CALCULUS

The Following is the list of all kind of Calculus courses that OMATHA can offer either online or home tutoring

Precalculus
Precalculus is a course that is designed to prepare students for Calculus, either in high school or college. The goal of precalculus is to equip students to handle rigorous and dynamic concepts by helping them to connect their previous learning from Algebra and Geometry. To do this, Pre-Calculus is divided into two major categories: Trigonometry and Elementary Mathematical Analysis.

Introduction to Calculus
Review of elementary functions. Introduction to Limits. Geometric series. Introduction to differential and integral calculus in one variable with applications. Linear approximations, applications to optimization.
Note: This course is reserved primarily for students in the Faculties of Arts and Social Sciences. Functions Polynomial and rational functions: factoring, the remainder theorem, families of polynomials with specified zeros, odd and even polynomial functions. Logarithms and exponentials to various bases, their laws. Trigonometric functions: radian measure, values of primary trigonometric ratios, compound angle formulae, trigonometric identities. Solving equations and inequalities involving absolute values, polynomial, rational, logarithmic, exponential and trigonometric functions. Their graphs. Operations on functions: point-wise addition and multiplication, composition; inverse functions. Average and instantaneous rate of change, approximating instantaneous rate of change, secants and tangents to graphs. Applications to graphing and finding maxima and minima of functions. Using functions to model, interpolate, and extrapolate data.
Note: This course is much more like Grade 12 Math, however a little bit more advanced. It is intended for all students who has not passes Grade 12 Math yet.

Calculus I
Intuitive definition of limits; continuity, statement of intermediate value theorem. Quick review of basic derivative formulas: products, chain rule, exponentials, and trigonometric functions. Derivatives of quotients, logarithms, inverse trigonometric functions. Finite difference approximations of derivatives. Analysis of functions via the first and the second derivatives; statements of extreme and mean value theorems. L'Hospital's rule. Implicit differentiation,
related rates, optimization, linear approximation, Newton s method. The definite integral and the fundamental theorem of calculus. Antiderivatives of elementary functions, techniques of integration (integration by parts, substitutions, partial fractions). Numerical integration: mid-point, trapezoidal rule and Simpson's rule; error analysis.

Note: This course is intended for those students whose majors might be Mathematics, Physics, Engineering, and some interdisciplinary majors.

Intensive Calculus I
Instantaneous rate of change and definition of limits; continuity, statement of intermediate value theorem. Derivatives of polynomials using limits, derivatives of sums, products, the chain rule, derivatives of rational, trigonometric, exponential, and radical functions.
Derivatives of quotients, logarithms, inverse trigonometric functions. Finite difference approximations of derivatives. Analysis of functions via the first and the second derivatives. Applications to finding maxima and minima. Concavity and points of inflection, and graph sketching; statements of extreme and mean value theorems. L'Hospital's rule. Implicit differentiation, related rates, optimization, linear approximation, Newton’s method. The definite integral and the fundamental theorem of calculus. Antiderivatives of elementary functions,

techniques of integration (integration by parts, substitutions, partial fractions). Numerical integration: mid-point, trapezoidal rule and Simpson's rule; error analysis.

Note: This course is mostly intended for those students whose majors are Mathematics. But other majors, such as Physics, Engineering, and some interdisciplinaries may also register or audit in this course.

Calculus II

Improper integrals. Applications of the integral. Separable differential equations. Euler's method for differential equations. Sequences, series. Taylor's formula and series. Functions of two and three variables. Partial derivatives, the chain rule, directional derivatives, tangent planes and normal lines.

Note: This course is intended for those students whose majors might be Mathematics, Physics, Engineering, and some interdisciplinary majors.

Calculus II and an Introduction to Analysis

A second course in calculus emphasizing geometric and physical intuition in which attention is also given to the conceptual foundations of calculus-analysis. Review of inequalities. Sequences. Completeness axiom of the real numbers. Continuity. Proofs of some of: the intermediate and extreme value theorems, the mean value theorem. Taylor's theorem. Standard curves and surfaces in 2 and 3-space. Tangent vectors, planes and normals. Partial derivatives, directional derivatives, derivatives as linear maps.

Note: This course is mostly intended for those students whose majors are Mathematics. But other majors, such as Physics, Engineering, and some interdisciplinaries may also register or audit in this course.

