Simplify the expression $\dfrac{\left(x^2+1\right)^2}{x}$ and express the answer without a denominator.

  Answer: $x^3 + 2x + x^{-1}$

- If $h(x) = \left(2x^2+1\right)^3$ and $h(x) = f(g(x))$, find $f(x)$.

  Answer: $f(x) = x^3$

- If $h(x) = \dfrac{3-x}{x^2-4}$, find the equations of all horizontal and vertical asymptotes to the graph of $h(x)$.

  Answer: Vertical asymptotes are $x = 2$ and $x = -2$

           Horizontal asymptote is $y = 0$

- If $f(x) = x^3 + 5$, find the average rate of change of $f(x)$ with respect to x on the interval $1 \le x \le 3$.

  Answer: 13

- Solve $e^{3x} = 27$ for x.

  Answer: $x = \dfrac{\ln 27}{3}$ which can be simplified to $x = \ln 3$

- If $f(x) = x^2$ and $h \ne 0$ express $\dfrac{f(x+h) - f(x)}{h}$ in simplest form.

  Answer: $2x + h$

- If $x = \ln a$ and $y = \ln b$ express $\ln \sqrt[3]{a^2 b}$ in terms of x and y.

  Answer: $\tfrac{1}{3}(2x + y)$ or $\dfrac{2x}{3} + \dfrac{y}{3}$

- If $f(x) = 4x^2 + 2x$, find $f\left(\tfrac{1}{2}\right)$.

  Answer: 2

MAT 114 - Foundations of Mathematics for Educators (3 credits)

This course is only for students enrolled in selected teacher education transfer programs.

Math Placement: MAT 100.
Prerequisite: Successful completion of MAT, ENG 001 and RDG 001 developmental course requirements prior to starting the course.
Course Description: This course is intended for students who are interested in teaching at the elementary school level. Topics include a development of binary algorithms, the real numbers,

field properties of the real number system as applied to abstract mathematical systems, numerations systems, functions and equivalence relations, solving systems of algebraic equations and number theory, including some algebraic proofs. Applications, historical perspectives, problem solving and use of technology will be emphasized in all topics. Students will NOT receive credit for both MAT 100 and MAT 114. MAT 114 satisfies SUNY GEN ED-n/a; NCC GEN ED-MATH.

MAT 116 – Engineering Technical Math I (4 credits)

This course is only for students enrolled in selected engineering technology programs.

Math Placement: MAT 109.
Prerequisite: Successful completion of MAT002 or MAT 003, ENG 001 and RDG 001 developmental course requirements prior to starting the course.
Course Description: Designed for students in engineering technology programs. Topics include operations with real numbers, exponents and scientific notation, equations and inequalities, functions and graphs, system of equations and determinants, triangle trigonometry and introduction to general trig definitions, algebraic products and factoring, solving equations by factoring and quadratic formula, fractional equations and operations with algebraic fractions. Applications are considered from various scientific, technical, and practical areas. Students will NOT receive credit for both MAT 109 and MAT 116. MAT 116 satisfies SUNY GEN ED-GMAT; NCC GEN ED-MATH.

This course is intended to prepare students for MAT 117 (Engineering Technical Math II) or MAT 111 (Pre-Calculus). It further develops the algebra from MAT 002 (Introductory Algebra) or MAT 003 (Integrated Arithmetic and Basic Algebra).

 Students should only register for MAT 116 under the following conditions:

- a. They need to take MAT 116 for their major

- b. They need to take MAT 117 for their major, but don't yet fulfill the prerequisite

If you plan to take MAT 116, some of the skills you are expected to know before entering the class are listed below. If this material is unfamiliar to you, then you should consider taking MAT 002 before registering for MAT 116.

- Express $-8^0 + 3^{-1}$ as a single fraction.

  Answer: $-\dfrac{2}{3}$

- Find the product of $(2x-4)(3x+5)$.

  Answer: $6x^2 - 2x - 20$

- Solve for r: $2\pi r = c$.

  Answer: $r = \dfrac{c}{2\pi}$

- Solve for x: $\dfrac{14}{6x} = \dfrac{3}{2}$.

  Answer: $x = \dfrac{14}{9}$

- Factor completely: $25x^2 - 36y^2$.

  Answer: $(5x + 6y)(5x - 6y)$

- If $y - 3x = -2$, find the slope and the y-intercept.

  Answer: slope: 3 and y-intercept: $(0, -2)$

- Simplify: $\sqrt{32}$

  Answer: $4\sqrt{2}$

- Add: $\dfrac{1}{x} + \dfrac{1}{y}$

  Answer: $\dfrac{x + y}{xy}$

- Solve for x: $x^2 + 5x = -6$

  Answer: $x = \{-2, -3\}$

- Simplify $\dfrac{12x^7 y^8}{4x^5 y^9}$ and express the answer with positive exponents.

  Answer: $\dfrac{3x^2}{y}$

MAT 117 – Engineering Technical Math II (4 credits)

This course is only for students enrolled in selected engineering technology programs.

Math Placement: MAT 111.
Prerequisite: a grade of C or higher in MAT 109 or MAT 116.
Course Description: Designed for students in engineering technology programs. Topics include rational exponents and radicals, functions and their graphs, polynomials, exponential, logarithmic and trigonometric functions, conic sections, introduction derivatives and integrals. Applications are considered from various scientific, technical, and practical areas. Students will NOT receive credit for both MAT 111 and MAT 117. MAT 117 satisfies SUNY GEN ED-GMAT; NCC GEN ED-MATH.

