Basic Concepts List

for All Available Subjects

Last updated January 2021

Math

Elementary Math
Mid-level Math
Algebra
Algebra II
Geometry
Trigonometry
Pre-Calculus
Calculus
Calculus BC
Multivariable Calculus
Statistics
Intermediate Statistics
Discrete Math
Finite Math
Linear Algebra
Differential Equations
Quantitative Methods
Quantitative Reasoning
Data Analytics
R Programming

Science & Engineering

Electrical Engineering
Chemistry
Earth Science
Biology
Microbiology
Environmental Science
Elementary Science
Physics – Calculus Based
Organic Chemistry
Physics – Algebra Based

Health & Medical

Anatomy & Physiology
Nursing RN (Pediatrics)
Health Administration
Nursing
Medical Coding
Mental Health & Psychiatric Nursing

English/Humanities

Essay Writing
Reading
Symbolic Logic
College Essay Writing
Primary Reading
Art History & Appreciation
Doctoral Writing
English
Primary ELL
Literature
College English
ELL

Business

Intro Accounting
Govt/Nonprofit Accounting
Advanced Accounting
Intermediate Microeconomics
Principles of Management
Intermediate Accounting
Managerial Accounting
Intro Economics
Intro Finance
Auditing
Cost Accounting
Tax Accounting
Intermediate Macroeconomics
Business Law
Marketing

Social Sciences

Intro Criminal Justice	Intro Ethics	Intro Philosophy	Intro Psychology
Research Methods	Intro Sociology	Cultural Anthropology	Political Science

Technology

Adobe Illustrator	Adobe InDesign	Adobe Photoshop	
MS Access	MS Excel	MS Word	MS PowerPoint
Windows	Windows Server	A+	Comp Networking
Cisco Admin	Linux Admin	Cloud Technologies	

Computer Science

Principles of CS	C	C++	C#
Java	Python	Database Systems	Web Design
Network Engineering	Network Security	Cybersecurity	Software Dev & Eng

Foreign Languages

French	German	Italian	Spanish

Teacher Education

Elem Math Methods	Elem Reading Methods	General Education	Early Childhood Ed

Communication

Business/Org	Interpersonal/Group	Intercultural/Global	Journalism
Mass Comm	Public Speaking		

Other

Social Studies	Student Success	Career Help

Elementary Math (Grades 4-6)

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Counting and Cardinality
- One to One Correspondence
- Number recognition
- Count sequence
- Compare numbers- More or Less than or Equal
- Skip counting
- Odd and Even
- Number sequence
- Sets and Classifying objects

Operations and Algebraic Thinking
- Patterns
- Addition- Putting together / Adding to
- Subtraction- Taking apart / Taking From
- Addition and Subtraction
- Foundation of Multiplication
- Multiplication and Division
- Relationship of multiplication and Division
- Word Problems - Multiple steps
- Property of Operations
- Order of Operations
- Understanding Addition, Subtraction, Multiplication, and Division
- Equations
- Numerical Expression
- Functions
- Number Theory - Factors, Multiples, Primes, Divisibility
- Ratios, Rates, Proportions, Percent, Square Roots

Number Operations Base Ten and Fractions
- Parts and Wholes
- Base Ten
- Place Value
- Whole Numbers
- Fractions- Compare and Order
- Fractions - Read, Write, Model
- Decimal notation
- Decimals - Read, Write, Compare
- Equivalent Numbers - Decimals and Fractions
- Integers
- Divide Fraction by Fraction
- Build Fractions
- Money- Count bill coins, and Collection of Money

Measurement and Data
- Describe and Compare measurable attributes
- Sort and Classify Objects
- Time - Tell and write with both analog and digital
- Represent and Interpret Data
- Measurements - Compare Objects, Measure with Different objects
- Estimates
- Units and Tools
- Probability
- Geometric Measurement
- Conversion of Measurements and units
- Money
- Measurements of Angles
- Volume
- Graphing data points

Geometry
- Spatial Sense - Position of Objects
- Two Dimensional Shapes- Identify, Compare, Sort
- Composite and Real-World Shapes
- Composes Shapes
- Three Dimensional Shapes- Identify, Compare, Sort
- Identify Lines and Angles
- Perimeter, Area, Volume
- Coordinates
- Similar, Congruent, Symmetric Shapes
- Sorting and Classifying- by shape attributes
- Graph Coordinates

Additional Topics
- The number system
- Exponents
- Equations and Inequalities
- Dependent and Independent Variables
- Variability
- Summarize and Describe distributions

Elementary Math Methods

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Planning, Teaching and Assessing

- Develop a Lesson
- Develop Assessments
- Evaluate Learning

Mathematical Practices and Processes

- Solve Problems using various and appropriate strategies
- Reason abstractly and quantitatively
- Construct and evaluate mathematical arguments
- Use representations to model with mathematics, such as counters, linked cubes, a balance and a number line
- Use tools strategically
- Use precise mathematical language, symbols and units
- Find and use patterns to make generalizations
- Determine if repeated processes are reasonable
- Make connections among mathematical ideas

Number Sense

- Classify numbers and use numbers in patterns
- Use conservation, group recognition, comparison, one-to-one correspondence
- Develop counting strategies counting on, counting back or skip counting
- Use place value to introduce the base 10 number system and decimals

Operations, Basic Facts and Computation

- Apply properties of operations
- Solve problems involving the four operations with whole numbers and fractions
- Add and subtract whole numbers within 20 fluently
- Multiply and divide whole numbers within 100 fluently
- Write and interpret numerical expressions
- Use models (such as geometric shapes and other objects) to order fractions, understand equivalent fractions and compute with fractions
- Compare decimal quantities and convert from fractions

Measurement and Data

- Solve problems involving measurement and estimation
- Represent and interpret data
- Tell and write time using analog and digital clocks
- Solve problems involving money
- Find the perimeter, area and volume of objects
- Convert like measurement units within a given measurement system
- Measure and sketch angles

Geometry

- Draw and identify lines and angles
- Classify shapes by properties of their lines and angles
- Graph points on the coordinate plane to solve problems
- Reason with shapes and their attributes

Mid-Level Math (Grades 7-8)

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Algebra, Patterns and Relationships
- Algebraic Expressions
- Formulas
- Functions
- Graphing Relationships
- Inequalities
- Linear Relationships
- Number and Geometric Patterns
- Solving Equations
- Systems of Equations
- Variables and Substitution
- Represent and Analyze Quantitative Relationships between Dependent and Independent Variables
- Use Properties of Operations to Generate Equivalent Expressions
- Work with Radicals and Integer Exponents
- Understand the Connections between Proportional Relationships, Lines and Linear Equations
- Analyze and Solve Linear Equations and Pairs of Simultaneous Linear Equations
- Define, Evaluate and Compare Functions
- Use Functions to Model Relationships between Quantities

Data and Graphs
- Experiments and Data Collection
- Infer, Predict, Evaluate, Compare Data
- Measures of Central Tendency and Variation
- Represent, Read, Interpret Data Displays

Geometry
- Circles and Pi
- Classify Two- and Three-Dimensional Figures
- Coordinate Plane
- Drawing, Modeling, and Constructing Figures and Describe the Relationships between them
- Formulas for Perimeter, Area, Surface Area, Volume
- Logic and Reasoning
- Points, Lines, and Planes
- Properties of Two-Dimensional Figures
- Understand and Apply the Pythagorean Theorem
- Similarity, Congruence, and Symmetry
- Transformations

Measurement
- Estimate and Measure
- Measurement Systems
- Measurement Tools
- Rates, Indirect Measurements, Proportion

Numbers
- Compare and Order Numbers
- Equivalent Forms of Rational Numbers
- Estimation and Rounding
- Exponents and Roots
- Number Properties
- Number Theory Concepts
- Operations to Solve Problems
- Operations with Integers and Absolute Value
- Operations with Real Numbers
- Order of Operations
- Percents
- Ratios, Rates, Proportions
- Understand Ratio Concepts and Use Ratio Reasoning to Solve Problems
- Real Number System

Probability
- Develop Understanding of Statistical Variability
- Summarize and Describe Distributions
- Sample Space, Combinations, Permutations
- Theoretical and Experimental Probability
- Use Random Sampling to Draw Inferences about a Population
- Draw Informal Comparative Inferences about Two Populations
- Investigate Chance Processes and Develop, Use, and Evaluate Probability Models
- Understand Patterns of Association in Bivariate Data

Algebra

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Absolute Value Equations and Inequalities
- Graphing Absolute Value Equations and Inequalities
- Solving Absolute Value Equations and Inequalities

Algebraic Expressions
- Add, Subtract Expressions
- Multiply, Divide, Factor Expressions including Exponents
- Variables and Expressions

Linear Equations and Inequalities
- Slope, Intercepts, Points on a Line
- Solving Linear Equations
- Solving Linear Inequalities
- Solving Problems with Equations and Inequalities
- Systems of Equations and Inequalities
- Writing and Graphing Linear Equations
- Writing and Graphing Linear Inequalities

Numbers
- Exponents and Roots
- Number Properties
- Number Theory Concepts
- Operations with Real Numbers
- Ratios, Proportions, Percents and Rates

Patterns and Functions
- Composition and Operations on Functions
- Graphing Functions and Transformations
- Inverse of Function
- Patterns
- Properties of Functions - Domain and Range
- Properties of Functions - Zeros, End Behavior, Turning Points
- Relations and Functions
- Solving Problems with Functions
- Translate Between Forms

Probability
- Counting Principles and Sample Spaces
- Theoretical and Experimental Probability

Quadratic Equations, Inequalities, and Functions
- Factoring Quadratic Equations
- Graphing and Properties of Quadratic Equations
- Solving Quadratic Equations and Inequalities
- Systems of Nonlinear Equations and Inequalities

Radical, Exponential and Logarithmic Equations and Functions
- Graphing Exponential and Logarithmic Functions
- Properties of Exponents and Logarithms
- Radical Expressions, Equations and Rational Exponents
- Solving Exponential and Logarithmic Equations and Inequalities
- Solving Problems with Exponential and Logarithmic Functions

Statistics
- Data Analysis – Data Collection – Data Displays – Measures of Data

Algebra II

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Absolute Value Equations and Inequalities
- Graphing Absolute Value Equations and Inequalities
- Solving Absolute Value Equations and Inequalities

Conic Sections
- Properties of Conic Sections
- Solving Problems with Conic Sections

Linear Functions, Equations, and Inequalities
- Slope, Intercepts, Points on a Line
- Solving Linear Equations
- Solving Linear Inequalities
- Solving Problems with Equations and Inequalities
- Systems of Equations and Inequalities
- Writing and Graphing Linear Equations
- Writing and Graphing Linear Inequalities

Matrices
- Matrices Operations and Problems

Numbers
- Complex Numbers
- Number Properties
- Operations with Real Numbers

Patterns and Functions
- Composition and Operations on Functions
- Graphing Functions and Transformations
- Inverse of Function
- Patterns
- Properties of Functions - Domain and Range
- Properties of Functions - Zeros, End Behavior, Turning Points
- Relations and Functions
- Solving Problems with Functions
- Translate Between Forms

Polynomial, Rational Expressions, Equations and Functions
- Solving and Graphing Polynomial Equations
- Solving and Graphing Rational Equations

Probability
- Counting Principles and Sample Spaces
- Theoretical and Experimental Probability

Quadratic Equations, Inequalities, and Functions
- Complex Solutions to Quadratic Equations
- Factoring Quadratic Equations
- Graphing and Properties of Quadratic Equations
- Solving Quadratic Equations and Inequalities
- Systems of Nonlinear Equations and Inequalities

Radical, Exponential and Logarithmic Equations and Functions
- Graphing Exponential and Logarithmic Functions
- Properties of Exponents and Logarithms
- Radical Expressions, Equations and Rational Exponents
- Solving Exponential and Logarithmic Equations and inequalities
- Solving Problems with Exponential and Logarithmic Functions

Sequences and Series
- Properties of Sequences and Series
- Solving Problems with Sequences and Series

Statistics
- Data Analysis
- Data Collection
- Data Displays
- Measures of Data

Geometry

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Measurement
- Formulas and Measurement
- Indirect Measurements, Ratios, and Rates
- Units, Unit Conversions, and Error

Points, Lines, Angles, Planes
- Angle Relationships and Problems
- Coordinate Geometry - Slope, Distance, Midpoint
- Geometric Constructions

Proofs and Logic
- Conditional Statements
- Conjectures, Axioms, Theorems, Proofs
- Inductive and Deductive Reasoning

Two- and Three- Dimensional Shapes
- Congruency
- Relationship Between Plane and Solid Figures
- Right Triangles, Including Pythagorean Theorem
- Similarity
- Symmetry and Transformations
- Theorems and Problems with Circles
- Theorems and Problems with Polygons
- Theorems and Problems with Quadrilaterals
- Theorems and Problems with Triangles
- Three-Dimensional Figures
- Trigonometric Ratios in Right Triangles

Trigonometry

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Complex Numbers
- Polar Coordinates, DeMoivre's Theorem
- Trigonometric Form
- z Complex Number

Introduction to Trigonometry: Linear Relationships and Functions
- Introduction to Trigonometry
- Introduction to Trigonometry: Linear Relationships and Functions
- Relations, Functions, and Graphs
- Defining and Finding Trigonometric Functions
- Slope, Linear Relations, Scatter Plots, and Piecewise Functions
- Introduction to Trigonometry: Linear Relationships and Functions Unit Review

Trigonometric Ratios
- Trigonometric Ratios
- Angles and Angle Measures
- Measuring angles using radian and degree measures
- Right Triangles and Trigonometric Ratios
- The Unit Circle
- Trigonometric Ratios Unit Review

Graphing Trigonometric Functions
- Introduction to Graphing Trigonometric Functions
- Graphing Trigonometric and Inverse Functions
- Inverse Trigonometric Functions
- Transformations of Trigonometric Functions
- Real-world Applications of Trigonometric Functions
- Vectors
- Graphing Trigonometric Functions Unit Review

Trigonometric Laws and Identities
- Trigonometric Laws and Identities
- Law of Sines and Law of Cosines
- Trigonometric Identities and Equations
- Area of Triangles
- Angular and Linear Velocities
- Trigonometric Laws and Identities Unit Review
- Modeling Periodic Phenomenon

Vectors
- Graphing and Operations with Vectors
- Solving problems with Vectors

Pre-Calculus

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Functions

- Know and use a definition of a function
- Write a function that describes a relationship between two quantities
- Perform algebraic operations on functions and apply transformations
- Write an expression for the composition of one given function with another and find the domain, range, and graph of the composite function
- Determine whether a function has an inverse and express the inverse, if it exist
- Know and interpret the function notation for inverses
- Identify and describe the discontinuities of a function and how these relate to the graph
- Understand the concept of limit of a function as x approaches a number or infinity
- Analyze a graph as it approaches an asymptote
- Computer limits of simple functions
- Explain how rates of change of functions in different families differ

Exponents and Logarithms

- Use the inverse relationship between exponential and logarithmic functions to solve equations and problems
- Graph logarithmic functions
- Graph translations and reflections of functions
- Compare the large-scale behavior of exponential and logarithmic functions with different bases and recognize that different growth rates are visible in the graphs of the functions
- Solve exponential and logarithmic equations
- Find an exponential or logarithmic function to model a given set of data or situation
- Solve problems involving exponential growth and decay

Quadratic Functions

- Solve quadratic type equations by substitution
- Apply quadratic functions and their graphs in the context of motion under gravity and simple optimization problems
- Find a quadratic function to model a given set of data or situation

Polynomials

- Given a polynomial function, find the intervals on which the function's values are positive and those where it is negative
- Solve polynomial equations and inequalities of degree of three or higher
- Graph polynomial functions given in factored form using zeros and their multiplicities, testing the sign on intervals and analyzing the function's large scale behavior
- Theorems: The Remainder Theorem, The Factor Theorem, The Fundamental Theorem of Algebra

Rational Functions and Difference Quotients

- Solve equations and inequalities involving rational functions
- Graph rational functions; identify asymptotes, analyzing their behavior for large x values and testing intervals
- Given vertical and horizontal asymptotes, find an expression for a rational function
- Know and apply the definition and geometric interpretation of difference quotient
- Simplify difference quotients
- Interpret difference quotients as rates of change and slopes of secants lines

Trigonometric Functions

- Define and graph and use all trigonometric functions of any angle
- Convert between radian and degree measure
- Calculate arc lengths in given circles
- Graph transformations of the sine and cosine functions
- Explain the relationship between constants in the formula and transformed graph
- Know basic properties of the inverse trigonometric functions, including their domains and ranges. Recognize their graphs

Know the basic trigonometric identities for sine, cosine, and tangent
Pythagorean identities
Sum and difference formulas
Co-functions relationships
Double-angle and half angle formulas
Solve trigonometric equations using basic identities and inverse trigonometric functions
Prove and derive trigonometric identities
Find a sinusoidal function to model a given set of data or situation

Vectors, Matrices and Systems of Equations

Perform operations on vectors in the plan
Solve applied problems using vectors
Know and apply the algebraic and geometric definitions of the dot product of vectors
Know the definitions of matrix addition and multiplication
Add, subtract and multiply matrices
Multiply a vector by a matrix
Represent rotations of the plane as matrices and apply to find the equations of rotated conics
Define the inverse of a matrix and computer the inverse of two-by-two and three-by-three matrices
Computer determinants of two-by-two and three-by-three matrices
Write systems of two and three linear equations in matrix form
Solve systems using Gaussian elimination or inverse matrices
Represent and solve inequalities in two variables
Linear programming

Sequence, Series and Mathematical Induction

Know, explain and use sigma and factorial notation
Write an expression for the nth term
Write a particular term of a sequence when given the nth term
Understand, explain and use the formulas for the sums of finite arithmetic and geometric sequences
Compute the sums of infinite geometric series
Understand and apply the convergence criterion for geometric series
The principle of mathematical induction
Pascal's triangle
Binomial theorem

Polar Coordinates, Parameterizations, and Conic Sections

Convert between polar and rectangular coordinates
Graph functions given in polar coordinates
Write complex numbers in polar form
De Moivre's theorem
Evaluate parametric equations for given values of the parameter
Convert between parametric and rectangular forms of equations
Graph curves described by parametric equations
Use parametric equations in applied contexts to model situations
Identify parabolas, ellipses and hyperbolas from equations
Write the equation in standard form and graph parabolas, ellipses and hyperbolas
Derive the equation for a conic section from given geometric information
Identify key characteristics of a conic section from its equation or graph
Identify conic sections whose equations are in polar or parametric form

Modeling Mathematics

Construct a tangent from a point outside a given circle to a circle
Cavalieri's principle
Identify the shapes of two dimensional cross sections of three dimensional objects
Identify three dimensional objects generated by rotations of two-dimensional objects

Calculus

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Limits of functions (including one-sided limits)
- Calculate limits using algebra
- Estimating limits from graphs or tables
- Limits proofs for linear functions
- Vertical asymptotes and infinite limits
- Horizontal asymptotes and limits to infinity
- L'Hospital's Rule

Continuity
- Understanding continuity in terms of limits
- Types of discontinuity (infinite, jump, removable)
- Determining continuity from a graph or rule for a function
- Intermediate Value Theorem

Derivatives
- Compute derivatives of functions: power, exponential, logarithmic, trigonometric, inverse trig
- Apply Product Rule, Quotient Rule, Chain Rule, etc.
- Understand the first and second derivative graphically
- Approximate derivative from graph or tables
- Interpretation of the derivative as a rate of change (limit of an average rate of change)
- Relationship between differentiability and continuity
- Tangent line to curve
- Linear approximation and differentials
- Relationship between increasing and decreasing behavior and the sign of the derivative
- Mean Value Theorem
- Relationship between concavity and the sign of the second derivative
- Inflection Points
- Optimization Problems
- Related Rates Problems
- Implicit differentiation
- Antiderivatives and initial value problems
- Particle motion (position, velocity, acceleration)
- Slope fields and solution curves for differential equations

Integrals
- Riemann sums
- Basic properties of definite integrals
- Applications of integrals (including areas, arc length, volumes for solids of revolution)
- Fundamental Theorem of Calculus, Parts I and II
- Definite and indefinite integrals of basic functions
- Techniques of Integration (Substitution, Parts, Partial Fractions, Trigonometric Substitution)
- Improper Integrals
- Numerical Approximation of Integrals
- Separable differential equations