Calculus for the Life Sciences I

Instantaneous rate of change and definition of limits; continuity. Derivatives of polynomials using limits, product and quotient rules, chain rule, derivative of exponential, logarithm and basic trigonometric functions, higher derivatives, curve sketching. Applications of the derivative to life sciences. Discrete dynamical systems: equilibrium points, stability, cobwebbing. Integrals: indefinite and definite integrals, fundamental theorem of calculus, antiderivatives, substitution, integration by parts. Applications of the integral to life sciences.

Note. From the name of the course it is obvious that this course is intended for Life Science Students.

Calculus for the Life Sciences I

Derivatives: product and quotient rules, chain rule, derivative of exponential, logarithm and basic trigonometric functions, higher derivatives, curve sketching. Applications of the derivative to life sciences. Discrete dynamical systems: equilibrium points, stability, cobwebbing. Integrals: indefinite and definite integrals, fundamental theorem of calculus, antiderivatives, substitution, integration by parts. Applications of the integral to life sciences.

Note: This course is primarily intended for students registered in a life sciences program. Please verify your program requirements.

Calculus for the Life Sciences II

Integrals: numerical integration; improper integrals. Introduction to differential equations: some techniques to solve simple differential equations, numerical solution of differential equations and models in the life sciences using differential equations. Introduction to linear algebra: matrices and matrix algebra, determinants, eigenvalues and eigenvectors (in two or three dimensions). Functions of several variables: graphical representations, partial derivatives. Systems of differential equations: equilibrium points, stability, phase portrait and global analysis.

Note: This course, which is the continuation of "Calculus for the Life Sciences I", is primarily intended for students registered in a life sciences program. Please verify your program requirements.

Introduction to Calculus and Vectors

Instantaneous rate of change as a limit, derivatives of polynomials using limits, derivatives of sums, products, the chain rule, derivatives of rational, trigonometric, exponential, logarithmic, and radical functions. Applications to finding maxima and minima and graph sketching. Concavity and points of inflection, the second derivative. Optimization in models involving polynomial, rational, and exponential functions. Vectors in two and three dimensions. Cartesian, polar and geometric forms. Algebraic operations on vectors, dot product, cross product. Applications to projections, area of parallelograms, volume of parallelepipeds. Scalar and vector parametric form of equations of lines and planes in two and three dimensions. Intersections of lines and planes. Solution of up to three equations in three unknowns by elimination or substitution. Geometric interpretation of the solutions.

Note: This course is intended for students who choose to pursue careers in fields such as science, engineering, economics, and some areas of business, including those students who will be required to take a university-level calculus, linear algebra, or physics course.

Multivariable Calculus

Derivatives as linear maps, the chain rule. The Clairaut-Schwarz theorem. Taylor's theorem. Implicit function theorem. Extrema, critical points. Lagrange multipliers. Double and triple integrals, Fubini's theorem, polar, spherical and cylindrical coordinates. Change of variables. Line integrals, Green's theorem. Parametric surfaces and surface integrals. Curl and Stokes's theorem, existence of potentials. Divergence and Gauss's theorem. Applications.

Note: This course is intended for those students whose majors might be Mathematics, Statistics, Physics, Engineering, and some interdisciplinary majors.

Calculus III for Engineers

Extrema of functions of several variables. Multiple integration and applications. Vector fields and their derivatives. Curves. Vector differential operators. Line integrals. Surfaces and surface integrals. Theorems of Stokes, Gauss, etc.

Note: This course is mostly intended for those students whose majors are any branches in Engineering. Applied Mathematics students are also welcome.

Calculus for Business, Economics, Life Sciences, and Social Sciences

Calculus for Business, Economics, and the Social and Life Sciences introduces calculus in real-world contexts and provides a sound, intuitive understanding of the basic concepts which students need as they pursue careers in business, the life sciences, and the social sciences. In this course students learn the process of describing a real-world problem in mathematical terms, usually in the form of equations, and then using these equations both to help understand the original problem, and also to discover new features about the problem.

Advanced Calculus

In this course the following topics will be discussed: Topology of n-dimensional Euclidian space, analysis of multivariable functions, multiple integrals in n-dimensions: areas and n-volumes, surface areas, volumes of submanifolds and hypersurfaces in n-space, change of variables; vector analysis: line integrals, surface integrals, integration on submanifolds, Green theorem, divergence theorem and Stokes theorem in n-dimensions.

