

Kenneth P. Dietrich School of Arts and Sciences
College in High School

2023-2024
Business Calculus
MATH 0120--4 Credits

Description: This is an introduction to calculus for students in business, economics, and other social sciences. Application of concepts is stressed throughout the course

Prerequisite: A rigorous high school algebra background that includes exponentials and logarithmic functions or precalculus is a prerequisite for the course. Proficiency in algebraic manipulation is essential. A score of 61 or greater on the ALEKS placement examination is required to register for the CHS credits for this course.

Grading: The grade is determined by the student's performance on three exams and a comprehensive final.

Textbook: The recommended text for this course is *Brief Applied Calculus* by Berresford and Rockett, 7th ed. Brooks/Cole, Cengage Learning.

The following topics are covered in the University of Pittsburgh MATH 0120 course:

1. Functions

- Inequalities and lines
- Exponents
- Functions
 - Linear and quadratic
 - Polynomial, rational
 - Exponential
 - Piecewise linear
 - Composite, shifts of graphs
- Difference quotient
- Break-even points
- Maximizing profit

2. Derivatives

- Limits
 - Introduction to limits
 - Approaching infinity
 - One-sided limits
- Continuity
- Tangents as rate of change
- Definition of derivatives
- Rules for derivatives

- Polynomials
- Products
- Quotients
- Chain Rule
- Powers
- Implicit differentiation
- Higher-order derivatives
- Related rates

3. Application of the Derivative

- Graphing using:
 - First derivative
 - Second derivative
 - Asymptotes and intercepts
- Absolute extrema on a given domain
- Optimizing problems
- Differentials
- Marginal analysis in business

4. Exponential and Logarithmic Functions

- Algebraic properties review

Kenneth P. Dietrich School of Arts and Sciences

College in High School

- Graphs of exponential/log functions
- Constant e
- Compounding Interest
- Derivatives
- Chain Rule
- Elasticity of Demand

5. Integration

- Antiderivatives and Indefinite integrals
- Integration rules and procedures
 - Polynomials
 - Powers
 - Exponentials/logarithmic
- Definite integral
- Definite integral as a limit of a Riemann sum
- Fundamental theorem of integral calculus
- Area under the curve and between curves
- Integration by substitution
- Integration by parts
- Applications
 - Recovering cost from marginal cost
 - Cost of a succession of units
 - Average value of a function

- Consumer and producer's surplus

6. Multivariable Calculus

- Functions of several variables
- Partial derivatives
- Maxima and minima, the D test
- LaGrange multipliers

OPTIONAL:

- Improper integrals
- Integration using tables
- Numerical Integration
 - Trapezoidal and/or Simpson's Rule
- Method of least squares
- Double integrals over rectangular regions
- Logistic Growth
- Trigonometric functions
 - Basic trigonometric values, graphs, and laws
 - Derivatives and integrals
- Differential Equations
 - General and particular solutions
 - Separation of variables
- Arithmetic and Geometric Progressions

Additional course credit information for MATH 0120:

At the University of Pittsburgh:

- Majors: This is a course that can be used for majors in the College of Business Administration as well as some social sciences. Students intending to major in a math- or science-related field or engineering should not take this course and would need to take a scientific calculus course such as the University of Pittsburgh's MATH 0220
- Electives: Individual Schools and Colleges of the University (such as Engineering, Arts & Sciences, Business, Information Sciences, and so on) have different policies about elective credits and may count this course as an elective. Students interested in studying at the University of Pittsburgh should contact their School/College of interest to see if this course would be counted

Kenneth P. Dietrich School of Arts and Sciences

College in High School

Academic Integrity: All College in High School teachers, students, and their parents/guardians are required to review and be familiar with the University of Pittsburgh's Academic Integrity Policy located online at <https://www.as.pitt.edu/faculty/policies-and-procedures/academic-integrity-code>.

Grades: Grade criteria in the high school course may differ slightly from University of Pittsburgh standards. A CHS student could receive two course grades: one for high school and one for the University transcript. In most cases the grades are the same. These grading standards are explained at the beginning of each course.

Transfer Credit: University of Pittsburgh grades earned in CHS courses appear on an official University of Pittsburgh transcript, and the course credits are likely to be eligible for transfer to other colleges and universities. Students are encouraged to contact potential colleges and universities in advance to ensure their CHS credits would be accepted. If students decide to attend any University of Pittsburgh campuses, the University of Pittsburgh grade earned in the course will count toward the student grade point average at the University. At the University of Pittsburgh, the CHS course supersedes any equivalent AP credit.

Drops and Withdrawals: Students should monitor progress in a course. CHS teacher can obtain a Course Drop/Withdrawal Request form from the CHS office or Aspire. The form must be completed by the student, teacher and parent/guardian and returned to teacher by deadlines listed. Dropping and withdrawing from the CHS course has no effect on enrollment in the high school credits for the course.