Parametric and Polar Curves
- Graphs, derivatives, areas, arc length

Series and Sequences
- Sequence convergence
- Partial Sums and the definition of series convergence
- Geometric Series and their sums
- Tests for series convergence
- Test for divergence (nth term test)
- Integral test and p-Series
- Alternating series
- Comparison test and limit comparison test
- Ratio and Root Test
- Power series, radius and interval of convergence
- Maclaurin and Taylor series

In addition, the concepts below are frequently seen by students in pre-Calculus courses and ones that all Calculus tutors are expected to know and be able to assist students with:
- Circle, ellipse, hyperbola, and parabola
- Perform translations for various conic sections
- Arithmetic and Geometric sequences
- Trigonometric Ratios and Identities
- Trigonometric graphs
- Law of Cosines and Law of Sines
- Functions and Graphs (Linear and Polynomial)
- Exponential and Logarithmic Functions

Calculus BC

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Calculus Basics
- Combining Functions
- Patterns in Graphs

Limits and Continuity
- Finding Limits Analytically
- Asymptotes as Limits
- Relative Magnitudes for Limits
- When Limits Do and Don't Exist
- Continuity
- Intermediate and Extreme Value Theorems

Derivatives
- Slope and Change
- Derivaties at a Point
- The Derivative
- The Power Rule
- Sums, Differences, Products and Quotients
- Graphs of Functions and Derivatives
- Continuity and Differentiability
- Rolles and Mean Value Theorems
- Higher Order Derivatives
- Concavity
- Chain Rule
- Implicit Differentiation

Rates of Change
- Extrema
- Optimization
- Tangent and Normal Lines
- Tangents to Polar Curves
- Tangent Line Approximation
- Rates and Derivatives
- Rectilinear Motion
- Motion with Vector Functions

Integrals
- Riemanns Sums
- Area Approximations
- The Definite Integral
- Properties of Integrals
- Graphing Calculator Integration
- Application of Accumulated Change
- The Fundamental Theorem of Calculus
- Definite Integrals of Composite Functions
- Analyzing Functions and Integrals
- Area Between Curves
- Volumes of Revolution
- Cross Sections
- Arc Length

Inverse and Transcendental Functions
- Derivatives of Inverses
- Inverse Trigonometric Fucntions
- Logarithmic and Exponential Review
- Transcendentals and 1/x
- Derivatives of Logarithms and Exponentials
- L'Hopital's Rule
- Analysis of Transcendental Curves
- Integrating Transcendental Functions
- Partial Fractions
- Integration by Parts
- Improper Integrals
- Application of Transcendental Integrals
- Derivatives of Parametric Functions
- Integrating Parametric and Polar Functions

Separable Differential Equations and Slope Field
- Slope Fields
- Differential Equations and Models
- Euler's Method
- Exponential Growth
- Application of Differential Equations

Sequences and Series
- Sequences
- Series
- Convergence Tests
- Radius of Convergence
- Functions Defined by Power Series
- Taylor and Maclaurin Series
- Taylor's Theorem and Lagrange Error

Multivariable Calculus

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Vectors & Geometry of Space in Multiple Dimensions

- Two Dimensional Coordinate Systems
- Three Dimensional Coordinate Systems
- Vectors
- Cylindrical Coordinates
- Spherical Coordinates
- The Dot Product
- The Cross Product
- Equations of Lines and Planes
- Cylinders and Quadric Surfaces
- Functions of Several Variables

Vector Functions

- Vector Functions and Space Curves
- Derivatives of Vector Functions
- Integrals of Vector Functions
- Tangent, Normal, and Binormal Vectors
- Arc Length and Curvature
- Motion: Position, Velocity, and Acceleration

Multivariable Differentiation

- Limits and Continuity
- Partial Derivatives
- Differentials
- Chain Rule
- Tangent Planes and Linear Approximations
- The Gradient Vector Operator and Directional Derivative
- Critical Points: Relative and Absolute Extrema
- Lagrange Multipliers

Multivariable Integration

- Double Integrals over General Regions
- Double Integrals in Polar Coordinates
- Applications of Double Integrals
- Triple Integrals
- Triple Integrals in Cylindrical and Spherical Coordinates
- Applications of Triple Integrals
- Change of Variables: Jacobian of a Transformation

Vector Calculus: Line Integrals

- Vector Fields
- Line Integrals
- The Fundamental Theorem For Line Integrals
- Conservative Vector Fields
- Potential Functions of Vector Fields
- Green's Theorem
- The Divergence and Curl Vector Operators

Vector Calculus: Surface Integrals

- Parametric Surfaces and Area
- Surface Integrals
- Stokes' Theorem
- Gauss' Divergence Theorem

Finite Math

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Solve linear equations and inequalities.
Graph linear equations in two variables.
Use mathematical modeling and linear regression to make predictions.
Solve function problems.
Quadratic Functions
Polynomial and Rational Functions
Solve exponential function problems.
Solve logarithmic function problems.
Solve simple interest problems.
Solve compound interest problems.
Solve problems involving future and present value of annuities. (sinking funds and amortization)
Solve systems of linear equations.
Gauss Jordan Elimination
Perform operations on matrices.
Inverse of a square matrix
Solve matrix equations.
Apply matrices in a real world scenario.
Inequalities in two variables
Systems of linear inequalities in two variables
Solve linear programming problems geometrically
Geometric Introduction to the Simplex Method
Maximization and Minimization with Mixed Problem Constraints
Basic Counting Principles
Permutations and Combinations
Sample Spaces, Events and Probability
Apply counting principles to solve problems.
Conditional Probability, Intersection and Independence
Solve probability problems.
Random Variables, Probability Distribution and Expected Value
Solve problems involving discrete probability.
Solve problems involving discrete probability.
Make decisions by computing the expected value of random variables.
Summarize and present data using graphs, measures of central tendency, and measures of dispersion.
Bernoulli Trials and Binomial Distribution
Normal Distributions
Solve linear programming problems geometrically.
Solve linear programming problems by the simplex method.
Solve problems involving Markov chains.
Properties of Markov Chains
Regular Markov Chains
Absorbing Markov Chains
Solve problems involving game theory.
Strictly Determined Games
Mixed Strategies Games
Linear Programming and 2 x 2 games - geometric approach
Linear programming and m x n games - simplex method and the dual

Discrete Math

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Apply basic enumeration techniques.
Simplify assertions and compound statements in first-order logic.
Apply basic set-theoretic concepts.
Apply the principles of mathematical induction and recursion.
Apply the basic concepts of computational complexity and algorithmic analysis.
Solve problems of iteration.
Manipulate relations and simple functions and their inverses.
Use the properties of relations.
Apply the properties of equivalence relations and partitions.
Use the Principle of Inclusion and Exclusion.
Identify graph isomorphism, planarity, connected components, and chromatic numbers.
Identify properties of a tree.
Apply properties of general graphs.
Apply the basic concepts of Boolean algebra.
Use the basic laws of Boolean algebra.
Convert Boolean expressions into a disjunctive or conjunctive normal form.

Statistics

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Analyze Data

- Confidence Intervals
- Correlation
- Expected Values and Probability Distributions
- Hypothesis Testing
- Infer and Predict
- Regression
- Sample Distributions and Central Limit Theorem

Collect Data

- Experiments and Data Collection
- Sampling

Probability

- Computing Probability
- Counting - Combinations and Permutations

Summarize Data

- Data Distribution
- Display Data
- Measures of Data
- Read, Interpret, Classify Data

Intermediate Statistics

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Probability
- Probability Theory
- Random Variables
- Simulations (including Monte Carlo)

Discrete Probability Distributions
- General
- Binomial & Negative Binomial
- Geometric & Hypergeometric
- Poisson
- Multinomial

Continuous Probability Distributions
- Normal/Student's T
- Log Normal
- Bivariate
- Gamma & Beta
- Exponential
- Chi-square
- F

Statistical Inference
- Confidence Intervals
- Hypothesis Testing
- Errors, Power, & Effect Size

Anova
- One-way ANOVA
- Two-way ANOVA
- Factorial – interactions
- Randomized block ANOVA
- Repeated Measures
- Post-hoc analysis/multiple comparisons (Bonferroni, Tukey, LSD)

Nonparametric Tests
- 1-sample sign test
- Wilxcoxon rank tests
- Kruskal-Wallis Test
- Friedman Test
- Mann-Whitney Test
- Mood's Median Test
- Spearman Rank Correlation

Regression and Correlation
- Simple Linear Regression
- Multiple Regression
- Logistic Regression
- Polynomial Regression
- ANCOVA

Quantitative Reasoning

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Logic/Critical Thinking
- Truth Tables
- Simple Statements
- Venn Diagrams
- Compound Statements
- Analyzing Arguments

Arithmetic Knowledge
- Fractions
- Decimals and Rounding
- Scientific Notation, Powers of 10, and Approximations
- Rate, Ratio and Proportion
- Percentages
- Uses and Abuses of Percentages
- Index Numbers
- Unit Conversions
- Interpretation of Graphs

Geometry/Trigonometry
- Perimeters and Areas of Basic Geometric Shapes
- Measures of Distance and the Pythagorean Theorem
- Volume and Surface Area
- Basic Trigonometry
- Graphs of the Trigonometric Functions
- Applications of Trigonometry

Functions
- Definition and the Vertical Line Test
- One-to-one and Inverse Functions, the Horizontal Line Test
- Linear Functions (Standard and Slope-Intercept Forms of Equations)
- Applications of Linear Models
- Linear Inequalities
- Nonlinear Models (Exponential, Power, Logarithmic)
- Graphing Functions (Excel or TI-84/83)
- Solving systems of equations (Linear & Nonlinear)
- Linear Programming (Graphical Method)
- Linear Programming (Simplex Method)

The Mathematics of Finance
- Simple Interest
- Compound Interest (Lump Sums and Annuities)
- Applications of Compound Interest
- Amortization Schedules

Descriptive Statistics
- Measures of Central Tendency
- Measures of Spread/Dispersion/Variation
- Percentiles & Z-scores
- Graphing Tools Used to Summarize Data

Designing & Analyzing Studies
- Observational vs Experimental Studies
- Sampling Methods (Strengths and Weaknesses)
- Critical Evaluation of Statistical Studies

Probability Rules & Simulation
- Counting Methods - Multiplication Principle, Permutations, Combinations
- Probability Concepts and Rules
- Independent vs. Dependent Events
- Joint vs. Disjoint (Mutually Exclusive) Events
- Law of Large Numbers
- Simulation Using TI-84/83 or MS Excel
- Probability Distributions
- Discrete vs Continuous Distributions
- Normal Distribution
- Random Variables and Probability Distributions
- Expected Value & Risk Assessment
- Binomial and Geometric Distributions, including Normal Approximation to the Binomial Distribution

Inductive/Deductive Reasoning

Inference & Regression
- Central Limit Theorem
- Logic of Confidence Intervals
- Logic of Hypothesis Testing
- One Sample Inference About a Population Mean
- One Sample Inference About a Population Proportion
- Scatterplots & Correlation
- Simple Linear Regression

Quantitative Methods

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Applications and Limitations of Quantitative Analysis
- Business and Decision Analysis
- Arts and Social Sciences
- Medical and Health Sciences

Data and Terms
- Data Quality and measures
- Multivariate data
- F Statistic
- Coefficient Interpretation
- Data Sensitivity
- Hypothesis Testing

Decision Models
- Maxmin and Maximax
- Hurwicz
- Expected Value and Expected Value Perfect Information
- Decision Tree
- Equal Likelihood
- Highest Value vs Lowest Cost

Forecasting
- Linear Regression
- Non-Linear Regression
- Moving Average
- Exponential Smoothing
- Seasonal Index

Linear Algebra
- Vector
- Matrix
- Determinant
- Solving systems

Calculus
- Functions
- Derivatives
- Optimization

Advanced Statistical Modeling
- Chi Square
- Data Clusturing
- ANOVA
- Simulation
- Probability Modeling

Data Analytics

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Predictive Analytics and Machine Learning
- Support Vector Regression
- Naive Bayes
- Neural Networks
- K-Means

Applications and Limitations of Quantitative Analysis
- Business and Decision Analysis
- Arts and Social Sciences
- Medical and Health Sciences

Data and Terms
- Data Quality and measures
- Multivariate data
- F Statistic
- Coefficient Interpretation
- Data Sensitivity
- Hypothesis Testing
- Data Aggregation
- Data Slicing
- Data Cleansing
- Python Data Analytics Libraries (pandas, numpy, matplotlib, sickit-learn)

Decision Models
- Maxmin and Maximax
- Hurwicz
- Expected Value and Expected Value Perfect Information
- Decision Tree
- Equal Likelihood
- Highest Value vs Lowest Cost

Forecasting
- Linear Regression
- Non-Linear Regression
- Moving Average
- Exponential Smoothing
- Seasonal Index

Linear Algebra
- Vector
- Matrix
- Determinant
- Solving systems

Calculus
- Functions
- Derivatives
- Optimization

Advanced Statistical Modeling
- Chi Square
- Data Clustering
- ANOVA
- Simulation
- Probability Modeling

Linear Algebra

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Systems of Linear Equations
- Homogeneous and non-homogeneous systems
- Matrix representation of system
- Row reduction and echelon forms
- Gaussian and Gauss-Jordan elimination
- Consistent and inconsistent systems

Matrix Properties and Arithmetic
- Addition, Subtractions, Scalar Multiplication
- Matrix multiplication
- Transpose of a matrix
- Special Matrices - Identity, zero, diagonal, etc.
- Elementary matrices and elementary row operations
- Row equivalence

Determinants
- Determinant of 2 x 2 and 3 x 3 matrices
- Co-factor expansion
- Cramer's Rule
- Theorems involving determinants and invertibility
- Properties of determinants

Linear Transformations
- Properties of linear transformations
- Matrix representation of linear transformation
- Kernel
- Range
- Change of basis

Vector Spaces
- Linear dependence and independence
- Rank and nullity of a matrix
- Properties of vector spaces
- Subspaces
- Span of a vector space
- Basis of a vector space
- Properties of vectors and vector arithmetic

Eigenvalues and Eigenvectors
- Eigenvalues and Eigenvectors
- The Characteristic Equation

Matrix Decomposition
- LU decomposition
- QR decomposition
- Diagonalization
- Singular Value decomposition

Orthogonality/Least Squares
- Inner product spaces
- Orthogonality
- Orthonormal bases
- Gram-Schmidt orthonormalization
- Least squares regression

Differential Equations

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Introduction to Ordinary Differential Equations

- Define and classify differential equations
- Determine whether a function is a solution to a DE
- Existence and Uniqueness Theorem
- Principle of Superposition

1st order Ordinary Differential Equations

- Identify 1st order linear, separable, exact, Bernoulli, and homogeneous 1st order ODEs
- Find general solution for 1st order ODEs
- Solve 1st order initial value problems
- Construct and solve ODEs for applications such as mixtures, populations, and Newtonian Mechanics

Gaining information about ODEs without solving

- Identify autonomous 1st order ODEs
- Find and classify equilibrium solutions to autonomous 1st order ODEs with constant coefficients
- Predict end behavior of solution to autonomous ODE given initial condition
- Construct, identify, and interpret slope/direction fields
- Euler's method

Higher Order ODEs

- Linear independence of solutions
- Construct and solve problems involving harmonic motion, electrical circuits, and projectile motion
- Solve linear higher order ODEs with constant coefficients using method of undetermined coefficients
- Find second solution to 2nd order ODE using method of Reduction of Order
- Find particular solution to 2nd order nonhomogeneous ODE using variation of parameters
- Solve Cauchy-Euler equations

Laplace Transforms

- Compute Laplace transforms of simple functions using definition of Laplace tranform
- Compute Laplace transforms of polynomial, exponential, and trig functions using table
- Solve IVPs using Laplace transforms

Power Series Solutions of ODEs

- Manipulate power series
- Identify ordinary and singular points of ODEs
- Evaluate recurrence relations
- Find power series solutions of ODEs

Systems of 1st Order Differential Equations

- Use row operations to reduce matrices
- Compute eigenvalues and eigenvectors of square matrices
- Solve system of two 1st order linear ODEs with constant coefficients using matrix methods
- Convert 2nd order linear ODE to a system of two first order linear ODEs
- Orthogonality
- Orthonormal bases
- Gram-Schmidt orthonormalization
- Least squares regression

Elementary Science

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Grades 4-6

- 5 Senses
- Animals
- Astronomy
- Atmosphere
- Atoms
- Basic Needs for Living Organisms
- Calendar
- Carbon Cycle
- Cells
- Classifying Living Things
- Earthquakes
- Earth's Resources
- Earth's Surface
- Ecosystem
- Electricity
- Energy
- Energy Conservation
- Environment
- Food Chain/Web
- Forces and Motion
- Fossils
- Genetics
- Heat
- Insect Life Cycle
- Invertebrates
- Investigation
- Light
- Light Energy
- Magnets
- Matter
- Nitrogen Cycle
- Organ Systems
- Plants
- Reproduction
- Resources
- Rock Cycle
- Rocks
- Seasons
- Simple Machines
- Soil
- States of Matter
- Tools
- Vertebrates
- Volcanoes
- Water
- Weather
- Work

(Grades 7-8)

- Astronomy
- Cell Structure and Function
- Earth
- Ecology
- Genetics
- Human Body
- Living Organisms
- Matter
- Metric system
- Motion
- Optics
- Periodic Table
- Scientific Method
- Scientific Tools

Earth Science

(Back to Top)

Math basics
- Algebra
- Dimensional analysis
- Metric system
- Scientific notation
- Significant digits

Nature of Science
- Accuracy and precision
- Bias and Ethics
- Communication
- Data collection and analysis
- Graphical interpretations
- Models
- Scientific Method
- Scientific Quantities
- Scientific Thinking
- Scientists and Discoveries
- Theories and Laws
- Tools and Measurement

Geology
- Biomes
- Chemical Cycles
- Climate change
- Ecosystems
- Energy flow – Carbon cycle – Population Growth
- Erosion and Weathering
- First Principle of Geology
- Fossils
- Glaciers
- Human impact/changes to planet
- Law of Superposition
- Minerals
- Natural disasters – causes, effects, impact
- Natural Resources
- Plate Tectonics
- Pollution
- Population
- Principle of Uniform Process
- Radioactive dating of rocks
- Relative Age
- Soil
- Time
- Types of Rock and the Rock Cycle
- Unconformity
- Water

Meteorology
- Air
- Weather Conditions and how they are created
- Global Weather
- Predication, forecast and measurement
- Tools for measuring weather conditions
- Weather map construction and interpretation
- Clouds
- Air Mass
- Climates

Oceanography
- Sea Floor Profile
- Parts of the Ocean
- Salinity
- Contributories to the water in the ocean
- Resources
- Coriolis Effect
- Major currents in the world and features
- Waves
- Tsunami characteristics

Astronomy
- Earth, Sun, and Moon System
- Features of the Moon
- Theories of the creation of the moon
- Sun
- Solar system
- Stars
- Galaxies
- Big Bang Theory and evidence
- Space probes and exploration
- Telescopes

Biology

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Chemistry of Life

- Atoms
- Carbohydrates, Lipids, Proteins, and Nucleic Acids
- Chemical Gradients
- Important properties of water
- Molecular Movement, Osmosis and Diffusion
- Monomers and Polymers
- Origins of life
- pH

Cell Structure and Function

- Active and Passive Transport
- Cell junctions
- Cellular Transport across the Cell Membrane
- Facilitated Diffusion
- Fluid Mosaic Model of the Cell Membrane and Semi-permeability
- Prokaryotic and eukaryotic cells
- Receptor Proteins
- Signaling Molecules
- Structure and function of cellular components

Cellular Energetics

- Autotrophs and Heterotrophs
- Calvin Cycle
- Cell cycle
- Cell Cycle Checkpoints
- Cell Reproduction
- Change in free energy
- Chemosynthesis
- Coupled reactions, activation energy, and ATP
- Electron Transport Chain
- Enzymes, Enzymatic Functions, and Enzymatic Pathways
- Exergonic and Endergonic Reactions
- Fermentation
- G0, G1, S, G2, and M Phases of the Cell Cycle
- Glycolysis
- Krebs Cycle
- Light-Dependent Reactions of Photosynthesis
- Meiosis
- Mitosis
- Oncogenes and Tumor Suppressors in relation to cell cycle
- Ploidy