Applied Calculus I

In this course, we go beyond the calculus textbook, working with practitioners in social, life, and physical sciences to understand how calculus and mathematical models play a role in their work. Through a series of case studies, you'll learn about a wide range of applications, from predator-prey models to how statisticians use functions to model data.With real practitioners as your guide, you'll get hands-on experience with data and graphs, equations, calculus computations, and educated guesses and predictions.

This course provides a unique supplement to a course in single-variable calculus. Key topics include the application of derivatives, integrals and differential equations, mathematical models and parameters. This course is for anyone who has completed or is currently taking a single-variable calculus course (differential and integral), at the high school (AP or IB) or college/university level. You will need to be familiar with the basics of derivatives, integrals, and differential equations, as well as functions involving polynomials, exponentials, and logarithms.

This is a course to learn applications of calculus to other fields, and NOT a course to learn the basics of calculus. Whether you're a student who has just finished an introductory calculus course or a teacher looking for more authentic examples for your classroom, there is something for you, and we hope you'll join us!

Applied Calculus II

This course is a continuation of Applied Calculus II with the same goals. It provides a unique supplement to a course in multi-variable calculus with an emphasis throughout on applications in business, social sciences, life sciences, and Engineering.

Vector calculus

This course covers both the basic theory and applications of Vector Calculus. In the first week we learn about scalar and vector fields, in the second week about differentiating fields, in the third week about multidimensional integration and curvilinear coordinate systems. The fourth week covers line and surface integrals, and the fifth week covers the fundamental theorems of vector calculus, including the gradient theorem, the divergence theorem and Stokes' theorem. These theorems are needed in core engineering subjects such as Electromagnetism and Fluid Mechanics.

Instead of Vector Calculus, some universities might call this course Multivariable or Multivariate Calculus or Calculus 3. Two semesters of single variable calculus (differentiation and integration) are a prerequisite.

Calculus for Science & Engineering

An extensive treatment of differential and integral calculus in a single variable, with an emphasis on applications. Differentiation: derivative laws, the mean value theorem, optimization, curve sketching and other applications. Integral calculus: the fundamental theorem of calculus, techniques of integration, improper integrals, and areas of planar regions. Infinite series: power series, Taylor's theorem and Taylor series.

Multivariable Calculus for Science & Engineering

An introduction to calculus of several real variables: curves and parametrizations, partial differentiation, the chain rule, implicit functions; integration in two and three variables and applications; optimization and Lagrange multipliers.

Advanced Calculus for Energy Engineering

A broad introduction to ordinary differential equations, multivariable calculus and elements of vector calculus. Differential equations: linear ordinary differential equations, and systems of linear ordinary differential equations. Calculus of several variables: partial differentiation, the chain rule, double and triple integrals. Vector Calculus: vector fields, line integrals, and flux integrals.

Foundations for Calculus

This course develops and enriches fundamental skills in foundational math to prepare students for success in calculus and other courses at Stanford that rely on quantitative methods (such as in biology, chemistry, computer science, economics, engineering, and physics). The focus is on proficiency in topics prior to calculus, with an emphasis on both conceptual understanding and problem-solving experience. A primary goal is to help students to hone the mathematical skills necessary to transition to quantitative coursework at Stanford, including how to use understanding of ideas to improve study habits and to avoid excessive rote memorization.

Calculus I & Calculus I-ACE

Introduction to differential calculus of functions of one variable. Review of elementary functions (including exponentials and logarithms), limits, rates of change, the derivative and its properties, applications of the derivative. Prerequisites: trigonometry, advanced algebra, and analysis of elementary functions (including exponentials and logarithms). You must have taken the math placement diagnostic (offered through the Math Department website) in order to register for this course.

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Additional problem solving session guided by a course assistant. Students attend this session with the length of two hours per week.

Calculus II & Calculus II-ACE

The definite integral, Riemann sums, antiderivatives, the Fundamental Theorem of Calculus. Integration by substitution and by parts. Area between curves, and volume by slices, washers, and shells. Initial-value problems, exponential and logistic models, direction fields, and parametric curves. Prerequisite: Math 19 or equivalent. If you have not previously taken a calculus course at Stanford then you must have taken the math placement diagnostic (offered through the Math Department website) in order to register for this course.