If you plan to take MAT 117, then you will be expected to have a strong foundation in intermediate algebra, with some knowledge of functions, graphing and trigonometry. Below are some concepts your instructor will expect you to be familiar with before you enter the course. If this material is unfamiliar to you, then you should consider taking MAT 116 before registering for MAT 117.

- Express $\dfrac{5}{x} - \dfrac{3}{x-2}$ as a single fraction.

  Answer: $\dfrac{2x-10}{x^2-2x}$

- Find an equation of the line passing through the points $(2, -6)$ and $(5, -12)$.

  Answer: $y = -2x - 2$

- Simply the expression $\dfrac{\sqrt{x} \cdot x^2}{x^4}$ and express the answer with positive exponents.

  Answer: $\dfrac{1}{x^{\frac{3}{2}}}$

- What is the exact value of $\sin 60°$?

  Answer: $\dfrac{\sqrt{3}}{2}$

- Solve $3x^2 - 5x + 1 = 0$ for x.

  Answer: $x = \dfrac{5 \pm \sqrt{13}}{6}$

- Solve for x: $5 = ax + xy$

  Answer: $x = \dfrac{5}{a+y}$

- If $f(x) = x^2$ then what is $f(x+h)$?

  Answer: $f(x+h) = x^2 + 2xh + h^2$

- Remove the parentheses and simplify the expression $9a^2 - \left[7a^2 - 12a - (a^2 - 3a)\right]$.

  Answer: $3a^2 + 9a$

- Factor completely: $3x^3 + 27x^2 - 156x$.

  Answer: $3x(x+13)(x-4)$

- Factor completely: $x^4 - 2bx^2 + b^2$.

  Answer: $\left(x^2 - b\right)^2$

MAT 118 - Finite Mathematics: Quantitative Analysis (3 credits)

<u>Math Placement</u>: MAT 100.

<u>Prerequisite</u>: Successful completion of MAT, ENG 001 and RDG 001 developmental course requirements prior to starting the course.

<u>Course Description</u>: Topics include applications of finite mathematical models, primarily to problems in business and management. Matrix operations, Markov analysis, linear programming and the simplex method, game and decision theory. MAT 118 satisfies SUNY GEN ED-GMAT; NCC GEN ED-MATH.

MAT 118 ties a variety of interconnected math topics together with applications to business, social science and other fields.

Some topics included in this course are:
- probability
- linear programming
- game theory (gambling/ competing businesses)
- matrix operations
- Markov chains

This course may be of particular interest to students focusing on business or for students who need an easily transferable liberal arts math course.

MAT 122 - Calculus I (4 credits)

Math Placement: MAT 112.

Prerequisite: a grade of C or higher in MAT 111 or MAT 117.

Course Description: Topics include definitions of limit, continuity and derivative, rates of change, tangent to a curve, derivatives of elementary functions, products, quotients, chain rule, higher order, implicit and inverse differentiation, mean value theorem, maxima and minima, differentials, definition of definite integral, Fundamental Theorem of Integral Calculus, applications, integration of elementary functions. Students will NOT receive credit for both MAT 112 and MAT 122. MAT 122 satisfies SUNY GEN ED-GMAT; NCC GEN ED-MATH.

This course may be of particular interest to students interested in science, technology, engineering or mathematics careers.

If you plan to take MAT 122, you will be expected to have a strong foundation in pre-calculus. Below are some concepts your instructor will expect you to be familiar with before you enter the course.

If this material is unfamiliar to you, then you should consider taking MAT 111 before registering for MAT 122

- Find the solution set for the inequality $x^2 - 2x - 8 < 0$.
  Answer: $-2 < x < 4$

- Simplify the expression $\sqrt{2^{4x} \cdot 5^{4x}}$.
  Answer: 100^x

- Simplify the expression $\dfrac{\left(x^2 + 1\right)^2}{x}$ and express the answer without a denominator.
  Answer: $x^3 + 2x + x^{-1}$

- If $h(x) = \left(2x^2 + 1\right)^3$ and $h(x) = f(g(x))$, find $f(x)$.
  Answer: $f(x) = x^3$

- Find the exact value of $\tan\dfrac{\pi}{4} - \sin\dfrac{3\pi}{2}$.

  Answer: 2

- If $h(x) = \dfrac{3-x}{x^2-4}$, find the equations of all horizontal and vertical asymptotes to the graph of $h(x)$.

  Answer: Vertical asymptotes are $x = 2$ and $x = -2$

             Horizontal asymptote is $y = 0$

- If $f(x) = x^3 + 5$, find the average rate of change of $f(x)$ with respect to x on the interval $1 \le x \le 3$.

  Answer: 13

- Solve $e^{3x} = 27$ for x.

  Answer: $x = \dfrac{\ln 27}{3}$ which can be simplified to $x = \ln 3$

- If $f(x) = x^2$ and $h \ne 0$ express $\dfrac{f(x+h) - f(x)}{h}$ in simplest form.

  Answer: $2x + h$

- If $x = \ln a$ and $y = \ln b$ express $\ln\sqrt[3]{a^2 b}$ in terms of x and y.

  Answer: $\frac{1}{3}(2x + y)$ or $\dfrac{2x}{3} + \dfrac{y}{3}$

- If $f(x) = 4x^2 + 2x$, find $f\left(\frac{1}{2}\right)$.

  Answer: 2

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