Molecular Biology

- DNA and genome structure
- Famous experiments
- Genetic Engineering Techniques and Their Uses
- Introns and mRNA splicing
- Mutations and Chromosomal Abnormalities
- Regulation of Gene Expression and Epigenetics
- Semi-conservative replication
- Transcription
- Translation and protein processing

Heredity

- Dominance, co-dominance, and incomplete dominance
- Inheritance
- Mendel's Law of Heredity
- Mitochondrial DNA
- Monohybrid, Dihybrid, and Trihybrid Crosses
- Pedigree Analysis
- Probability of Genotypes or Phenotypes based on Genetic Crosses
- Sex-linked Traits

Evolution and Phylogeny

- Cell Theory and Characteristics of Life
- Common Ancestry
- Evidence Supporting Evolution
- Examples of Selective Pressures and Their Effects on Population
- Natural Selection and Fitness
- RNA World Hypothesis
- The Role of Genetic Drift, Mutation, and Sexual Reproduction in Evolution
- Theory of Endosymbiosis
- Three-Domain Hypothesis
- Types of Selection
- Hardy-Weinberg Equilibrium
- Phylogenetic Trees & Cladograms
- Speciation & Extinction
- Taxonomy

Bacteria

- Bacterial Conjugation
- Basic Structures
- Binary Fission
- Characteristics

Viruses

- Basic Structure Including:
- Capsid/Coat Proteins
- Characteristics
- Genetic Material (including Reverse Transcriptase for RNA viruses)
- Lytic and Lysogenic Stages of Virus Life Cycle
- Relationship of Cell Receptors to Entrance of Viruses into Host cells
- Relationship of Viruses to Cancer
- Role of Mutation on the Evolution of Viruses

Animal Form & Function

- Animal Behavior
- Animal Reproduction
- Body Plan Development
- Characteristics of the Following Taxa:
- Endotherms and Ectotherms
- Epithelial, Connective, Muscle, Nervous
- Homeostasis, Feedback Loops, and Hormones
- Origin and Function of the Following Cell Types
- Protists, Porifera, Cnidaria, Nematoda, Mollusca, Annelida, Arthropoda, Echinodermata, Chordata
- Surface Area to Volume
- Tissues, Organs and Organ Systems

Plant Form & Function

- Adaptations of Plants to Land
- Alternation of Generations
- Evolution of Plants from Algae
- Plant Reproduction
- Plant Structures
- Pollen, Seeds, Flowers, and Fruit
- Response to Stimuli (hormones involved)
- Vascular and Nonvascular Plants

Fungi

- Fungal Structures
- Reproduction
- Role in Decomposition

Ecology

- Biodiversity
- Biogeochemical cycles
- Biomes
- Biotic and Abiotic Factors Affecting Environments
- Ecosystem Energy Flow
- Interactions between species and types of symbiosis
- Life History Strategies
- Population Growth and Regulation
- Producers, Consumers, and Decomposers

General Science

- Assistance with Lab-related Assignments
- Development of Science Fair Projects
- Interpreting and Graphing Scientific Data
- Interpreting and Summarizing Information from Literature
- Reviewing Reports for Science Content

Lab techniques

- Bacterial culturing
- Centrifugation
- Gel electrophoresis
- Microscopy
- Serial dilution
- Spectrophotometry

Chemistry

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Math basics
- Algebra
- Dimensional analysis
- Metric system
- Scientific notation
- Significant digits

Math and Science
- Algebra and Dimensional Analysis
- Scientific Notation
- Significant Digits
- The Metric System
- Measurements
- Chemistry and Other Fields
- Scientific Thinking
- The Scientific Method
- Laboratory Basics
- Lab Safety
- Lab tools and techniques
- Lab Report Writing

Atoms, Compounds, and the Periodic Table
- Atomic Theory and the Elements
- The Periodic Table
- Atom Nomenclature
- Periodic Trends
- Subatomic Particles
- Atomic Number, Mass, and Charge
- Isotopes and Ions
- Avogadro's number and the Mole
- Molecules, Compounds, Mixtures, and Solutions
- Naming and Writing Compounds
- Empirical and Molecular Formula
- Electron Configuration
- Chemical and Physical Properties
- Chemical and Physical Changes

Bonding
- Molecular, Ionic, and Metallic Bonding
- Intermolecular Forces
- States and Types of Matter
- Solids, Liquids, and Gasses
- Valance Electrons
- Lewis Dot Diagrams
- Orbitals
- VSEPR Theory
- Resonance
- Hybridization
- Polarity

Chemical Reactions
- Completing Chemical Equations
- Balancing Chemical Equations
- Stoichiometry
- Limiting reactants
- Percent Completion and Excess Reagents
- Redox Reactions
- Gasses and Gas Laws
- Reaction Kinetics
- Rate Laws

Solutions
- Electrolytes
- solubility and Colligative Properties
- Molarity and Other Concentrations
- Acids and Bases
- pH and pOH
- Strong and Weak Acids and Bases
- pKa and Buffers
- Chemical Equilibrium
- ICE Tables
- Electrochemistry

Physical Chemistry
- Quantum Theory
- Quantum Numbers
- Thermodynamics
- Exothermic and Endothermic
- Enthalpy and Entropy
- Nuclear Chemistry
- Radioactivity and Light

Introductory Organic Chemistry and Biochemistry
- Carbon Chain and Functional Group Nomenclature
- Cyclic Compounds and Sugars
- Proteins, Carbohydrates, and Nucleic Acids

Physics – Algebra-based

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Math basics
- Algebra and Trigonometry
- Dimensional analysis
- Metric system
- Scientific notation
- Significant digits
- Vectors and scalars

Nature of Science
- Accuracy and precision
- Bias and Ethics
- Communication
- Data collection and analysis
- Models
- Pseudo Sciences
- Safety
- Science and Society
- Scientific Method
- Scientific Quantities
- Scientific Thinking
- Scientists and Discoveries
- Theories and Laws
- Tools and Measurement

Kinematics
- Position, Distance, and Displacement
- Speed and velocity
- Acceleration
- Position vs time graphs
- Velocity vs time graphs
- Kinetic equations under constant acceleration
- Free fall equations
- Projectiles
- Circular motion
- Center of mass

Dynamics
- Newton's Laws

Work, energy and power
- Work and work-kinetic energy theorem
- Conservative forces and Potential energy
- Conservation of mechanical energy
- Power
- Simple Harmonic motion
- Momentum
- Sources of energy on Earth

Fluid Mechanics
- Density and Pressure
- Buoyancy – Archimedes' Principle
- Fluid dynamics
- Fluid Flow continuity equation
- Bernoulli's Equation

Fluid Mechanics (Cont'd)
- Hydrostatics
- Fluid Pressure

Thermal Physics
- Heat
- Temperature
- Mechanical Equivalent of heat
- Heat Transfer and thermal expansion
- Calorimetry
- Kinetic Theory
- Ideal Gases
- Gas laws
- Thermodynamics

Electrostatics
- Electric charges
- Conductors, insulators and semi-conductors
- Charging by conduction
- Charging by induction
- Coulomb's Law
- Electric fields
- Gauss' Law
- Electric Potential Energy and Electric Potential
- Motion of charges particles in electric fields
- Capacitance

Current Electricity
- EMF
- Circuits
- AC/DC
- Current
- Resistance
- Electric Power
- Electric Energy
- Resistors in series
- Resistors in Parallel
- Batteries and Internal Resistance
- Kirkoff's Law
- Ohm's Law
- Voltmeters
- Ammeters
- RC circuits

Electromagnetism
- Force of a magnetic field on a moving charge
- Force of a magnetic field on a current carrying wire
- Torque on a crrent carrying loop
- Magnetic fields due to straight and coiled wires
- Electromagnetic Induction
- Magnetic flux
- Faraday's Law
- Lens's Law

Electromagnetism (cont'd)

- Motors
- Mass Spectrometers
- Generators

Wave Motion and Sound

- Description and characteristics of waves
- Types of waves
- Standing waves
- Beats
- Harmonics
- Wave on a string
- Wave in a tube
- Doppler Effect
- Sound intensity
- Sound Power
- Relative sound intensity

Optics

- Reflection
- Law of reflection
- Refraction
- Snell's Law
- Total Internal reflection
- Critical angle
- Images formed by plane mirrors
- Images formed by spherical mirrors
- Images formed by parabolic mirrors
- Images formed by lenses
- Ray-diagrams
- Thin lens
- Mirror equation
- Image formation by a two-lens system
- Interference
- Diffraction
- Polarization
- The electromagnetic spectrum
- Inverse square law

Modern Physics

- Atomic Physics and Quantum Effects

Nuclear Physics

- Atomic mass
- Mass number
- Atomic number
- Mass defect and binding energy
- Nuclear processed
- Mass-energy equivalence
- Conservation of energy-mass
- Nuclear symbols
- Nuclear reactions
- Neutrino
- Chain reactions
- Isotopes
- States of matter
- Atomic Models

Physics – Calculus-based

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This subject covers the material from AP Physics C-Mechanics, AP Physics C-Electricity and Magnetism, and introductory college level physics courses that require calculus as a prerequisite.

Math Basics
- Algebra, trigonometry and calculus
- Dimensional analysis
- Units and unit conversions
- Scientific notation
- Estimates and orders of magnitudes
- Significant figures
- Vectors and scalars
- Cross product, Dot product
- Derivatives, Integrals

Nature of Science
- Accuracy and precision
- Data collection via observation and measurement and the analysis of this data
- Error analysis
- Experimental design
- Models
- Scientific method
- Tools and measurement
- Communicating scientific results

Newtonian Mechanics

Kinematics (Motion Along a Straight Line)
- Position, distance, and displacement
- Average and instantaneous velocity
- Average and instantaneous acceleration
- Position vs time graphs
- Velocity vs time graphs
- Acceleration vs time graphs
- Differential determination of position, velocity and acceleration as a function of time
- Kinematic equations under constant acceleration

Dynamics
- Newton's Laws of Motion
- Mass and weight
- Fundamental forces of nature
- Static and kinetic friction
- Air resistance
- Elevator problems
- Incline planes
- Atwood Machines
- Dynamics of circular motion

Work, energy, and power
- Work and the work-kinetic energy theorem
- Integrate to calculate the work performed by a varying force
- Conservative forces and potential energy
- Non-conservative forces

Work, energy, and power(cont'd)
- Conservation of mechanical energy
- Energy diagrams
- Power

Systems of particles, linear momentum, impulse and collisions
- Center of mass
- Two object system
- Momentum

Circular Motion and Rotations
- Uniform circular motion
- Angular velocity and acceleration
- Frequency and period
- Vertical circular motion
- Rotational kinematics
- Moment of inertia
- Rotational inertia
- Parallel axis theorem
- Rotational kinetic energy
- Work and power in rotational motion
- Torque
- Torque and angular acceleration for a rigid object
- Rotation of a rigid object around a fixed axis

Equilibrium and Elasticity
- Rotational equilibrium (torque)
- Conditions for static equilibrium
- Center of gravity
- Stress, strain, and elastic moduli
- Elasticity

Fluid Mechanics
- Density and Pressure
- Buoyancy – Archimedes' Principle
- Fluid dynamics
- Fluid Flow continuity equation
- Bernoulli's Equation
- Hydrostatics
- Fluid Pressure
- Viscosity and Turbulence

Gravitation
- Universal Gravitation
- Gravitational Fields
- Orbits
- Kepler's Laws of Planetary Motion
- The Motion of satellites
- Apparent Weight
- Oscillatory Motion

Thermal Physics

- Heat, Temperature
- Mechanical Equivalent of heat
- Heat Transfer and thermal expansion
- Calorimetry
- Kinetic Theory
- Ideal Gases, Gas laws
- Thermodynamics

Electricity and Magnetism

Electrostatics

- Electric charges
- Conductors, insulators and semiconductors
- Charging by conduction and induction
- Coulomb's Law
- Electric fields, Electric Field Lines
- Electric Dipoles, Electric Flux
- Gauss's Law
- Electric Potential Energy and Electric Potential
- Potentials of charge distributions

Conductors, Capacitors and Dielectrics

- Electrostatics with conductors
- Equipotential surfaces
- Capacitance
- Dielectrics

Current and Resistance

- Current
- Resistivity
- Resistance

Direct Current Electric Circuits

- EMF
- Electric Power, Electric Energy
- Resistors in series and in parallel
- Batteries and Internal Resistance
- Kirchhoff's Law, Ohm's Law
- Voltmeters, Ammeters
- RC circuits

Magnetic Fields

- Sources of magnetic fields
- Right-hand rule
- Left-hand rule
- Force of a magnetic field on a moving charge
- Force of a magnetic field on a current carrying wire
- Torque on a current carrying loop
- Magnetic fields due to straight and coiled wires
- Biot-Savart Law, Ampère's Law

Electromagnetism

- Motion of charged particles in electric and magnetic fields
- Electromagnetic induction
- Magnetic flux
- Inductance

Electromagnetism (Cont'd)

- RL circuits, LC circuits, LRC circuits
- Faraday's Law, Lenz's Law
- Alternating current circuits
- Displacement current
- Maxwell's equations
- Motors
- Mass spectrometers
- Generators
- Transformer

Wave, Motion, and Sound

- Description and characteristics of waves
- Types of waves
- Standing waves
- Beats
- Harmonics
- Wave on a string
- Wave in a tube
- Doppler Effect
- Sound intensity
- Sound Power
- Relative sound intensity

Optics

Nature and Propagation of Light

- Reflection, Law of reflection
- Refraction
- Snell's Law
- Total internal reflection
- Critical angle
- Geometric Optics
- Physical Optics

Modern Physics

- Quantum Mechanics and the nature of light
- Relativity
- Atomic physics and quantum effects
- Nuclear physics

Anatomy & Physiology

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Anatomical Terminology

- Anatomical Regions, Cavities, Planes of Symmetry, and Directional Terms

General Chemistry

- Protons, Neutrons, Electrons, Atoms, Elements, and Compounds
- Bonding: Ionic, Covalent, and Hydrogen
- pH scale, Acids and Bases, Organic and Inorganic Compounds
- Macromolecules: Carbohydrates, Lipids, Proteins, and Nucleic Acids

Cellular Biology

- Light and Electron Microscope Images and Uses
- Cell Structure: Cell Membrane, Cytoplasm, Nucleus
- Organelle Structure and Function
- Protein Synthesis
- Metabolism and Homeostasis
- Mitosis and Meiosis

Histology

- Structure, Function, Location, and Subtypes of Epithelial, Connective, Muscular, and Nervous Tissue

Embryology

- Ectoderm, Mesoderm, and Endoderm and their derivatives

Organ Systems

Integumentary

- Functions of the Integument
- Layers composing the epidermis and dermis
- Nutrient and Oxygen Supply to the epidermis and dermis
- Subcutaneous layer
- Accessory Organ Structure and Function: Hair, Nails, and Glands
- Basic Knowledge skin cancer types and prognoses

Skeletal

- Functions of the Skeletal System
- Structure and Function of Cartilage
- Bone Markings, Shapes, Matrix, Structures, and Names
- Bone Cells Structure and Function: Osteocyte, Osteoclast, and Osteoblast
- Differentiate between Compact & Spongy Bone
- Differentiate between Endochondral and Intramembranous Ossification
- Differentiate between Axial and Appendicular Skeleton
- Basic knowledge of bone fractures and osteoporosis
- Supporting Ligaments and discs
- Types of Joints and their locations

Muscular

- Functions of the Muscular System
- Types and Locations of Muscular Tissue
- Muscle Cell Structure and Function
- Sliding Filament Theory & Excitation – Contraction Coupling
- Sources of Energy for Muscle
- Role of Exercise and Muscle Function
- Knowledge of Names and Locations of muscles

Digestive

- Structure and Function of Esophagus, Stomach, Small Intestines, Colon, Liver, Gall Bladder, Appendix and Rectum
- Mechanical Digestion, Chemical Digestion
- Absorption and transport of nutrients

- pH balance and enzymatic function
- Hormone regulation of digestive function and appetite
- Extrinsic and Intrinsic Nervous function
- Digestive Disease
- Normal Flora of the gut

Nervous

- Functions and Divisions of the Nervous System
- Structure and Function of Neurons and Neuroglia
- Generation and Propagation of an action potential
- Synapses, Neurotransmitters, and Myelination
- Brain Structure, Divisions, and Functions
- Spinal Cord and Peripheral Nerve Structure and Function
- Special Senses: Olfaction, Taste, Vision, Hearing, and Balance
- Structure and Function of the Autonomic Nervous System

Endocrine

- Second Messenger Pathways
- Steroid production and function
- Role of Hypothalamus
- Structure & Function of Pituitary, Thyroid, Parathyroid, Adrenal, Pancreas, testes, Ovaries, and Pineal Glands
- Hormones produced and their function

Cardiovascular

- Functions and Composition of Blood
- Clotting Cascade
- Blood typing and diagnostic tests
- Structure and Function of the heart
- Electrical Activity of the Heart
- Cardiac Cycle
- Cardiac Output
- Knowledge of Arteries and Veins that supply the body
- Immunity & Lymphatic
- Innate and Adaptive Immunity
- Types and Functions of Immune Cells
- Immunological Surveillance and Tolerance
- Acquired Immunity
- Structure and Function of Lymph Nodes, Spleen, Lymphoid Tissue, and Peyers Patches
- Lymphatic Circulation

Respiratory

- Functions of the Respiratory System
- Anatomy and Histology of the Respiratory Tract and Lungs
- Properties of Ventilation and Pulmonary Function Tests
- Oxygen and Carbon Dioxide exchange and circulation

Urinary

- Structure and Function of the Kidney
- Glomerular Filtration and Tubular Section & Reabsorption
- Renin-Angiotensin Aldosterone Pathway
- Function of Vasopressin (ADH) and Atrial Natriuretic Peptide
- Structure and Function of the Ureter, Bladder, and Urethra

Reproductive

- Meiosis and Gamete Production
- Structure and Function of the Male & Female Reproductive System
- Fertilization and Pregnancy

Microbiology

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The microbiology course is considered an advanced science course. It is expected that tutors are knowledgeable in foundational biological, chemical and mathematical concepts as they underlie and relate to microbiology

Basic Biology
- Eukaryotes
- Prokaryotes
- Cellular division of eukaryotic and prokaryotic cells
- Functional anatomy of various cells
- Whitaker Five Kingdoms
- Woese Three Domain clarification

Microbial Traits
- Types
- Nutrition
- Growth
- Control in various environments
- Structure
- Metabolism
- Pathways
- Catabolism
- Anabolism
- Gram positive bacteria anatomy
- Gram negative bacteria anatomy
  - Deinococci
  - Nonproteobacteria
- Biochemistry processes
- Recombinant DNA technology
- Taxonomy and classification (Bergey)
- Cytology
- Cellular physiology

Genetics
- Structure
- Replication
- Expression
- Mechanisms of variation
- Mapping of distances in genes
- Lac operon
- Lac repressor
- Trp operon
- Arabinose operon
- Genetic recombination
- Transformation
- Conjugation
- Transduction

Ecology
- Biogeochemical cycling
- Microorganisms in marine and freshwater ecosystems
- Microorganisms in terrestrial ecosystems
- Symbiosis
- Mutualism
- Commensalism
- Parasitism

Pathogenicity
- Germ Theory
- Infection and reproduction
- Host and parasite relationship
- Infectious disease
- Disease transmission
- Nosocomial infections
- Mechanisms of pathogenicity
- Antimicrobial drugs
- Important pathogens and diseases
- Sterilization
- Disinfection

Immunization
- Innate host resistance
- Adaptive Immunity
- Sanitation
- Hygiene

Health
- Epidemiology
- Antimicrobial chemotherapy
- Microbiology of food
- Industrial microbiology

Laboratory Techniques
- Basic laboratory equipment identification
- Guidelines for safe handling of microorganisms and infectious materials
- Microscope use including oil emersion
- Methods for taking clinical samples
- Incubation techniques
- Inoculation techniques
- Isolation techniques
- Identification techniques
- Chromatography
- Spectrophotometry
- Serial dilution technique and calculations

Organic Chemistry

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Structure & Bonding
- Electron Configurations of Atoms
- Chemical Bonding & Valence
- Charge Distribution in Molecules
- The Shape of Molecules
- Isomers
- Analysis of Molecular Formulas
- Resonance
- Atomic and Molecular Orbitals