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Additional problem solving session guided by a course assistant. Students attend this session with the length of two hours per week.

Calculus III & Calculus III-ACE

This course addresses a variety of topics centered around the theme of "calculus with infinite processes", largely the content of BC-level AP Calculus that isn't in the AB-level syllabus. It is needed throughout probability and statistics at all levels, as well as to understand approximation procedures that arise in all quantitative fields (including economics and computer graphics). After an initial review of limit rules, the course goes on to discuss sequences of numbers and of functions, as well as limits "at infinity" for each (needed for any sensible discussion of long-term behavior of a numerical process, such as: iterative procedures and complexity in computer science, dynamic models throughout economics, and repeated trials with data in any field). Integration is discussed for rational functions (a loose end from Math 20) and especially (improper) integrals for unbounded functions and "to infinity": this shows up in contexts as diverse as escape velocity for a rocket, the present value of a perpetual yield asset, and important calculations in probability (including the famous "bell curve" and to understand why many statistical tests work as they do). The course then turns to infinite series (how to "sum" an infinite collection of numbers), some useful convergence and divergence rests for these, and the associated killer app: power series and their properties, as well as Taylor approximations, all of which provide the framework that underlies virtually all mathematical models used in any quantitative field.

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Additional problem solving session guided by a course assistant. Students attend this session with the length of two hours per week.

Integral Calculus of Several Variables & ACE

Iterated integrals, line and surface integrals, vector analysis with applications to vector potentials and conservative vector fields, physical interpretations. Divergence theorem and the theorems of Green, Gauss, and Stokes. **&:** Additional problem solving session guided by a course assistant.

Variational Calculus

This course aims to introduce the theory of the calculus of variations, which is motivated by applications to problems in physics and engineering. The theoretical development is quite extensive, covering both scalar and vector functionals of real and vector variables, and the cases of both fixed and free boundaries and free and constrained problems. Many examples illustrating the theoretical concepts are taken from the discipline of mechanics.

The variational integral and functionals of one dependent and one independent variable; fundamental principles of the variational method and the Euler equations; generalisations to two or more dependent and/or independent variables; variation subject to constraints; Lagrange multipliers; boundary conditions: natural boundary conditions and free boundaries; the second variation and the concept of stability (optional); Hamilton's principle, the equations of classical mechanics and Lagrange's equations; applications to problems in mechanics appear throughout the course.

Integral & Differential Valculus

This course will offer a detailed introduction to integral and vector calculus. We'll start with the concepts of partition, Riemann sum and Riemann Integrable functions and their properties. We then move to anti-derivatives and will look in to few classical theorems of integral calculus such as fundamental theorem of integral calculus. We'll then study improper integral, their convergence and learn about few tests which confirm the convergence. Afterwards we'll look into multiple integrals, Beta and Gamma functions, Differentiation under the integral sign. Finally, we'll finish the integral calculus part with the calculation of area, rectification, volume and surface integrals. In the next part, we'll study the vector calculus. We'll start the first lecture by the collection of vector algebra results. In the following weeks, we'll learn about scalar and vector fields, level surfaces, limit, continuity, and differentiability, directional derivative, gradient, divergence and curl of vector functions and their geometrical interpretation. We'll also study the concepts of conservative, irrotational and solenoidal vector fields. We'll look into the concepts of tangent, normal and binormal and then derive the Serret-Frenet formula. Then we'll look into the line, volume and surface integrals and finally we'll learn the three major theorems of vector calculus: Green's, Gauss's and Stoke's theorem.

Calculus through Data & Modelling

This course continues your study of calculus by focusing on the applications of integration to vector valued functions, or vector fields. These are functions that assign vectors to points in space, allowing us to develop advanced theories to then apply to real-world problems. We define line integrals, which can be used to fund the work done by a vector field. We culminate this course with Green's Theorem, which describes the relationship between certain kinds of line integrals on closed paths and double integrals. In the discrete case, this theorem is called the Shoelace Theorem and allows us to measure the areas of polygons. We use this version of the theorem to develop more tools of data analysis through a peer reviewed project.