Intermolecular Forces
- Boiling & Melting Points
- Hydrogen Bonding
- Crystalline Solids
- Water Solubility

Functional Groups – Properties, Nomenclature, Synthesis, & Reactions of…
- Alkanes
- Alkenes
- Alkynes
- Alkyl halides
- Alcohols
- Aromatics
- Ketones
- Ethers
- Esters
- Carboxylic acids
- Amides
- Amines

Acids & Bases
- Arrhenius acids and bases
- Lowry-Brønsted Acids & Bases
- Lewis Acids and Bases
- Acid dissociation constants and pH
- Effect on acidity

Stereochemistry
- Isomers
- Constitutional isomers
- Stereoisomers
- Chiral and achiral
- Enantiomers
- Optical activity
- R and S configurations
- Diastereomers
- Fischer projections
- Meso compounds

Nucleophilic Substitution, Elimination, and Addition reactions

Biochemicals – Structure & Function of…
- Carbohydrates
- Lipids
- Amino acids
- Proteins
- Enzymes
- Vitamins

Lab techniques
- Synthesis of compounds (solid and gas)
- Separation techniques
- Melting point determination
- Nuclear Magnetic Resonance (NMR) spectrometer operation and analysis
- Infrared (IR) spectrometer operation and analysis
- Gas chromatography and Mass Spectrometry (GC-MS) analysis

Health Administration

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Governance and Organizational Structure

- Organizational structures, key players, and their impact on health care delivery system
- Responsibility, authority, and accountability at each level of an organization
- Developing, implementing, and updating strategic plans
- Accreditation, regulatory, licensing, and certification programs

Quality and Performance Improvement

- Quality assessment programs and procedures
- Importance of regulation in health care organizations and its impact on continuous quality improvement
- Processes of continuous quality improvement, including the cost-quality paradigm

Law, Ethics, and Professionalism

- Government regulations and laws affecting the healthcare environment
- Relationship between healthcare law and healthcare ethics
- Application of moral, ethical, and legal principles in the delivery of healthcare
- Role of healthcare workers in protecting patient rights

Human Resources

- Assessing personnel needs
- Recruitment, selection, compensation, and training of personnel
- Evaluation of personnel including disciplinary actions

Management

- General management principles
- Role of leadership in promoting organizational effectiveness
- Management change theories and strategic management

Healthcare Finance, Technology, and Information Management

- Common financial tools, processes, and techniques used in healthcare
- Revenue cycle & reimbursement
- Financial considerations in the provision of health services (e.g. admitting and registration, case management/denials, credit and collections)
- Management and clinical information systems
- Electronic health records including legal and ethical issues

Healthcare

- Trends that are likely to shape the future of healthcare
- Role, structure, and funding of various health care organizations (e.g. physician's office, walk-in clinic, hospital, ambulatory surgery center, rehabilitation center, etc.), community health services, and public health
- Patient relations

Nursing

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Nursing Medical Surgical Fundamentals

Tutors must be knowledgeable about the fundamentals of nursing including nursing roles, settings, health care trends, all body systems and their disorders, emergency and disaster management, and mental health nursing. In particular, tutors should be familiar with nursing care in all of the following areas:

- Role of the medical-surgical nurse
- Nursing practice and interventions
- Health and nursing assessments
- Diagnostic testing and evaluation
- Care of clients in the following areas:
  - Pain Management
  - Altered fluid electrolyte or acid-base balance
  - Trauma and shock
  - Pre- and post surgery
  - Infections
  - Altered immunity
  - Cancer
  - Loss, grief and death
  - Problems with substance abuse
- Maternal-Child Health (OB)
- Pediatrics
- Psychiatric Nursing

Nursing Care Plans

Tutors must be familiar with all aspects of the creation of nursing care plans including:

- Assessment
- Nursing diagnosis
- Outcomes and Interventions
- Creating the Nursing Care Plan
- Documentation
- Implementation of the Nursing Care Plan
- Evaluation of the Nursing Care Plan

Nursing Pathophysiology:

Tutors must be knowledgeable of the following **systems and associated disorders**:

- Cardiovascular system
- Circulatory system
- Renal system
- Respiratory system
- Nervous system
- Gastrointestinal system
- Endocrine system
- Reproductive system
- Musculoskeletal system

Nursing Pathophysiology (Cont'd)

- Integumentary system
- Cell and body tissue physiology
- Fluid and electrolyte balances
- Genetic and hereditary disorders
- Inflammation, infection and immune response systems
- Oncological diseases
- Otolaryngology
- Ophthalmology

Nursing Pharmacology

- Nursing process in drug therapy
- Pharmacologic principles
- Principles and practices of administration of medication
- Drug calculations
- Dosage calculations
- Legal and ethical requirements in drug therapy
- Life span of pharmaceuticals
- Gene therapy and pharmacogenetics
- Medication error response and prevention
- Essential knowledge of the following drug types:
  - Analgesic drugs
  - General and local anesthetics
  - Depressants and muscle relaxants
  - Stimulants and related drugs
  - Antiepileptic drugs
  - Psychotherapeutic drugs
  - Antiparkinsonian drugs
  - Adrenergic drugs
  - Cholinergic drugs
  - Heart failure drugs
  - Antdysrhythmic drugs
  - Antianginal drugs
  - Antihypertensive drugs
  - Diuretic drugs
  - Coagulation modifier drugs
  - Antilipemic drugs
  - Pituitary drugs
  - Thyroid and antithyroid drugs
  - Adrenal drugs
  - Women's health drugs
  - Men's Health drugs
  - Antihistamines, decongestants and antitussives
  - Bronchodilators and other respiratory drugs
  - Antibiotics
  - Antiviral drugs

Nursing Pharmacology (Cont'd)

- Antitubercular drugs
- Antifungal drugs
- Antimalarial, antiprotozoal, antihelmintic drugs
- Anti-inflammatory and antigout drugs
- Immunosuppressants
- Immunizing drugs
- Antineoplastic drugs
- Biologic response drugs
- Acid controlling drugs
- Bowel disorder drugs
- Antiemetic and antinausea drugs
- Anemia drugs
- Dermatologic drugs
- Opthamic and otic drugs
- Hormones that regulate calcium and bone metabolism
- Drugs used in oncologic disorders
- OTC drugs, herbal and dietary supplements

Nursing RN (Pediatrics)

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Systems and Associated Disorders
- Cardiovascular and circulatory
- Endocrine
- Excretory
- Gastrointestinal
- Immune
- Integumentary
- Musculoskeletal
- Nervous and sensory
- Reproductive
- Respiratory

Health Assessments
- Communication with patients and family
- Diagnostic testing and evaluation
- Physical and developmental assessments

Health Promotion
- Health promotion for pediatric patients
- Health promotion for the families of pediatric patients
- Influences of family on child health promotion
- Influences of socioeconomics, culture, and religion on child health promotion

Nursing Care
- Chronic illness
- Cognitive and sensory impairment
- Community-based nursing care
- Disability
- End-of-life care
- Family-centered care

Interventions
- Behavioral
- Community
- Family
- Health System
- Physiological
- Safety

Professional Performance
- Advocacy
- Ethics
- Evidence-based practice and research
- Law and regulation

Fundamentals of nursing
- Nursing roles, settings, and health care trends

Systems and associated disorders seen in all stages of childhood (newborn, infant, toddler, preschooler, school-age, and adolescent)
- Cardiovascular system
- Circulatory system
- Excretory system
- Respiratory system
- Nervous system
- Gastrointestinal system
- Endocrine system
- Reproductive system
- Musculoskeletal system
- Integumentary system
- Immune system
- Otolaryngology
- Ophthalmology

Nursing care as it applies to pediatric patients
- Communication with the patient and family
- Pediatric nursing skills
- Physical and developmental assessments
- Diagnostic testing and evaluation
- Health promotion for patients in all stages of childhood (newborn, infant, toddler, preschooler, school-age, and adolescent) and their families
- Family, social, cultural, and religious influences on child health promotion
- Community-based nursing care
- Family-centered care at home and during hospitalization
- Care of the child and family in the following contexts:
  - Chronic illness
  - Disability
  - Cognitive and sensory impairment
  - End-of-life care

Pediatric variations of standard nursing practices and interventions
- Pain assessment and management
- Altered fluid electrolyte or acid-base balance
- Medication administration
- Trauma and shock
- Pre- and post-surgery
- Infections
- Altered immunity
- Cancer

Mental Health & Psychiatric Nursing

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- **Abuse and Neglect**
  - Types of Violence
  - Assessment and Physical Exam
  - Nursing Interventions
- **Eating Disorders**
  - Types of Eating Disorders
  - Risk Factors and Assessment
  - Symptoms and Behaviors
  - Diagnosis
  - Treatments
- **Personality Disorders**
  - Types of Personality Disorders
  - Risk Factors
  - Assessment
  - Symptoms
  - Treatment
- **Neurocognitive Disorders**
  - Types of Neurocognitive Disorders
  - Risk Factors
  - Nursing Interventions
- **Depressive Disorders**
  - Types of Depressive Disorders
  - Contributing Factors
  - Treatment
- **Psychotic Disorders**
  - Types of Psychotic Disorders
  - Contributing Factors
  - Treatment
- **Therapies**
  - Modeling
  - Operant Conditioning
  - Systematic Desensitization
  - Aversion Therapy
  - Natural Therapies (meditation, relaxation, deep breathing)
- **Suicide**
  - Risk Factors
  - Assessment
  - Treatment
- **Substance Use and Addictive Disorders**
  - Substance Abuse Defined
  - Substance Assessment
  - Dependency
  - Withdrawal
  - Common Abusive Substances
  - Treatment
- **Psychopharmacological Therapies**
  - Medications for Anxiety
  - Medication for Depressive Disorders
  - Medication for Bipolar Disorder
  - Medications for Psychotic Disorders
  - Medications for Substance Abuse

Anesthesia
Medicine
Endocrine system
Nervous system
Urinary system
Integumentary system
Pathology
Laboratory
Hemic and lymphatic system
Practice management
Medical terminology
Radiology
Musculoskeletal system
Digestive system
Evaluation and management
Respiratory system
Mediastinum and diaphragm
Male/female genital system
Maternity and delivery
Eye and ocular adnexa

-International Classification of Diseases, Tenth Revision, Clinical Modification (currently ICD-10-CM)
-International Classification of Diseases, Tenth Revision, Procedure Coding System (currently ICD-10-PCS)
-Current Procedural Terminology (CPT)
-Healthcare Common Procedure Coding Systems (HCPCS)

Electrical Engineering

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Communication skills in engineering
Overview of the process of engineering design for electrical and electronic systems
Electrical and Electronic Careers
Engineering Notation & Measurements
Fundamental Electrical Properties
- Ohm's Law and Power
- Measuring voltage, current, and resistance with multimeters
- Preparing electrical cables (Romex) for use in residential wiring
- Series circuits
- Parallel circuits
- Wiring a basic lighting circuit

Analog and Power Electronics
Digital Electronics & Design
Measurements & Instrumentation
Mathematical Modelling and Analysis
AC Circuit Analysis
- Complex Numbers and Phasors in Polar or Rectangular Form
- AC Circuits Phasors and Impedance Transformers

Computer Organization & Architecture
Physics of Electronics and Nanotechnology
Programming and Control systems
Photonics and Communication Systems
Transducer & Sensors
Microprocessor and Microcontrollers
Electromagnetic Theory and Semiconductor Devices
Electrical Machine Design & Signal Processing
Materials Science
Labs:
- Circuits & Network Lab
- Electrical & Electronic Measurement Lab
- Data Structure Lab
- Numerical Methods & Programming Lab
- Analog Electronic Circuits Lab
- Digital Electronics & Integrated Circuits Lab
- Electronic Measurements & Instrumentation
- Transducer & Sensors Lab
- Technical Report writing for the Lab

Environmental Science

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- **Climate Change**
  - Greenhouse gases
  - Impacts
  - Technologies
  - Policies
  - Orbital and solar forcing
  - Properties of light and albedo
  - Climate and weather
  - Climate modeling
  - Paleoclimate and proxies
- **Population impact on the environment**
  - Consumption
  - Deforestation
  - Agriculture
  - Urbanization
  - Waste management
- **Energy and the environment**
  - Renewable energy sources
  - Non-renewable energy sources
  - Environmental impacts of fossil fuels
  - Energy efficiency and conservation
- **Water conservation and pollution**
  - Water cycle
  - Chemistry of water
  - Physical properties of water
  - Freshwater systems
  - Saltwater systems
  - Groundwater
  - Water contamination
  - Water treatment
  - Water sampling and analysis
  - Regulations
- **Soil and groundwater pollution**
  - Soil composition formation and development
  - Processes
  - Soil physical properties
  - Soil chemical properties
  - Soil and/or groundwater pollution
  - Threats to the environment by soil pollution
  - Remediation
  - Soil sampling and analysis
  - Regulations
  - Solid hazardous waste
- **Earth's atmosphere**
  - Atmospheric pollution
  - Air composition
  - Main atmospheric pollutants
  - Particulate matter
  - Analytical methods and equipment
  - Health effects
  - Ozone
  - Regulations
  - Toxicology
- **Ecology**
  - Flora and fauna
  - Biodiversity
  - Nutrient cycling
  - Biogeography
  - Forestry
  - Invasive species
  - Ecological Disturbance and Successions
  - Biotic and abiotic factors
  - Biomes and ecosystems
- **Environmental management**
  - Environmental policies, procedures and Strategies
  - Sustainability
  - Green business
  - Human Health
  - Environmental Ethics

Social Studies

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Elementary (Grades 4-6)

- Africa
- American Historical Figures
- American Revolution
- China
- Citizenship
- Civil Rights
- Civil War
- Colonial Settlements in America
- Communities
- East Asia and Pacific
- Egypt
- Elections
- Europe
- Family and Authority
- French and Indian War
- Geography
- Government
- Greece
- Holidays and Diversity
- India
- Japan
- Latin America
- Louisiana Purchase
- Mesopotamia
- Middle East
- Native American Culture
- Religions of the World
- Rome
- Slavery in America
- South and Southeast Asia
- The Bill of Rights
- The Constitution
- The Declaration of Independence
- The Incas
- The Mayans
- Trade
- War of 1812
- Westward Expansion
- World Cultures

Middle Grades (Grades 7-8)

- Africa
- American Revolution
- Articles of Confederation
- Byzantine Empire
- Central and South America
- China
- Civil Rights
- Civil War
- Colonial Settlements in America
- Demographic Concepts
- Early American government and political systems
- Economics
- European History
- Exploration
- French and Indian War
- Geography
- India
- Japan
- Louisiana Purchase
- Mapping
- Middle East
- Monroe Doctrine
- Native Americans
- North America
- Religions of the World
- Slavery in America
- The Bill of Rights
- The Constitution
- The Declaration of Independence
- The Physical Environment
- War of 1812
- Westward Expansion

High School (Grades 9-12)

- Africa
- American Revolution
- Ancient Civilizations
- Articles of Confederation
- Asia
- Civil War
- Cold War
- Colonial Settlements in America
- Contemporary World Events
- Declaration of Independence
- Early American Government and Political Systems
- Economics
- European History
- Geography
- Gulf War
- Industrialism
- Korean War
- Latin America
- Louisiana Purchase
- Middle East
- Native Americans
- Prehistoric America
- Reconstruction
- Slavery in America
- Soviet Union and Eastern Europe
- The Bill of Rights
- The Constitution
- The Monroe Doctrine
- Vietnam War
- War of 1812
- Westward Expansion
- World War 1
- World War 2

Student Success

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Academic Strategies
- Note-taking Techniques
- Studying Techniques
- Homework
- Selecting a Major
- Managing Knowledge Gaps
- Scholarly Resources
- Using Technology

Habits for Success
- Organizational Skills
- Attendance & Punctuality
- Motivation & Goals

Stress Management
- Healthy Habits
- Finding Balance
- Building a Support System

Non-Traditional Students
- Work/Life/Family Balance
- Learning New Technologies
- Financial Planning
- Career Transition
- Scheduling & Organization

Parent Coaching for Student Success
- Scheduling & Organization
- Setting Expectations
- Studying Techniques
- Using Resources
- Motivation & Goals
- Managing Knowledge Gaps
- Finding Balance

Employment Strategies
- Self-evaluation of qualifications
- Educational Requirements
- Salary Requirements
- Benefits Requirements
- Scheduling and hours
- Promotion / progression potential
- Immediate needs v. long term goals

Employment Searches
- Targeted job searches
- Navigating online job forums
- Submitting digital records
- Follow-up strategies

Resume Writing
- Templates and formatting
- Appropriate email address
- Resume language v. conversational language
- Identifying and using key words
- Screen-out factors
- Resume length

Cover Letter Writing
- Customizing cover letters to employers
- Confidence v. unrealistic expectations
- Brevity
- Professional information v. personal information
- Controlling emotional appeals

Interview Preparation
- Appropriate attire
- What to bring
- Scheduling
- Punctuality
- Preparing answers and questions

Military Specific Factors
- MOS skills transfer
- Crossover language for military skills and qualifications
- Applicable certifications v. unrelated/military specific training
- Translating military acronyms and jargon

Art History and Appreciation

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Art Historical Periods

- Prehistory
- Ancient Near Eastern/Mesopotamia
- Ancient Egyptian
- Classical - Crete/Greece/Etruria/Rome
- Late Antique/Medieval (Europe)
- Byzantium/Islam
- Pre-Columbian/South American/North American
- African Art and Architecture
- Art of Asia and Oceania
- Renaissance/Baroque/Rococo
- 19th Century
- 20th Century
- Global Modern/Contemporary (since 1950 CE)

Formal Elements and Principles of Design

- Composition
- Color
- Texture
- Value
- Line
- Shape/Form
- Balance
- Emphasis
- Unity/Variety
- Scale/Proportion
- Rhythm
- Time/Motion

Artistic Devices

- Chiaroscuro
- Tenebrism
- Linear Perspective
- Composite view/twisted perspective
- Hierarchy of scale
- Calligraphy
- Trompe l'oeil
- Foreshortening
- Impasto
- Plein-air painting
- Memento mori

Artistic Media

- Drawing
- Painting (tempera/oil/watercolor/fresco)
- Collage
- Sculpture
- Mosaic
- Photography
- Textile arts
- Ceramics
- Printmaking
- Installation
- Video/Film/Digital
- Earthworks

Artistic Movements

- Impressionism
- Post-Impressionism
- Abstraction/Expressionism
- Realism
- Neo-Classicism/Romanticism
- Cubism
- Pop Art
- Surrealism/Dada
- Performance art

Theoretical Approaches

- Feminist
- Psychoanalysis
- Modernism/Post-modernism
- Queer theory
- Hermaneutics
- Archaeology of Knowledge
- Reader-response theory
- Marxist
- Formalism/Semiotics
- Post-Colonial
- Structuralism/Post-structuralism
- Deconstruction

Art Terms

- Sublime
- Miniature
- Portrait
- Decorative arts
- Academy/Salon
- Aesthetics
- Narrative
- Still-life
- Avant-garde
- Genre painting
- Iconography
- Landscape
- Symbol
- Naturalism
- Vanishing point
- History painting

English

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Elementary (Grades 4-6)

- Adjectives
- Adverbs
- Antonyms
- Compare/Contrast
- Connotation
- Contractions
- Cross-Curricular Reading/Writing
- Denotation
- Extract ideas from a variety of texts
- Fiction
- Grammar
- Graphemes
- Letter Writing
- Literary Analysis
- Literary Device
- Literary Themes
- Non-Fiction
- Nouns
- Paragraphs
- Parts of Speech
- Phonemes
- Plays and Theater
- Poetry
- Point of View
- Prefix/Suffix
- Presentations
- Pronouns
- Punctuation and Capitalization
- Reading Comprehension
- Research Skills
- Root Words
- Sentence Structure
- Synonyms
- Verbs
- Vocabulary
- Writing Sentences

Middle Grades (Grades 7-8)

- Characterization
- Connotation
- Content Area Literacy
- Contextual Analysis
- Denotation
- Elements of a Story
- Grammar
- Interdisciplinary Subjects
- Interpreting Graphs in Text
- Literary Analysis
- Literary Criticism
- Literary Devices
- Literary Themes
- Modes of Persuasion
- Narrative
- Non-Fiction
- Oral Communication
- Plays and Theater
- Point of View
- Prose and Poetry
- Punctuation and Capitalization
- Reading Comprehension
- Research Skills - Sources and Documentation
- Sentence Structure
- Subject Area Themes
- Theme
- Vocabulary

High School (Grades 9-12)

- Argument
- Copyright
- Exposition
- Expression through writing and presenting
- Figures of Speech
- Functional Texts
- Grammar
- Literary Analysis
- Literary Criticism
- Literary Devices
- Literary Periods
- Literary Themes
- Logical Development of Ideas
- Multimedia Communication
- Oral Communication
- Organizational Features of Text
- Persuasion
- Plays and Theater
- Point of View
- Presenting Media
- Prose and Poetry
- Punctuation and Capitalization
- Reading Comprehension
- Research Skills
- Sources and Documentation (APA/MLA/Chicago/Turabian)
- Viewing Media
- Visual Communication
- Vocabulary

Literature

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Literary Periods and Movements
- British Literature
- The Enlightenment
- Existentialism
- Medieval Literature
- Modernism
- Multi-Media
- Naturalism
- Post-Colonial Literature
- Post Modernism
- Realism
- Religious Texts
- Renaissance Literature
- Romanticism
- Transcendentalism
- Victorian Literature

Literary Criticism
- Feminist and Gender Criticism
- Formalism
- Historical Criticism and New Historicism
- Marxist Criticism
- Mythological Criticism
- Psychological/Sociological Criticism
- Reader Response Criticism
- Structuralism/ Deconstruction

Prose Non-Fiction
- Biography
- Creative Non-Fiction
- Essay
- News Media
- Non-Fiction

Dramatic Elements/Genres
- Classical Drama
- Comedy of Manners/Farce/Satire
- Drama: Tragedy/Comedy/Tragicomedy/Heroic
- Medieval Mystery/Miracle Plays
- Renaissance Theater
- World Drama Traditions

Prose Fiction
- Ballad
- Elegy
- Epic
- Lyric
- Novellas
- Novels
- Poetry
- Prosody: Rhyme/Meter/Rhythm/Stanza
- Short Stories
- Sonnet Italian/English
- World Fiction Traditions
- World Poetry Traditions

Literary Elements
- Character Development
- Character Types
- Narrative Point of View: First, Second, Third Person
- Plot Structure
- Setting: Geographic, Historical, Socio-Economic
- Stylistic Characteristics of Literature
- Thematic Characteristics of Literature
- Theme
- Versification

Literary Devices
- Allegory
- Irony: Verbal/Dramatic
- Figurative Language: Imagery
- Hyperbole and Synecdoche
- Mimesis/Metonymy
- Symbolism/Metaphor/Simile

Essay Writing

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- Business Writing
- Citation and Documentation
- College and Job Application Writing
- Cover Letter Writing
- Creative Writing
- Descriptive Essay
- Editing and Proofreading
- Elements of Composition
- Expository Essay
- Five Paragraph Essay
- Functional Writing
- Grammar
- Interdisciplinary Writing
- Journal Writing
- Literary Analysis Writing
- Narrative
- Organization and Outlining Essays
- Paragraphs
- Persuasive Essay
- Poetry Writing
- Pre-writing Skills
- Punctuation and Capitalization
- Research Skills and Resources
- Resume Writing
- Source Documentation (APA/MLA/Chicago/Turabian)
- Speech Writing
- Story Writing
- Technical Writing
- Thesis Statements
- Topic Sentences
- Transitions
- Use of Literary Devices
- Vocabulary and Word Choice
- Voice
- Writing Conclusions
- Writing for Standardized Tests
- Writing Leads, Introductory Paragraphs, Conclusions
- Writing Research Papers
- Writing Process
- Writing Sentences
- Writing Strategies
- Writing Styles

College English

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Grammar
- Parts of Speech
- Sentence Structure
- Ending Strategies
- Consistent Tense
- Subject-Verb Agreement
- Noun-Pronoun Agreement

Mechanics and Usage
- Punctuation
- Spelling
- Capitalization
- Homophones
- Comma-splices
- Run-ons
- Incomplete Sentences

Reading
- Evaluating Sources
- Summary/Paraphrase
- Analyzing Texts
- Literary Devices

Source Documentation
- APA (American Psychological Association)
- MLA (Modern Language Association)
- Chicago/Turabian

Style
- Varied Sentence Structure
- Qualifiers
- Positive Form
- Concrete Language
- Concise Writing

Tone
- Formality
- Word Choice
- Clarity
- Academic Expression
- Point of View
- Bias
- Active vs. Passive Voice

Vocabulary
- Synonyms/Antonyms
- Academic Word Choice

College Essay Writing

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NOTE: Tutors wishing to tutor College Essay Writing are expected to be familiar with all concepts on this list ***in addition to*** the College English list.

Reading
- Literary Devices
- Comprehension
- Summary/Paraphrase

Source Documentation
- APA/MLA/Turabian-Chicago
- Evaluating Sources
- Integrating Sources

Modes of Persuasion
- Logical Fallacies
- Argument Types (Toulmin, Rogerian, Classical/Aristotelian)

Writing Process
- Prewriting Strategies
- Thesis Statement
- Organizational Structure
- Grammar and Mechanics

Writing Purpose
- Analysis
- Narrative
- Persuasive
- Work-Related
- Speech Writing

Doctoral Writing

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Proofreading
- Spelling, punctuation, capitalization

Copy Editing
- Grammar
- Syntax
- Consistency of terms

Formatting
- Reference page
- Citations
- Headings
- Auditing references and citations
- Table of Contents
- Headers and footers
- Appendix, tables and figures
- Spacing
- Pagination

Scholarly Writing
- Concise language
- Sentence structure
- Transitions between paragraphs
- Organization of thoughts and sections
- Flow
- Academic Tone

Argument
- Clarity of ideas
- Non-biased, logical argument
- Alignment of argument throughout the manuscript

Primary Reading

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Comprehension

- Main idea and supporting details
- Synthesizing
- Summarizing
- Making predictions and inferences
- Questioning

Vocabulary and Word Recognition

- Root words and affixes
- Syllabication patterns
- Spelling patterns
- Context clues
- Phonemic awareness

Author's Craft

- Tone and mood
- Figurative language
- Point of view
- Author's purpose
- Theme
- Literary devices
- Types of genres

Text Structure

- Literary elements
- Cause and effect
- Problem / solution
- Compare and contrast
- Order and sequence
- Description
- Summarization

Understanding Features of Genres

- Poetry
- Fictional narratives
- Drama
- Informational texts
- Non-fiction

Reading

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Describe features of different genres of writing or poetry. Apply suitable analysis strategies.

- Fiction- narrative -identify features and analyze
- Fiction-mystery/suspense- identify features and analyze
- Poetry- identify features and analyze
- Nonfiction-informational -identify features and analyze
- Nonfiction-persuasive -identify features and analyze
- Biography -identify features and analyze
- Other

Identify main ideas and details, both explicit and implied, within a text.

- Main idea- explicitly stated
- Main idea- implied
- Locating details

Draw valid inferences from a written text and be able to identify supporting text evidence.

- Create valid inferences
- Locate text evidence to support an inferred claim

Correctly identify point of view (first person, second person, third, etc.) and analyze for potential bias within a text.

- First person point of view features and characteristics
- Second person point of view features and characteristics
- Third person point of view features and characteristics
- Omniscient and Limited Omniscient Points of View
- Reliable/Unreliable point of view narration

Identify text structures (cause and effect, chronological order, etc.) within a given text.

- Cause and Effect
- Problem solution
- Compare/Contrast
- Description
- Main idea and Details
- Chronological Order (Sequence)

Use an appropriate graphic organizer or other systematic approach (i.e. note-taking)to demonstrate conceptual understanding of a text.

- Venn Diagram
- Identify an Author's purpose for writing
- Alphanumeric/Structured outline format
- Timeline
- Concept Web
- T-chart
- Other

Draw valid generalizations from a given text.

- Create and/or identify valid generalizations from a text.
- Locate text evidence to support a generalization

Correctly establish facts from a opinions within a text.

- Identify facts from a text
- Identify opinions from a text

Evaluate how graphic sources such as graphs, tables, charts, and other visual images increase understanding of a text.

- Analysis- graph, chart or table in a text
- Analysis- picture
- Other graphics in text context

Integrate main ideas and key details or events to create an effective summary of a text, passage, or book.

- Summarizing a passage
- Details in a summary
- Evaluate a given summary for completeness

Evaluate word meaning within a passage context, or in isolation.

- Vocabulary in isolation
- Vocabulary in context

Assess an author's purpose, use of tone, and theme based on a given text.

- Identify an Author's purpose for writing
- Identify tone of a given text
- Identify theme of a given text

Evaluate reliability of sources, giving consideration to tone, mood or potential bias of the author.

- Tone of text/effect on reliability
- Mood of text/effect on reliability
- Potential bias of author/effect on reliability

Evaluate persuasive writing to determine if an argument is presented logically, clearly, and adequately to influence the reader.

- Text features of persuasive writing
- Argument effectiveness

Formulate connections between texts, compare and contrast two texts on related topics.

- Text connections
- Compare/contrasts related texts

Explain pre-reading activities that increase comprehension.

- Justify pre-reading strategies
- Analyze effective pre-reading activities

Utilize figurative language and textual elements to gain a better understanding of literature.

Primary ELL

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Use of English
- Articles
- Comparisons and Superlatives
- Conditionals
- Contractions
- Countable and uncountable nouns
- Determiners
- Indirect speech
- Participial adjectives
- Passive and active voice
- Passive causatives
- Phrase usage
- Prepositions
- Pronouns
- Relative clauses
- Tag questions
- Time expressions
- Uses of gerunds and infinitives
- Using dictionaries
- Verbs
- Vocabulary
- Word form

Writing
- Conventions of standard written English syntax
- Linking words and text organizers
- Essay structure and development
- Parallel structure
- Research skills
- Spelling
- Stages of the writing process

Speaking
- Daily communication
- Differences between English pronunciation and spelling
- Idioms
- Presentations
- Phonemic awareness

Listening
- Identifying main ideas vs. details
- Listening comprehension strategies
- Processing contextual audio
- Visual organizers

Reading
- Analysis of figurative language
- Concepts of print
- High-frequency sight words
- Reading comprehension strategies
- Phonics as used in Primary ELL
- Rhyme
- Segmenting
- Visual organizers

Pedagogy of ELL
- Concept of communicative competence
- Differences among languages
- Error correction strategies
- Literacy learning strategies

ELL

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English Language Use
- Word form
- Verbs followed by gerunds or infinitives
- Verb tense formation and uses
- Time expressions
- Tag questions
- Subjunctive mood
- Subject-verb agreement
- Relative clauses
- Pronouns
- Prepositions
- Phrase usage: Neither, nor, such, so
- Phrasal verbs
- Passive causatives
- Passive and active voice
- Parts of a sentence
- Participial adjectives
- Modal verbs
- Irregular verb forms
- Indirect speech
- Countable and non-countable nouns
- Conditionals
- Comparisons
- Articles
- Sentence Diagramming
- Vocabulary--finding meaning in context
- Vocabulary--dictionary definitions, appropriate usage, collocations, word families, and connotations)
- Using dictionaries

English Writing
- Conventions of standard written English syntax
- Inversion
- Linking words and text organizers
- Parallel structure
- Prewriting--Brainstorming, outlining
- Finishing the writing process--revising & editing
- Avoiding Plagiarism
- Using sources--credibility, citation, synthesizing info
- Introductions and thesis statements
- Conclusions
- Paragraph construction (topic sentence, body, concluding sentence)

Types of Writing
- Critical Response
- Synthesis
- Argumentative
- Analysis
- Compare/contrast
- Narrative
- Descriptive
- Opinion
- Process
- Summary/paraphrase
- Research Papers

Speaking
- Presentations
- Daily communication--giving directions, giving advice, etc.
- Pronunciation--Stress and intonation patterns
- Pronunciation--Phonetic (International Phonetic Alphabet) transcription
- Pronunciation--Identification of cause of pronunciation errors

Listening
- Note taking
- Processing academic discourse (lectures, presentations, videos, etc.)
- Identifying main ideas vs. details
- Visual Organizers (Venn diagrams, conept maps, etc.)
- Predicting

Reading
- Note taking
- Reading and processing academic texts
- Identifying main ideas vs. details
- Visual Organizers (Venn diagrams, conept maps, etc.)
- Skimming/scanning
- Predicting

Symbolic Logic

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Inferences and Arguments (Premises and Conclusions)
- Recognition of argument
- Validity
- Soundness
- Contingency
- Factual Statements
- Invalidity
- Form versus Content
- Statements and Propositions
- Deductive versus inductive logic
- Sentential logic
- Terms, predicates, variables, and pronouns
- Compound formals
- Necessary versus sufficient conditions
- Statement connectives
- Truth-functional derivations

Categorical Propositions
- Components of a Categorical Proposition
- Venn diagrams and the square of opposition
- Aristotelian versus Boolean logic

Categorical Syllogisms
- Standard form, mood and figure
- Venn diagrams applied to syllogisms
- Rules
- Fallacies of Relevance
- Fallacies of Ambiguity

Propositional Logic
- Symbols and translation
- Truth functions
- Truth tables
- Tautology, contradiction, contingency, and replacement
- Complex truth-functional formals
- If statements versus Only if statements
- Symbolizing the statement form

Natural deduction in propositional logic
- Rules of implication and replacement
- Proving logical truths

Predicate Logic
- Symbols and translation
- Change of Quantifier
- Relational and Overlapping Quantifiers
- Translations in monadic predicate logic
- Translations in polyadic predicate logic
- Complex predicates
- Wide-scope quantifiers
- Derivations in predicate logic
- Symbolizing the statement form

Logic Truth Trees
- Propositional Logic
- Predicate Logic

Introduction to Criminal Justice

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Ethical Issues in Justice and Security
Criminological Theory
Information Technology
Policy Issues
Physical and Personal Protection
Response Planning and Crisis Management
Weapons and Personal Protective Equipment
Management of Criminal Justice Organizations
Victimology
Critical Incident Planning and Preparedness
Governmental Regulation of Policing Policies
Forensic Science

Introduction to Ethics

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Normative Ethical Theories
- Egoism
- Consequentialism
- Deontological Ethics
- Obligatory and Superobligatory Actions
- Hedonism
- Stoic Ethics
- Pragmatic Ethics
- Virtue Ethics
- Existentialism/Radical Freedom
- Feminist Ethics

Metaethics
- Moral Realism and Anti-Realism
- Naturalism and Non-Naturalism
- Cognitivism and Non-Cognitivism
- Objectivism and Subjectivism
- Divine Command Theory (Theological Voluntarism)
- Error Theory
- Is-Ought Gap
- Moral Relativism

Applied Ethics
- Bioethics
- Business Ethics
- Animal Ethics
- Religious Ethics
- Political Ethics
- Sexual Ethics
- Environmental Ethics
- Social Justice

Key Ethical Terms
- Autonomy
- Free Will and Determinism
- Sympathy and Empathy
- Good and Evil
- Happiness
- Pleasure and Pain
- Normative
- Justice

Key Ethical Thought Experiments
- Trolley Problem
- Veil of Ignorance
- Utility Monster
- Experience Machine
- Violinist
- Ring of Gyges
- Drowning Child
- Organ Transplant

Key Ethical Philosophers
- Plato
- Aristotle
- Thomas Aquinas
- Immanuel Kant
- John Stuart Mill
- Peter Singer
- Derek Parfit
- John Rawls
- Robert Nozick
- Philippa Foot
- Judith Butler

Introduction to Philosophy

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Ancient Philosophy

- Greek (Thales, Pythagoras, Zeno of Elea, Skeptics, Socrates, Plato, Aristotle)
- Hellenistic Philosophy (Epicurus, Stoicism)
- Philosophy & religion (Saint Augustine, Thomas Aquinas, Anselm of Canterbury)

Early Modern Philosophy

- The Renaissance (Humanism, Machiavelli, Hobbes)
- Descartes (Doubt & Existence, Mind & Body)
- Locke (Origin of ideas, British Moralists)
- Hume (Empiricism, Scientific Methods, Skepticism)

Recent Modern Philosophy

- The Enlightenment
- Kant (Ethics, Philosophy of Mind, Moral Philosophy)
- Idealism (Transcendental Ego, Objective Reality)
- Utilitarianism (John Stuart Mill, Women's Rights, Individual Liberty)

Contemporary Philosophy

- Phenomenology
- Existentialism (Kierkegaard, Nietzsche)
- Pragmatism (Charles Sanders Pierce, William James, John Dewey)
- Post Modernism
- Ludwig Wittgenstein (Analysis of Language)

Eastern Philosophy

- Buddha
- Daoism
- Confucius

Branches and Foundations in Philosophy

- Metaphysics (Ontology, Mind, Spirit)
- Epistemology (Agnotology, Alethiology, Truth, Belief, Validity)
- Axiology (Value Theory)
- Ethics
- Aesthetics
- Logic & Reasoning (Critical thinking, Deductive, Inductive, Syllogism, Formal, Informal)
- Applied Philosophy (Law, Education, Math, Religion, Science, Engineering)
- Metatheory
- Schools & Traditions
- Social Philosophy (Feminism, Politics, Language)

Introduction to Psychology

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History and Research
- Approaches/schools of psychology
- Research approaches
- Ethics in research, clinical and applied psychology

Biopsychology
- Physiological research techniques
- Nervous system – functional organization
- Neurons, electrical and chemical signaling
- Neuroanatomy
- Endocrine system
- Animal models in psychology, evolution
- Genetics
- Neuroplasticity

Sensation and Perception
- Sensory systems & receptors
- Attention
- Perceptual processes
- Psychophysical mechanisms

Consciousness
- Sleep and dreaming
- Sleep and dreaming
- Meditation
- Psychoactive drugs and consciousness

Conditioning and Learning
- Biological (neural) basis for learning
- Classical conditioning
- Operant conditioning
- Observational learning
- Cognitive processes in learning
- Constructivism
- Social learning, Implicit learning

Cognition
- Memory
- Language
- Thinking
- Problem solving
- Intelligence

Motivation, emotion
- Biological basis
- Social motivation
- Theories of emotion
- Stress

Developmental
- Types of development
- Gender, sex, and sexuality
- Heredity and environment
- Lifespan: prenatal through geriatric
- Developmental research methods

Personality
- Assessment: measuring personality
- Theories of personality
- Self-concept and self-esteem

Psychological disorders
- Defining "normality" and "abnormality"
- Anxiety disorders
- Dissociative disorders
- Mood disorders
- Neurocognitive disorders
- Personality disorders
- Psychoses
- Somatoform disorders
- Health, stress, coping

Treatment
- Psychological therapies
- Medical therapies, psychopharmacology
- Community psychology

Social psychology
- Aggression & antisocial behavior
- Attitudes, attitude change
- Attribution processes
- Conformity, compliance & obedience
- Group dynamics
- Interpersonal perception
- Cultural influences

Statistics, tests, measurement
- Descriptive & inferential statistics (definitions)
- Measurement, operational definitions
- Reliability and validity
- Samples, populations, standardization & norms

Cultural Anthropology

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Cultural Anthropology
- Subdisciplines of Anthropology
- Culture
- Method and Theory
- Applied Anthropology

Language and Art
- Communication and Language
- Art and Media

Ethnicity, Gender and Religion
- Race and Ethnicity
- Gender and Sexuality
- Religion

Politics and Economics
- Subsistence
- Political Arrangements

Kinship and Marriage
- Kinship
- Marriage

Global Perspective
- Colonialism and Global Systems
- Trade
- Ecology
- Current Issues

Political Science

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American Politics
- Structure of Federal and Local Governments
- Civil Rights and Liberties
- Political Behavior and Culture
- Communication and Political Strategies
- Homeland Security
- Current Political Issues
- Institutions

Comparative Politics
- The Modern State
- Identity
- Regimes and Governing Institutions
- Participation and Representation
- Political Economy
- Conflicts and Violence
- Intercultural Awareness

International Relations
- Realist Theories
- Liberal and Social Theories
- Globalization and Global Citizenship
- Violence, Terrorism and Counter-Terrorism
- International Organizations and Law
- Foreign Policy
- International Security and Military Strategies
- Geopolitics and Human Geography

Methodology in Political Science
- Research Design
- Research Ethics
- Qualitative Method
- Quantitative Method
- Statistical Inference
- Data Collection and Interpretation

Political Thoughts
- The Meaning of Politics
- Freedom and Social Contract
- Power, War and Conflicts
- Justice and Law
- Individual v. Collective Rights
- Political Culture and Behavior

Public Policy
- Contexts of Public Policy
- Economic Issues
- Environmental Policies
- Criminal Justice
- Morality and the Role of Religion
- Social Policies
- Defense Policies Subdisciplines of Anthropology

Research Methods

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- **Scientific Method**
  - Cause and effect
  - Research hypotheses
  - Testability
- **Developing research ideas**
  - Defining and using constructs
  - Theories, models, and hypotheses
  - Pilot research
- **Literature searches**
  - Conducting a literature search
  - Evaluating quality of sources
  - Peer review
  - Reading journal articles
- **Research ethics**
  - Belmont report
  - Deception
  - Institutional Review Boards and human-subjects research
  - Animal Care and Use Committees and non-human subjects
- **Bias**
  - Experimenter bias
  - Participant bias
  - Research and Culture
- **Sampling**
  - Populations and samples
  - Probability sampling methods
  - Nonprobability sampling
  - Sampling Error
- **Validity and Reliability**
  - Internal validity
  - External validity
  - Threats to validity
  - Measurement
  - Inter-rater reliability
- **Non-Experimental & Quasi-Experimental Research**
  - Correlational studies
  - Pre-Post, time-series, and longitudinal designs
  - Quasi-independent variables
  - Ex Post Facto research
  - Survey construction and administration
  - Likert scale questions
  - Tests, Inventories, and self-report
- **Qualitative research**
  - Naturalistic observation
  - Case study
  - Focus groups
  - Coding and categorizing
- **Small-N and single-subject designs**
  - Phases and phase changes
  - Reversal designs
  - Multiple baseline designs
  - Evaluating single-subject research
- **Quantitative research and Experimental Design**
  - Independent variables
  - Dependent variables and measurement choices
  - Control
  - Counterbalancing
  - Extraneous variables
  - Confounding variables
  - Group selection
  - One factor, two or more groups
  - Factorial designs
  - Interaction
  - Sample size and power
- **Evaluating Research**
  - Hypothesis testing
  - Appropriate statistical tests for experimental design
  - Interpreting statistical results
  - Effect size
  - Drawing conclusions
  - Generalizability
  - Causality

Tutors should be familiar with parametric and nonparametric hypothesis tests included in the College Statistics subject.

Introduction to Sociology

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History and Theory
- Purpose of Sociology
- Sociological Imagination
- Structural Functionalism
- Conflict Theory
- Symbolic Interactionism
- Social Exchange Theory
- Ethnomethodology
- Individual and Society
- Social Context of Time, Place, and Location
- Macro- and Micro- Approaches

Theories of Self
- Socialization and the Self
- Looking Glass
- "I" and "Me"
- Dramaturgy
- Status
- Role Conflict, Strain, Performance, and Expectation
- Emotions

Culture and Society
- Norms, Customs, Traditions, Values, Symbols, and Language
- Ethnocentrism
- Cultural Relativism
- Group Behavior
- Power
- Authority
- Leadership

Social Class
- Class Systems
- Inequality
- Income and Wealth
- Subcultures
- Labor Market
- Division of Labor
- Economic Systems
- Privilege and Oppression
- Social Mobility

Deviance and Social Control
- Deviance
- Labelling
- Misdemeanor and Felony
- Group Dynamics
- Criminal Justice, Punishment
- Social Control
- Stigma

Race/Ethnicity
- Common Culture
- Shared Experience
- Divisions

Race/Ethnicity (Cont'd)
- Inequalities
- Dominant Group
- Minority Group(s)
- Discrimination, Prejudice, Racism
- Homogeneity and Heterogeneity

Gender/Sex
- Biological Traits
- Gender Norms
- Gender Orders
- Masulinity/Femininity
- Personal Identity
- Feminism
- Heterosexism

Sexuality
- Sexual Attraction
- Relationship with Sex and Gender
- Non-binary sexuality
- Sexual Harrasment
- Homophobia

Social Institutions and the Family
- Education
- Schooling and Social Class
- Types of Families
- Nuclear/Extended
- Types of Marriage
- Religion
- Protestant Work Ethic
- Religious Organization - Denominations, Cult, Church, Sect
- Types of Politics
- Capitalism, Socialism, and Communism
- Demography
- Deindustrialization
- Migration
- Health
- Morbidity and Mortality

Social Change
- Social Change and Dilemmas
- Threat to Social Order
- Group Reluctance
- Social Change and Movements

Research Methods
- Qualitative Methods
- Quantitative Methods
- Mixed Methods
- Independent and Dependent Variables
- Mean/Median/Mode
- Sample
- Hypothesis

Introductory Accounting

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Financial Reporting and Accounting Cycle
- Accrual vs. cash accounting
- Worksheets and t-accounts
- Adjusting Entries
- Financial Statement Preparation (including direct/indirect statement of cash flows)
- Closing Entries

Accounting for Service and Merchandising Companies
- Journal Entries
- Multi-step income statements
- Perpetual vs. periodic
- LIFO, FIFO, & weighted average
- Accounting for uncollectible accounts (allowance method vs. direct write off method)

Internal Controls & Cash
- Bank reconciliations
- Petty cash

Accounting for Property, Plant, and Equipment
- Entries for PPE purchases
- Entries for PPE sales/disposal
- Depreciation (straight-line, double-declining-balance, units-of-production)

Accounting for Partnerships
- Forming a partnership
- Income allocation
- Partner admission/withdrawal
- Partnership liquidation

Accounting for Corporations
- Entries for stock
- Entries for dividends
- Stock splits
- Financial ratio analysis
- Treasury stock

Accounting for Investments
- Accounting for investments in stocks (purchase, sale, equity method, fair value method, etc.)
- Accounting for investments in bonds

Bonds Payable
- Accounting for bonds
- TVM Analysis for bonds
- Amortization & amortization tables

Payroll and Taxes
- Accounting for taxes
- Accounting for payroll

Managerial Accounting
- Job order costing
- Process costing
- Activity-based costing
- Cost-volume-profit analysis
- Variable vs. absorption costing
- Budgets

Planning, control, and performance evaluation
- Differential analysis
- Capital investment decisions

Intermediate Accounting

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Accounting Cycle, Income Statement, Balance Sheet

- Accrual vs cash
- Adjusting entries
- Extraordinary items
- Financial statement presentation and disclosures

Statement of Cash Flows

- Indirect method of cash flows
- Direct method of cash flows
- Investing & financing cash flows

Time value of money

- PV and FV of lump sum
- PV and FV of annuities
- Deferred annuities

Revenue recognition issues

- General criteria for recognizing revenue
- Long term contracts
- Installment sales
- Multi-component contracts

Revenue , Receivables and Cash Cycle

- Sales adjustments (discounts, returns, allowances)
- Notes receivable
- Sale of receivables
- Cash equivalents
- Estimating uncollectible accounts & net realizable value

Inventory & Cost of Goods Sold

- Perpetual vs periodic systems
- Inventory valuation methods
- Lower of cost or market
- Special issues: in transit, consignment, purchase adjustments

Noncurrent operating assets

- Establishing asset cost
- Valuation of assets and impairment
- Depreciation and amortization methods
- Retirement, sale or exchange of assets
- Error corrections

Debt

- Short term liabilities
- Bond pricing
- Bond issues and retirements

Equity

- Issuance of capital stock
- Treasury stock transactions
- Cash and stock dividends
- Accounting for share-based compensation

Investment in Debt & Equity Securities

- Classification of investment securities
- Recognition of revenue from investment securities
- Accounting for the change in value of securities
- Sale of securities

Leases

- Lease classification criteria
- Accounting for capital leases
- Accounting for operating leases

Income Taxes

- Computation of deferred assets and liabilities
- Carryback and carryforward of operating losses

Earnings Per Share

- Basic EPS
- Diluted EPS

Pensions

Contingencies

Accounting Changes and Error Corrections

- Changes in accounting principle
- Changes in accounting estimate

Cost Accounting

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Activity Based Costing
Budgetary Planning and Control
Cost & Revenue concepts
Cost-Volume-Profit
Inventory Valuation
Job Order Costing
Manufacturing inventories
Motivating Employees to Perform
Process Costing
Ratio Analysis
Transfer Pricing
Working Capital Management

Govt/Nonprofit Accounting

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In addition to a fundamental knowledge of Accounting, tutors will need to know specific applications with regard to:

Governmental Transactions
Budgeting
Nonprofit Transactions
Financial Reporting

Managerial Accounting

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Budgetary Planning and Control
Capital Budgeting
Capital Structure
Cost-Volume-Profit
Incremental Analysis
Job Order Costing
Manufacturing inventories
Motivating Employees to Perform
Process Costing
Product costs v. period costs
Ratio Analysis
Transfer Pricing
Working Capital Management

Tax Accounting

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1120
Business Income and Deductions
Compensation
Corporate Formation, Reorganization, and Liquidation
Corporate Operations
Corporation: Nonliquidating Distributions
Dispositions of Partnership Interests
Entities Overview
Forming and Operating Non-Profits
Forming and Operating Partnerships
Income and Exclusions
Individual Deductions
Individual Income Tax
Individual Income Tax Computation and Tax Credits
Intro to Tax
Investments
Property Acquisition and Cost Recovery
Property Dispositions
Retirement Savings and Deferred Compensation
S Corporations
State and Local Taxes
Tax Compliance
Tax Consequences of Home Ownership
Tax Planning
Transfer Taxes and Wealth Planning
U.S. Taxation of Multinational Transactions

Advanced Accounting

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Intercorporate Investments
- Investments in Financial Assets
- Investments in Associates
- Business Combinations
- Special Purpose Entities
- Equity Method
- Cost Method
- Acquisition Method
- Goodwill

Consolidations

Segment and Interim Reporting

International Accounting
- Foreign Currency Transactions
- Foreign Subsidiaries
- Foreign Exchange Risk and Hedging
- US GAAP vs. IFRS
- Translation of Foreign Currencies
- Financial Statement Conversions

Financial Reporting and Standards
- SEC
- SOX
- Ethical Standards

Accounting for Derivatives

Corporations in Financial Difficulty
- Legal Reorganizations
- Liquidations
- Accounting for Bankruptcy

Partnerships

Auditing

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Audit Reports

- Types of Audit Reports and Audit Opinions
- Components of an Audit Report

Quality Control Standards

- Elements of a System of Quality Control
- Acceptance and Continuance of Client Relationships
- Evaluating and Communicating Deficiencies
- Documentation of the system of internal control

Audit Risk and Analytical Procedures

- Materiality and Risk
- Audit Risk Model
- Internal Control and Control Risk
- Inherent Risk
- Planned Detection Risk
- Analytical Review Techniques

Professional Ethics and Legal Liability

- Auditor selection, compensation and termination
- Auditor vs Client responsibility for auditing statements
- Rights and Responsibilities of Auditors

Audit Evidence

- Types of Audit Evidence
- Procedures for Obtaining Evidence
- Sources of Substantive Audit Evidence

Fraud

- Types of Fraud
- Assessing the Risk of Fraud
- Responsibilities When Fraud is Suspected

Introductory Economics

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Intro Microeconomics

Basic Supply and Demand (Algebra-Based)
- The Demand Curve and Quantity Demanded
- The Supply Curve and Quantity Supplied
- Equilibrium and Market Demand
- Shortages, Surpluses, and Subsidies
- Taxes, Regulations, Price Controls, Price Ceilings, and Price Floors
- Consumer Surplus and Producer Surplus
- Deadweight Loss
- Income Effect and Substitution Effect

Production Possibilities Frontier (Algebra-Based)
- Opportunity Cost
- Comparative Advantage and Absolute Advantage
- Gains and Losses from Trade
- Marginal Rate of Substitution

Consumer Theory (Algebra-Based)
- Price Elasticity of Demand
- Cross-Price Elasticity
- Price Elasticity of Supply
- Consumer Utility and Marginal Utility

Monopoly and Oligopoly Behavior (Algebra-Based)
- Monopoly Structure and Power
- Monopoly Price Determination and Monopoly Marginal Revenue
- Monopoly Deadweight Loss and Inefficiency
- Price Discrimination
- Monopolistic Competition
- Economies of Scale
- Oligopoly Structure and Power
- Cartels, Cheating, and Breakdown of Cartels

Perfect Competition and Managerial Economics (Algebra-Based)
- Profit Maximization
- Short-Run Costs and Lost-Run Costs
- Marginal Cost, Average Cost, Fixed Costs, Variable Costs, and Total Cost
- Marginal Profit, Average Profit, and Total Profit
- Industry Supply and Demand Curves
- Uncertainty and Sunk Costs

Game Theory
- Nash Equilibrium
- Prisoners' Dilemma
- Application to Oligopoly and Competition

Behavioral Economics
- Market Efficiency, Market Inefficiency, and Market Failure
- Positive Externalities, Negative Externalities, and Solutions for Externalities

Behavioral Economics (Cont'd)
- Adverse Selection and Moral Hazard
- Public Goods and Private Goods
- The Tragedy of the Commons and the Coase Theorem

Introduction to the Labor Market
- Supply of and Demand for Labor
- Marginal Product of Labor
- Types of Wages
- Tournament Theory

Intro Macroeconomics

National Economic Models and Growth Theories
- Classical and Neoclassical Economic Models
- Keynesian and New Keynesian Economic Models
- Business Cycles and Shocks to Aggregate Demand
- Classical Growth Models
- Solow-Swan Growth Model

National Accounts, Price Indices, and the Circular Flow of Expenditures
- Gross Domestic Product and Gross Domestic Income
- Gross National Product and Gross National Income
- GDP Cycles, Real GDP, and Nominal GDP
- Economic Growth and Loss
- GDP Deflator
- Consumer Price Indices
- CPI Deflator

National Investment and Savings
- Marginal Propensity to Consume
- Marginal Propensity to Save
- The Multipliers

National Labor Market and Labor Force Participation
- Supply of and Demand for Labor
- National Labor Market Equilibrium
- Causes and Types of Unemployment
- Labor Force Participation Rates
- Full Employment Output

Fiscal Policy, Taxation, and Federal Spending
- Income Taxes and Corporate Income Taxes
- Balanced Budgets and Government Debt
- Transfer Payments and Federal Spending
- Insurance and Welfare

Monetary Policy and National Banking
- Fractional Reserve Banking System and Reserve Ratios
- The Power, Functions, and Tools of the Federal Reserve

Monetary Policy and National Banking (Cont'd)
- Levels of the Money Supply
- Positive and Negative Shocks to the Money Supply

Inflation and Quantity Theory of Money
- Types and Causes of Inflation
- The Phillips Curve
- Quantity Theory of Money

Introduction to Savings, Investment, and Finance
- The Market for Loanable Funds
- Supply of and Demand for Money
- The Role of Intermediaries and Types of Investments
- Stocks, Bonds, and Returns on Investment
- Simple and Compound Interest

Economic Ethics and Public Policy
- Cultural Goods, Paternalism, and Exploitation
- Fair and Equal Treatment

Economic Ethics and Public Policy (Cont'd)
- Immigration and Meddlesome Preferences
- Poverty, Inequality, and Distribution of Income
- Special Interest Groups

Political Economy
- Democracy, Growth, and Famine
- Median Voter Theorem
- Rational Ignorance and Voter Myopia
- Political Business Cycles

International Economics
- Balance of Payments
- Imports, Exports, and Trade Balance Behavior
- Tariffs and Protectionism
- Types of Exchange Rates
- Currency Speculation

Intermediate Macroeconomics

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Capital, Investment, and Market for Loanable Funds*
- Changes in and Factors of Capital Stock: Tobin's Q
- Cost of Capital and the Demand for Investment
- The Market for Loanable Funds
- Keynesian Cross
- Marginal Product of Capital
- Types of Interest Rates

National Consumption and National Savings*
- Budget Constraints and Consumption Functions
- Income Shocks and Intertemporal Choice
- Measuring National Savings
- The Marginal Propensity to Consume, the Marginal Propensity to Consume, and the Multipliers

National Economic Models and Growth Theories*
- Classical and Neoclassical Economic Models
- Savings and Investment Economic Models
- Consumption and Savings Economic Models
- Keynesian and New Keynesian Economic Models
- Business Cycles
- Fischer Economic Models
- Stylized Facts
- Classical Growth Models
- Endogenous Growth Model
- Solow-Swan Growth Model

Endowment and Production Economies
- Production Economy Model and Production Economy Problems
- Effects of Change in Production Economies
- Production Equilibrium
- Endowment Economy Model and Endowment Economy Problems
- Endowment Equilibrium

Fiscal Policy and Government Debt
- Balanced Budgets, Tax Smoothing, Stabilization Policies
- Government Deficits and Government Spending
- Government Transfer and Taxation Policies
- Traditional View of Government Debt
- Ricardian Debt and Ricardian Equivalence Theorem

National Accounts, Price Indices, and the Circular Flow of Expenditures
- Gross Domestic Product/Gross Domestic Income
- Gross National Product/Gross National Income
- GDP Cycles, Real GDP, and Nominal GDP
- Economic Growth and Loss
- GDP Deflator
- Consumer Price Indices
- CPI Deflator

National Labor Market and Labor Force Participation
- Supply of and Demand for Labor
- National Labor Market Equilibrium
- Causes and Types of Unemployment
- Labor Force Participation Rates
- Full Employment Output
- Labor/Leisure Choice
- Productivity Shocks
- Reservation Wages and Wage Determination

Aggregate Supply and Demand*
- The AS-AD Model
- Aggregate Demand and Long Run Aggregate Supply
- Shifting Aggregate Demand and Aggregate Supply and the AS-AD Equilibrium
- The IS-LM Model
- Shifting the IS-LM Curves and the IS-LM Equilibrium

Inflation, Quantity Theory of Money, and Theory of Liquidity
- Causes and Types of Inflation
- Inflation and Unemployment: The Phillips Curve
- Quantity Theory of Money
- Velocity of Money
- Levels of the Money Supply
- Positive and Negative Shocks to the Money Supply
- Theory of Liquidity

Monetary Policy and National Banking
- National Banking Systems, Tools, Federal Reserve
- The Role and Structure of Intermediaries
- The Fisher Effect and the Laffer Curve
- The Supply of and Demand for Money
- Money Neutrality, Money Non-Neutrality, and Monetary Equilibrium
- Rational and Irrational Expectations
- Welfare Improving Stabilization Policy
- Currency Printing and Seigniorage
- Ex Ante Outcomes, Ex Post Outcomes, Multiple Equilibria, and Animal Spirits

International Economics
- Imports, Exports, and Trade Policies
- Trade Balance Behavior
- Foreign Exchange Markets/Foreign Exchange Rates
- Currency Speculation and Signal Watching
- Balance of Payments
- Income Equality and Inequality: The Gini Coefficient and Autarky
- Poverty and Distribution of Income
- Immigration, Exploitation, and Paternalism

**Calculus-based*

Intermediate Microeconomics

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Consumer Theory (Calculus-Based)
- Budget Constraints and Consumer Surplus
- Consumer Choice and Demand
- Consumer Preferences and Utility
- Insurance, Lotteries, and Risk Aversion
- Compensating Variation and The Slutsky Equation
- Price Elasticity

Game Theory
- Nash Equilibrium, Mixed Strategies, and Dominant Strategies
- Sequential Games and Subgame Perfection
- Bayesian Equilibrium and Signaling\Separating Equilibrium
- Adverse Selection
- Threats, Commitments, and Credibility

Behavioral Economics
- Asymmetric and Incomplete Market Information
- Positive Externalities, Negative Externalities, and Market Failures
- Solutions for Negative Externalities and Markets for Positive Externalities
- Moral Hazard and the Principal-Agent Problem
- Warranties, Quality, Uncertainty, and Signaling
- Risks, Risk Preferences, and the Demand for Risky Assets
- Public, Private, and Network Goods
- Tragedy of the Commons and the Coase Theorem

Monopoly and Monopsony (Calculus-Based)
- Monopoly Structure and Power
- Monopoly Marginal Revenue and Monopoly Profit Maximization
- Price Discrimination
- Social Costs of Market Power
- Monopoly Advertising and Building
- Monopsony Structure and Power
- Tariffs, Price Ceilings, and Price Floors

Monopolistic Competition and Oligopoly (Calculus-Based)
- Market for Factor Inputs
- Structure and Power of Monopolistic Competition
- Oligopoly Structure and Power: Cournet and Stackelberg Models
- Price Competition
- Prisoner's Dilemma and Price Setting
- Cartels and Breakdown of Cartels

Theory of the Firm and Managerial Economics (Calculus-Based)
- Cost Minimization and the Cost Function
- Profit Maximization and the Profit Function
- Consumption Duality
- Long-Run Costs and Short-Run Costs
- Long-Run Supply and Short-Run Supply
- The Shutdown Condition
- Economies of Scope and Economies of Scale
- Technology, Inputs, and Outputs
- Marginal Product of Capital

Labor Market (Calculus-Based)
- Supply of and Demand for Labor
- Managerial Wage Determination and Minimum Wage
- Total Labor and Marginal Product of Labor
- Labor Market Efficiency Wage Theory
- Labor Unions

Finance

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Role and objective of financial management

- Review of the four basic financial statements
- Analysis of financial statements and financial performance
- Markets and Financial Institutions
- Stock and Bond Valuation
- Time Value of Money
- Techniques of Analysis (cash flow valuation; capital budgeting and risk analysis)

Financial Choices of Firms

- Distributions to shareholders
- Dividends and share repurchases/treasury stock
- Managing current assets/working capital
- Financing current assets/managing current liabilities

The Financial Environment

- Markets, institutions, interest rates, and taxes
- Risk and rates of return
- Bonds and their valuation
- Stocks and their valuation
- Cost of capital
- Capital budgeting, including cash flow estimation, decision criteria, and risk analysis
- Capital structure and leverage
- Distributions to shareholders
- Dividends and share repurchases/treasury stock
- Managing current assets/working capital
- Financing current assets/managing current liabilities
- Financial planning, budgeting, and forecasting.

Principles of Management

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History and Theories of Management
- Scientific Management
- Organizational Developments
- Sociotechnical Theory
- Hierarchy of Needs
- Five disciplines of the Learning Organization

The Role of Customer Relations
- Building customer relationships
- Promotions, Pricing & Credit
- Environmentalism (burdens and potentials)
- Psychological & Sociological influences

Professional Management & Managing Growth
- Managing Human Resources
- Managing Operations
- Managing Risk
- Leadership & Authority
- Time management

Entrepreneurial Opportunities
- Small Businesses Concepts

Ethics in Business
- Integrity framework
- Supporting Organizational Culture

Business Analysis
- SWOT
- Internal & External (outside-in analysis & inside-out analysis)

The Business Plan
- Function of and formatting plan
- Main types of plans

Employee Relations & Leadership
- Roles in motivation
- Specifying structure and creating balance

Legal forms of Organizations
- Sole proprietorship, partnerships, C corp, LLC, etc.

Financial Planning
- Income statement
- Balance sheet
- Cash Flow statement
- Financial forecasting
- Debt & Equity

Product & Supply Chain Management
- Product lifecycle
- Branding, labeling, strategies

Business Law

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Foundations of Law
- Criminal vs. Civil Law
- Substantive vs. Procedural Law
- Sources of Law
- Administrative Law & Regulation
- Consumer Protection Laws
- Anti-Trust Regulations
- Unfair Trade Practices
- Employment Law & Labor Relations
- Professional Liability and Accountability
- Environmental Law

Dispute Settlement
- Means of Dispute Settlement
- State and Federal Court Organization
- Alternative Dispute Resolution
- Court Procedure
- Criminal Concerns
- Intentional Torts
- Liability

Contracts & E-Contracts
- Elements of Contracts
- Offer & Acceptance (Agreement)
- Consideration
- Form and Meanting
- Capacity
- Consent, Mistakes, Fraud, Undue influence & Duress
- Statute of Frauds & Writing Requirement
- Third Party Rights
- Performance and Discharge
- Breach & Remedies

Sales & Lease Contract Formation
- Uniform Commercial Code (UCC)
- Title
- Risk
- Insurable Interest
- Performance, Breach and Remedies
- Warranties & Limitations
- Products Liability

Agency and Employment
- Agency Formation and Duties
- Agency Rights and Remedies
- Agency Liability and Termination
- Employment at Will
- Employment Discrimination
- Employment & Immigration

Business Organization
- Partnerships
- Hybrid Business Forms
- Corporations Formation
- Management of Corporations

Property
- Personal Property vs. Real Property
- Landlord-Tenant Relationships
- Zoning & Government Regulations
- Estates and Trusts
- Insurance Terms, Concepts & Types
- Intellectual Property

Commerical Paper
- Negotiable Instruments Definition
- Transferability & Holder in Due Course
- Liability of Parties
- Checks and Electronic Fund Transfers
- E-money & Online Banking

Creditor Rights
- Creditor Rights and Remedies
- Debtor Protections
- Surety & Guarantees
- Bankruptcy Concepts
- Mortgage and Foreclosure

Introductory Legal Research and Writing
- Effective Legal Research Strategies
- Researching Cases, Statutes, and Regulations
- Legal Databases and Governmental Codes
- Organizing Legal Research Notes
- Summarizing Case Law

Marketing

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Marketing Strategy Fundamentals
- Establishing SMART marketing objectives, strategies, and tactics
- Identifying target markets
- Understanding the marketing mix or Four Ps
- Conducting situation and competitor analysis
- Navigating B2B, B2C, and non-profit marketing

Product or Service Development
- Designing a product or service concept and prototype
- Formulating brand positioning
- Calculating development costs and projecting sales
- Preparing a launch strategy

Market Research and Data Analysis
- Writing research proposals
- Planning the research design
- Conducting research through focus groups, surveys, and interviews
- Analyzing and Interpreting data
- Reporting on research findings

Consumer Behavior
- Understanding consumer decision making process
- Examining consumer information searches
- Exploring subcultures influencing consumer behavior
- Distinguishing between planned versus impulse purchases
- Defining brand equity, perception, and reputation

Public Relations and Communications
- Composing ethical marketing policies
- Determining social responsibility strategies and campaigns
- Pitching compelling stories for the media
- Designing a crisis communication plan
- Recognizing owned, earned and paid media methods
- Measuring and evaluating public relations results

Supply Chain and Distribution Logistics
- Creating supply chain management processes
- Implementing a customer service management system
- Negotiating for suppliers, vendors, and intermediaries
- Estimating and fulfilling orders
- Planning warehousing and distribution logistics

Creative Strategy, Advertising, and New Media
- Writing a creative brief
- Formulating promotional strategies via traditional
- Constructing digital marketing and social media strategies
- Developing interactive and mobile marketing strategies

MS Access

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Proficiency with Access 2010 required, preferably older and newer versions as well. English version required.

- **Database Relations and Development**
  - Database Terminology
  - Primary and Secondary Keys - Creating Relationships
  - Enforcing Referential Integrity in Key Relationships
  - Creating a Database
  - Creating a Database from a Template
- **Tables**
  - Types of Tables within a DB
  - Creating Tables
  - Creating Linked Tables
  - Changing Tables
  - Entering New Data
  - Adding Descriptions
  - Indexing a field
  - Data Validation
  - Hiding Fields
  - Validating and Managing Records within a Table - Adding and Updating
- **Queries**
  - Using Queries within a Database
  - Running a Query
  - Creating a Simple Query
  - Creating a Crosstab Query
  - Creating a Parameter Query
  - Operations and Expressions in a Query
  - Creating an Aggregate Query
  - Create an Action Query
  - Create a Multiple Table Query
  - Saving Queries
- **Forms**
  - Using Forms within a Database
  - Creating a Blank Form
  - Creating a Form from a Template
  - Saving Forms
  - Adding and Moving Form Controls
  - Managing Labels
  - Adding Sub-Forms
  - Working with Data on Forms
  - Modifying Print Settings
  - Inserting backgrounds, headers, and footers
- **Reports and Reporting Tools**
  - Creating a New Report
  - Creating a Report Based on a Query
  - Creating a Report Using a Wizard
  - Selecting Summary options
  - Group and Sort Report Fields
  - Report Text Box Controls
  - Modify Data Sources
  - Inserting headers, footers, and applying themes
  - Formatting Reports
- **Macros**
  - Using Macros
  - Understanding Security
  - Creating a Macro
  - SubMacros
  - Handling Macro Errors
- **Importing/Exporting**
  - Creating a DB by importing
  - Importing Data into Tables
  - Exporting Data
- **Data Analysis**
  - Transforming Data
  - Calculations and Dates
  - Parametrized Queries
  - Entering SQL
  - Subqueries and Aggregation

MS Excel

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Note: Proficiency with Excel 2010 required, preferably older and newer versions as well. English version required.

Environment & Capabilities
- File Tab
- Excel Options – including finding and customizing
- Templates – including finding and implementing
- Add-Ins – including finding and installing

Toolbars
- Ribbon – including identification, usage, customization, etc.
- Quick Access Toolbar – including identification, usage, customization, etc.
- Custom Tabs – including creation and arrangement of custom tabs, custom groups, etc.
- Formula Bar and Name Box

Spreadsheet Basics
- Rows and Columns
- Ranges – including selecting, naming, finding, using named ranges, etc.
- Views – including page layout, page break, custom, etc.
- Entering Data
- Printing
- Worksheet Management – including inserting, deleting, hiding, unhiding, moving, copying, etc.
- Panes and Page Breaks
- Headers and Footers – inserting, using templates, customizing, etc.
- Keyboard Shortcuts

Formatting
- Formatting Cells, Worksheets, Workbooks
- Format Painter
- Paste Special
- Conditional Formatting – including built-in styles and formula-based styles

Filtering & Sorting
- Filters – including implementing, using, customizing, etc.
- Sorting – including basic and custom sorts

Formulas & Functions
- Entering Formulas – including basic formula syntax, etc.
- Using Functions – including commonly used functions, using function helper, etc.
- Evaluating Formulas and Function Results – including tracing formulas/precedents, error checking, etc.
- Interpreting and Troubleshooting Formulas and Functions
- Calculation Operations – including manual vs. automatic

Charts, Tables, & PivotTables
- Creating, Using, and Formatting Charts
- Creating, Using, and Formatting Tables
- Creating, Using, and Formatting PivotTables
- Smart Art and Illustrations
- Sparklines

Importing & Exporting
- Importing and Exporting Data/Documents
- Importing and Exporting Pictures
- Picture Editing

Macros
- Recording Macros
- Running Macros

Saving, Sharing & Protecting
- Auto-Save – including default settings and customizing
- Recovery
- File Types (e.g., .xls, .xlsx, .xlsm, etc.)
- Sharing and Protecting Worksheets and Workbooks
- Evaluating Changes in Shared Documents

MS Word

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Note: Proficiency with Word 2010 required, preferably older and newer versions as well. English version required.

Program Fundamentals
- Giving Commands in Word
- Using Command Shortcuts
- Creating, Opening, Previewing, Printing, Saving, and Closing a Document
- Using Help

Getting Started with Documents
- Entering, Deleting, Selecting, and Replacing Text
- Navigating, Browsing, and Viewing a Document
- Working with the Document Window and Viewing Multiple Document Windows

Working With and Editing Text
- Checking Spelling and Grammar
- Finding and Replacing Text
- Using Word Count and the Thesaurus
- Inserting Symbols and Special Characters
- Copying and Moving Text
- Collecting Multiple Items to Move or Copy
- Using Undo, Redo, and Repeat

Formatting Characters and Paragraphs
- Changing Font Type, Size, Color, Highlighting, Styles, and Effects
- Applying Spacing and Ligatures
- Creating Lists
- Changing Paragraph Alignment, Paragraph Spacing, and Line Spacing
- Adding Paragraph Borders and Shading
- Copying Formatting
- Setting, Adjusting, and Removing Tab Stops
- Using Left and Right Indents, and First Line and Hanging Indents

Formatting the Page
- Adjusting Margins, Page Orientation, and Size
- Using Columns, Page Breaks, Section Breaks, Line Numbers, and Hyphenations
- Working with the Page Background
- Rearranging, Numbering, and Viewing an Outline
- Rearranging and Navigating Long Documents
- Using Headers, Footers, Bookmarks, Cross-references, Footnotes, Endnotes, Citations, and Bibliographies
- Working with Picture Captions
- Adding a Table of Contents, Index, Cover Page, and Page Numbers

Working with Themes and Styles
- Creating, Modifying, Applying, and Deleting a Style
- Working with the Styles Gallery
- Creating a New Quick Style Set
- Selecting, Removing, and Printing Styles
- Comparing and Cleaning Up Styles
- Applying Document Themes
- Creating and Saving New Theme Colors and Fonts

Working with Shapes and Pictures
- Inserting and Formatting Clip Art, Screenshots, Pictures, Text Boxes, Shapes, and Graphics Files
- Removing a Picture's Background
- Formatting and Otherwise Altering the Look of Pictures and Graphics
- Resizing, Moving, Copying, Positioning, Grouping, and Deleting Objects

- Applying Special Effects
- Aligning, Distributing, Flipping, Rotating, and Layering Objects

Working with WordArt, SmartArt, and Charts

- Inserting, Editing, and Formatting WordArt
- Inserting and Formatting SmartArt
- Working with SmartArt Elements
- Inserting, Editing, and Formatting a Chart
- Working with Labels
- Using Chart Templates

Working with Tables

- Creating, Resizing, Moving, and Manipulating a Table
- Adjusting Table Alignment and Text Wrapping
- Working with Cell Formatting
- Merging and Splitting Cells and Tables
- Inserting and Deleting Rows and Columns
- Adjusting Row Height and Column Width
- Using Table Drawing Tools
- Working with Sorting and Formulas
- Working with Borders and Shading
- Using Table Styles and Table Style Options
- Converting or Deleting a Table
- Using Quick Tables

Working with Mailings

- Setting Up the Main Document for Mail Merge
- Creating and Editing a Data Source
- Selecting an Existing Data Source
- Inserting Merge and Rules Fields
- Previewing and Completing a Mail Merge
- Creating Labels and Envelopes

Using Collaborative Editing Tools

- Tracking, Accepting, and Rejecting Revisions
- Using Comments
- Comparing and Combining Documents
- Protecting a Document (with or without password)

Working with Templates

- Creating and using a Document Template
- Creating and Using Building Blocks and AutoText
- Attaching a Different Template to a Document
- Copying Styles between Documents and Templates

Working with Forms

- Creating a New Form
- Adding Content Controls
- Assigning Help to Form Content Controls
- Preparing the Form for Distribution
- Filling Out a Form

Customizing Word

- Customizing the Ribbon and Quick Access Toolbar
- Using and Customizing AutoCorrect
- Changing Word's Default Options

More Topics

- Converting an Older Document to Word 2010
- Translating Text
- Publishing a Blog Entry
- Using Hyperlinks
- Viewing Document Properties and Finding a File
- Recovering Your Documents
- Managing Versions
- Recording, Playing, and Deleting a Macro

MS PowerPoint

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Note: Proficiency with PowerPoint 2010 required, preferably older and newer versions as well. English version required.

Apply and change advanced options
Customizing the ribbon
Customizing the quick access toolbar
Creating/using macros
Using different view options
Proofreading options
Creating presenter notes
Setting up a slideshow
Adding animations
Utilizing transitions
Using & creating themes
Inserting charts & graphs
Inserting images
Grouping shapes and pictures
Creating tables
Inserting text options
Using audio & video in presentations
Working with watermarks
Creating and printing handouts
Adding headers & footers
Flowchart creation
Using and creating templates
Using drawing tools
Adding, removing, publishing slides
Creating layouts
Save & send options
Font options
Print options
Properties and Protecting File

Windows

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***Note*: Those wanting to tutor MS Windows must be proficient with BOTH the user side of Windows and the admin side of Windows.**

Windows Installation and Setup
- Preparing for Installation
- Adding/Managing User Accounts
- Display Settings & Personalization Options
- Power Settings
- Privacy / Security Settings
- Accessibility Options

File and Folder Operations
- Desktop, Start Menu & Taskbar
- Navigating with File Explorer
- Creating Folders and Saving Files
- Move, Copy, Delete, and Rename Files/Folders
- Folder Views and Settings
- File/Folder Searches
- Managing Hard Drives and Storage - Local, Removable, and Cloud

Windows Utilities
- Desktop Accessories
- Control Panel
- Backup and Recovery Tools
- Security - Antivirus, Antimalware, and Firewall Tools
- Windows Update

Basic Software & Hardware Management
- Windows Apps & Microsoft Store
- Adding/Removing Programs
- Adding/Removing/Managing Printers
- Adding/Removing/Managing Bluetooth Devices
- Locating and Running Programs

Accessing the Internet
- Connecting to a Network - Ethernet & WiFi
- Accessing the Internet with Internet Explorer, Microsoft Edge
- Email and the Mail app
- Searching the Internet/Default Search Engine

Basic Troubleshooting
- Viewing System Information
- Task Manager - Monitoring System Performance
- Windows Troubleshooter
- Safe Mode

Adobe Illustrator

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Program Basics
Working with Layers
Colors
Selection Tools
Drawing Tools
Shape Tools
Typography Tools
Painting Tools
Modifying Tools
Automation
Other Program Features

Adobe InDesign

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Program Basics
Working with Objects
Drawing and Color Tools
Typography
Page Tools
Using Styles
Other Features

Adobe Photoshop

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Program Basics
Working with Layers
Painting, Coloring, and Drawing Tools
Editing Images
Typography
Using Shapes
Animation and Action Panel
Making Selections
Other Program Features

Webdesign

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Internet Fundamentals
- Layers of the Internet (application, transport, etc..)
- URL
- Pathway
- FTP and File Management
- Protocols (HTTP, HTTPS)

HTML
- Basic XML
- HTML Structure
- Lists
- Classes and IDs
- Tables
- Linking Resources
- Special Tags
- Div and Span
- Forms

CSS
- Selectors
- Alignment
- Element Position
- Padding and Margins
- Content Decoration
- Variables
- Layout
- Multiple Browser Support

Fundamental Javascript
- Basic programming concepts (functions, loops, etc..)
- DOM
- Events

PHP
- Variables, including PHP Reserved Variables
- Control Structures
- Functions
- Mixing HTML and PHP
- Handling Input (e.g. GET, POST, PUT, DELETE)
- REGEX for PHP
- php.ini

Accessibility
- Web Accessibility Standards
- Presentation of content
- Operable and understandable user interfaces
- Different web browsers and devices like mobile

Database Systems

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- **Database Design**
  - Primary Keys and Foreign Keys
  - Indexes
  - Views
  - Creation of ERD
  - 1NF,2NF and 3NF
- **CRUD Statements**
  - INSERT Statement
  - SELECT Distinct Statement
  - SELECT TOP statement
  - UPDATE Statement
  - DELETE Statement
- **Advanced Queries**
  - Designing Advanced queries
  - Query optimization
  - Common Table Elements
  - Joins
- **Filtering Query Output**
  - WHERE Statement
  - ORDER BY Statement
  - Applying logical filters
- **Hosting Databases**
  - Connection Strings
  - Database IP
  - IOPS Limits and Storage limits
  - Monitor Database Health
- **Remote Database Access**
  - Designing a client application
  - Result Sets
  - Designing a Report
- **Database Management Systems**
  - SQL Server
  - Oracle
  - MS Access

Principles of CS

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NOTE: Computer Science tutors are expected to be familiar with all concepts on this list ***in addition to*** the language-specific list of the subject(s) they would like to tutor.

Object-Oriented Program Design
- Program design
- Read and understand a problem description, purpose, and goals
- Apply data abstraction and encapsulation.
- Read and understand class specifications and relationships among the classes ("is-a," "has-a" relationships).
- Understand and implement a given class hierarchy.
- Identify reusable components from existing code using classes and class libraries.
- Class design
- Design and implement a class.
- Choose appropriate data representation and algorithms.
- Apply functional decomposition.
- Extend a given class using inheritance.

Program Analysis
- Testing
- Test classes and libraries in isolation.
- Identify boundary cases and generate appropriate test data.
- Perform integration testing.
- Debugging
- Categorize errors: compile-time, run-time, logic.
- Identify and correct errors.
- Debugging, adding extra output statements, hand-tracing code.
- Understand and modify existing code
- Extend existing code using inheritance
- Understand error handling
- Understand runtime exceptions.
- Reason about programs
- Pre- and post-conditions
- Assertions
- Analysis of algorithms
- Informal comparisons of running times
- Exact calculation of statement execution counts
- Basic big-O questions
- Numerical representations and limits
- Representations of numbers in different bases
- Limitations of finite representations (e.g., integer bounds, imprecision of floating-point representations, and round-off error)

Program Implementation
- Implementation techniques
- Methodology
- Object-oriented development
- Top-down development
- Encapsulation and information hiding
- Procedural abstraction
- Programming constructs
- Primitive types vs. objects
- Constant declarations, Variable declarations
- Class declarations
- Interface declarations
- Method declarations, Parameter declarations
- Console output (System.out.print/println)
- Control
- Methods
- Sequential
- Conditional
- Iteration
- Understand and evaluate recursive methods

Standard Data Structures
- Simple data types (int, boolean, double)
- Classes
- Lists
- Arrays
- Sets and Multisets
- Stacks
- Dictionaries
- Queues
- Trees, binary trees, and binary search trees

Standard Algorithms
- Operations on data structures previously listed
- Traversals
- Insertions, Deletions
- Searching
- Sequential
- Binary
- Bubble Sort, Selection Sort, Insertion Sort
- Mergesort

Computing in Context
- System reliability
- Privacy
- Legal issues and intellectual property
- Social and ethical ramifications of computer use
- Software Methodology

C++

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NOTE: Computer Science tutors wishing to tutor C++ are expected to be familiar with all concepts on this list ***in addition to*** the Computer Science Principles list.

- **Namespaces**
- **Functions**
- **Control Structures**
  - Conditional (if, if else, else, switch statements)
  - Iteration (for, while, do-while loops)
  - Break and continue
- **Input/Output**
  - Standard (iostream)
  - File I/O (fstream)
- **Strings**
- **Pointers**
- **Exception Handling**
  - Try/Catch blocks
  - Throw statement
- **Arrays**
- **Classes and Structs**
- **Operator Overloading**
- **Parameters**
  - Call by reference vs Call by value
- **Inheritance**

C

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NOTE: Computer Science tutors wishing to tutor C are expected to be familiar with all concepts on this list ***in addition to*** the Computer Science Principles list.

Syntax and Structures
- Variables
- Data Types
- Arrays (single and multidimensional)
- Strings
- Operators
- Structures (struct)

Control Flow
- If/Else Statements
- Iterators
- Break/Continue
- Switch
- Goto

Input/Output
- Standard I/O
- Formatting
- Error Handling
- Preprocessor
- Streams

C Fundamentals
- Functions
- Standard Library
- Data Structures

Pointers
- Declaration and Usage
- Arrays and Pointers
- Pointer to Pointer
- Pointers and Functions

COMPTIA A+
- Principles and Procedures
- Safety and Security
- Windows 10

Hardware Overview
- Processors
- Memory
- BIOS
- Motherboards
- Storage
- Power

Operating Systems
- OS basics
- CLI
- Virtualization
- Mobile
- Troubleshooting OS
- File Systems
- Users and Groups

Building/Imaging a PC
- Custom components
- Install or upgrade OS
- Patching/SP
- Drivers
- Migrate data

Peripherals
- USB/Thunderbolt
- Keyboards
- Pointers (Mouse)
- KVM
- Multimedia
- Touch Screens
- SmartCard and Biometric
- Display

Hard Drives
- RAID
- Types (SATA,SSD,Magnetic)
- Formatting & Partitioning
- Removable Storage

Multifunction Devices
- Printers
- Copier/Scanners
- Fax
- Installation/Drivers
- Troubleshooting

Network
- Ethernet
- LAN
- WAN
- Wireless
- Internet
- Mobile
- Network Security

R Programming

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Importing and Exporting Data in R
- How to read in different file types
- Entering data in manually
- Using built-in datasets in R
- Exporting Data

Data Structures in R
- Vectors
- Matrices
- Lists and factors
- Data Frames
- Arrays

Basic R Commands
- Inferential statistics commands
- Statistical distribution functions
- If/then statements and conditional processing
- Writing functions
- Other commonly used functions

Data Manipulation
- Renaming row or column variables
- Filtering data
- Removing and adding data to an existing data set
- Looping
- Resampling techniques

Plotting in R
- Different types of plots (histograms, scatterplots, etc)
- Formatting
- Adding points, lines, etc to a plot

Statistical Modelling in R
- Linear and multiple regression models
- Logistic regression models
- Generalized linear models

Using R Packages
- How to install and load a package
- How to find help files for functions within a package

Java

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NOTE: Computer Science tutors wishing to tutor Java are expected to be familiar with all concepts on this list ***in addition to*** the Computer Science Principles list.

- **Primitive Data Types**
  - Integers
  - Floating Point Types
    - Characters
    - Boolean
- **Literals**
- **Variables**
  - Variable Scope
  - Initializing Variables
- **Operators**
- **Type Casting and Conversion**
- **Control Statements**
  - For loops
  - While Loops
  - If-Else Statements
  - Switch Statements
- **Classes**
  - Constructors
  - Class Definitions
  - Object Instantiation
- **Methods**
  - Using Parameters
  - Method Overloading
  - Returning Values
- **Arrays**
  - Multidimensional Arrays
  - Irregular Arrays
- **Strings**
  - Constructing Strings
  - Operating on Strings
- **Bitwise Operators**
- **Static Keyword**
- **File I/O**
- **Inheritance and Polymorphism**
  - Superclasses and Subclasses
  - Abstract Classes
  - Method Overriding
- **Packages and Interfaces**
  - Packages and Member Access
  - Implementing Interfaces
- **Exception Handling**
  - Using Try-Catch-Finally
  - The Exception Hierarchy
- **Enumerations**
- **Generics Fundamentals**

Python

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NOTE: Computer Science tutors wishing to tutor Python are expected to be familiar with all concepts on this list ***in addition to*** the Computer Science Principles list.

Lists
Control Flow and Looping (while/for, use of the range() function instead of traditional for loop)
Tuples (relation to lists, unpacking)
List/Dictionary/Generator comprehensions
"Dunder" methods (__init__, __plus__, etc)
Variadic arguments (*args)
Keyword arguments (**kwargs)
List slices
Generators (yield)
Lambda functions
Dictionaries
Functions (including map, filter, reduce)
Files

Cisco System Administration

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NOTE: Computer Science tutors wishing to tutor Cisco are expected to be familiar with all concepts on this list ***in addition to*** the Computer Science Principles list.

- **Data Networks**
  - OSI and TCP/IP
  - Network Devices
  - Topoligies
- **LAN Switching**
  - Configurations
  - Trobleshooting
  - Security
- **IP Addressing**
  - IPv4
  - IPv6
  - Addressing schema
- **Routing**
  - Configurations
  - Trobleshooting
  - Security
  - Protocols
- **WAN Technologies**
  - DSL
  - VPN
  - Cellular 3G and 4G
  - ISDN

Cloud Technologies

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NOTE: Computer Science tutors wishing to tutor Cloud Technologies are expected to be familiar with all concepts on this list ***in addition to*** the Computer Science Principles list.

- **Cloud Fundamentals**
  - Cloud Ecosystem
  - Motivation for Cloud
  - Building blocks of Cloud
- **Cloud Service Types**
  - Traditional
  - IaaS (Infrastructure as a service)
  - PaaS (Platform as a service)
  - CaaS (Container as a service)
  - SaaS (Software as a service)
  - N/A - Delete
- **Cloud Application Migration Approach**
  - Rebuild
  - Rehost
  - Replace
  - Refactor
- **Cloud Providers**
  - Microsoft Azure
  - Amazon AWS
  - Google Cloud Platform (GCP)
- **Cloud Deployment Models**
  - Private Cloud
  - Public Cloud
  - Hybrid
- **Getting into Cloud**
  - Deploying into Cloud
  - Security on Cloud
  - Scalability on Cloud

Linux System Administration

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NOTE: Computer Science tutors wishing to tutor Linux are expected to be familiar with all concepts on this list ***in addition to*** the Computer Science Principles list.

User and Group Creation and Administration
- Naming
- Concepts
- Roles in Security, Privilege, and Access

Hardware Management
- Mass storage commisioning and configuration
- Peripheral commissioning and configuration
- Device-related tools and utilities
- sysfs, udev
- /sys/, /proc/, /dev/

Booting
- Bootloader and kernel options
- Boot sequence details
- Log file boot events
- System bootup process
- Boot-time events, files, and utilities
- Runlevel setting
- Boot target establishment
- Safe shutdown and reboot procedures

Installation
- Disk configuration
- Package selection
- Package management utilities: RPM, YUM
- Key filesystems: /var, /home, /boot
- Swap space allocation and sizing

Process Configuration and Management
- Monitoring active processes
- Foreground and background processes
- Process signalling
- Managing shared libraries

Virtualization
- Virtual machines and containers, general concepts
- Deploying virtual machines

Command line and scripting
- Using shell commands
- Understanding and using man pages
- Characteristics of common shells
- Log file and other text file processing
- Creating/editing scripts
- Using streams, pipes, and redirects
- Fundamentals of regular expression coding.
- Using vi; exposure to Emacs, nano, vim
- Job scheduling (cron and at)
- Managing system time

File management
- Files and directories - concepts
- Copying, moving, removing single files
- Recursively handling files and directories
- Using find
- Files permision analysis and management

Filesystem management
- Partition tables
- mkfs command
- Filesystem types
- Filesystem integrity analysis and maintenance

X11 configuration and management
- X11 architecture and concepts
- X windows config file
- Displays and keyboards
- Windows managers
- X windows client/server model
- Graphical desktops

Email management
- Configuration of email aliases
- Configuration of formatting rules
- Overview of email utilities (sendmail, postfix, exim)

Printers and printing
- CUPS configuration
- print queue management

Networking
- Basic TCP/IP (IPv4 & IPv6) architecture
- Role of TCP/IP ports; common ports
- Name resolution; DNS; hosts
- Diagnostic tools and utilities

Security
- Best practice security concepts
- Security auditing
- Encryption concepts
- Understanding the threat landscape

Windows Server

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NOTE: Computer Science tutors wishing to tutor Windows Server are expected to be familiar with all concepts on this list ***in addition to*** the Computer Science Principles list.

- **Server Setup and Installation**
  - Prep for Installation
  - New install/Upgrade to Existing
  - Selecting Server Hardware
- **Server Manager**
  - Accesing and starting server manager
  - Create/Edit groups of servers
  - View/Change roles, role services, and features
  - Access Management Tools
  - Managing Services
  - Server Status - issues, events, and failures
  - Manage Remote Computers
- **Managing Storage**
  - Access storage options/Disk Management
  - Disk types
  - RAID options
  - Network Storage (NAS/SAN)
  - Disk volumes/partioning
  - Mounting/Unmounting
- **Windows Services**
  - File services, NTFS/Sharing Drives
  - Installing/Setting up printers
  - Naming resolution, DNS, Hosts
  - DHCP
  - Active Directory
  - IIS
- **Virtualization and Cloud**
  - Basic Concepts
  - Hypervisors
  - Install Hyper -V
  - Configure VM
  - Manage or Modify VM
  - Azure
- **Monitor and Troubleshoot**
  - Performance and Resource Monitor
  - Server Repair and Boot Options
  - Fault Tolerance and Clustering
  - Power - UPS, Redundancy
  - Safe Mode
- **Windows Server 2019**
  - Storage Migration Service
  - Containers
  - Security

Network Security

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NOTE: Computer Science tutors wishing to tutor Network Security are expected to be familiar with all concepts on this list ***in addition to*** the Computer Science Principles list.

- **CIA Principle**
  - Confidentiality
  - Integrity
  - Availability
- **Authentication**
  - Methods
  - Factors
  - Types
  - Authorities and Digital Certificates
- **Encryption**
  - Introduction to Encryption and Cryptography
  - Symmetric Key Systems
  - Asymmetric Key Systems
  - Public Key Systems
  - Uses and Implementations
  - Limitations, Attacks, Strengths
- **Vulnerability Assessment**
  - Types and Risk Factor Models
  - Types of Threats
  - Exploits, Flaws, and Classifications
  - Assessment Types
  - Vulnerability Assessment vs. Penetration Testing
- **Rights and Privileges**
  - Purpose of Privileges
  - Levels of Privilege and Identity Management
  - Differences Between Vendors
- **Physical Vs. Digital Security**
  - Site Security
  - Access Control
  - Compliance and Operational Security
  - Passwords
  - Firewalls
  - Application, Data, and Host Security

Computer Networking

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NOTE: Computer Science tutors wishing to tutor Computer Networking are expected to be familiar with all concepts on this list ***in addition to*** the Computer Science Principles list.

- **Network architecture**
  - Network Topologies
  - LAN/ WAN
  - Network Devices and connector
- **Data communication**
  - Data Transmission
  - Data Encoding
  - Error Detection
- **Protocols and Standards**
  - OSI model
  - HTTP/HTTPS
  - FTP
  - SMTP
  - CSMA/CD
  - VOIP
  - Token Ring
  - IPv6
  - IPv4
  - TCP/IP
- **Network security**
  - Risk related concepts
  - Attacks/threats
  - Access control
  - Hardening techniques
  - Authentication and authorization
- **Configuration**
  - Troubleshooting
  - Command line tools
  - WiFi analyzer
- **Cloud and virtualization**
  - Cloud types
  - Virtual networking components
- **Wireless and Mobile networking**
  - Mobile
  - Ad hoc
  - 802.11 standards
- **Networking services**
  - DHCP
  - DNS
  - Proxy Server
  - VLAN
  - VPN
- **Ethernet**
  - 802.3 Standards
  - Extending Ethernet
  - Frames
  - 100 MB/Gb/10Gb Ethernet
- **Routing**
  - Tables
  - Algorithms
  - Dynamic Routing
  - Configuration of Routers
  - Troubleshooting

Cybersecurity

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NOTE: Computer Science tutors wishing to tutor Cybersecurity are expected to be familiar with all concepts on this list ***in addition to*** the Computer Science Principles list.

Security Policies and Procedures
- Threat life cycle
- Advanced Threat Protection
- Training best practices

Networks/Internet
- IP Addressing/CIDR
- Mac Addresses
- Firewalls
- Antivirus
- 802.1x Filtering
- OSI model
- Common Network Appliances

Hacker Approaches
- Information gatherering/scanning
- SQL injection
- Password Cracking
- WAP/Honeypot

Social Engineering
- Impersonation
- Phishing or Spear Phishing
- Vishing
- CEO Fraud
- Shoulder Surfing
- Attack Concepts(Intimidation/Authority/etc)

Malware
- Characteristics of malware
- Multifunctional
- Crawlers/Bots
- Targeted Intrusions
- Denial of Service (DDOS)

Encrpytion
- Certificates
- Key Encryption
- Digital Signatures
- VPN(s)
- Cryptography

System Architecture
- Design Concepts
- Distributed Computing
- Security Models
- Hardware Security Architechure

Access Control
- Least Privilege
- Defense in Depth
- Physical Access Control
- Authentication Methods

Software Development & Engineering

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- **Software Architecture**
  - Components
  - Relationships
  - Patterns
- **Design Principles and Patterns**
  - Design Pattern Basics
  - MVC
  - Services
  - SOLID Principles
  - Testing
- **Platforms**
  - Servers
  - Distributed Systems
  - Cloud
  - Configuration Management
- **Layers**
  - Multitier Architecture
  - Data Model
  - Objects (e.g. Entities, DTOs, other Business Objects, etc..)
- **Tools/Languages**
  - IDEs
  - OpenSource, Nuget, and Third Party Software
  - Debugging
  - Basic Programming Languages for Web Applications like C#/.NET/SQL or PHP/MySQL
- **Software Maintenance**
  - Types of maintenance
  - Maintenance costs
  - Maintenance activities
  - Re-engineering and Reverse-engineering

C#

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NOTE: Computer Science tutors wishing to tutor C++ are expected to be familiar with all concepts on this list ***in addition to*** the Computer Science Principles list.

- **Fundamentals**
  - Namespaces
  - Directives
  - LINQ
  - .NET Framework
- **Syntax and Structures**
  - Variables
  - Data Types
  - Arrays
  - Operators
  - Lambda Expressions
- **Input/Output**
  - File Read/Write
  - Escape Sequencing
  - Convert data
- **Control Structures**
  - Conditional Statements
  - Interators
  - Jump/Break/Continue
  - Exception Handling
- **OOP Concepts in C#**
  - Methods
  - Constructors
  - Classes
  - Inheritance
  - Polymorphism
  - Interfaces

Network Engineering

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NOTE: Computer Science tutors wishing to tutor Network Engineering are expected to be familiar with all concepts on this list ***in addition to*** the Computer Science Principles list.

- **Fundamentals**
  - Topology
  - Interfaces and cabling
  - IPVs, TCP, UDP
  - Monitor and Troubleshoot
  - VOIP
  - Automation
- **Switching**
  - VLANs
  - Discovery Protocols
  - Spanning Tree
  - Interswitch connectivity
  - LACP
  - Switching concepts (Frame switching, flooding, etc)
- **Routing**
  - Routing Tables
  - Forwarding
  - Dynamic and Static routing
  - FHRP
  - Link state protocols
  - Distance vector protocols
- **Network Services**
  - DHCP
  - DNS
  - QOS
  - SSH
  - SNMP
- **Security**
  - Concepts
  - VPNs
  - Access Control
  - AAA
  - Layer 2 security features
  - Firewalls
- **Wireless**
  - Principles
  - Components
  - WLAN
  - APs/Channels

Spanish

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Basic Sentence Structure

- Gender & Number of Nouns
- Definite Articles
- Indefinite Articles
- Noun-Adjective Agreement
- Negation (& Double Negatives)
- Contractions Al / Del
- Questions and Exclamations

Advanced Sentence Structure

- Direct and Indirect Object Pronouns
- Relative Pronouns & Adjectives
- Possessive Pronouns
- Superlatives
- Demonstratives
- Comparisons of Quantity and Number
- The Personal "a"
- Por vs. Para
- Pero / Sino / Sino Que

Basic Verb Forms

- Present Indicative
- Stem Changing Verbs
- Gustar Type Verbs
- Irregular 1st Person Verbs ("go, zco, jo, oy, eo "verbs)
- Present Progressive
- Ser vs. Estar
- Saber vs. Conocer

Intermediate Verb Forms

- Preterit (Definite Past)
- Imperfect (Undefined Past)
- Reflexive Verbs
- Conditional Tense
- Future Tense
- Irregular Preterit Verbs

Advanced Verb Forms

- Subjunctive Tenses & Conditions
- Perfect Tenses
- Past Participles
- Formal Commands
- Informal (tú) Commands
- Negative Commands

Idiomatic Expressions

- Acabar de
- Hay / Hay que
- Hace… (To indicate time that has passed)
- Valer la Pena

Basic Vocabulary Units

- Ordinal Numbers
- Telling Time
- Expressions for Weather
- Sports & Recreation
- Science & Technology
- Animals
- Home Decor and Furnishings
- Food & Kitchen
- School & Office
- Family Expressions & Relationships
- Clothing
- Medical Care & Human Physiology
- Feelings & Emotions
- Travel (Train & Air)
- Customary Greetings & Protocol

French

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Basic Sentence Structure

- Gender & Number of Nouns

Vocabulary (including but not limited to…)

- Numbers and time
- Greetings, letter writing, speaking on the phone
- Food and drink
- Marketplace
- Clothing
- Education and careers
- Personal relationships, friends, family
- Emotions
- Hobbies, sports, leisure, travel
- Animals, plants, scenery, weather
- Body parts, illnesses, basic medical terms
- Residences, rooms, furniture
- Government, public institutions, infrastructure, news
- French/English *faux amis*
- Common French idioms

Grammar and Style

- Verb conjugations, tenses, and moods
- Pronouns

Literature (including but not limited to…)

- Louise Labé
- Jean-Jacques Rousseau
- Guy de Maupassant
- Paul Verlaine
- Jules Verne
- Victor Hugo
- Albert Camus

Pronunciation and Phonetics

- Describe how French vowels and certain French consonants differ from their English counterparts
- Identify silent consonants and vowels
- Identify and pronounce nasalized vowels
- Use *liaison* and *enchaînement* to enhance euphony
- Describe how stress functions in words and sentences
- Describe how pronunciation and stress differ in poetry

French History and Culture

- Basic history of France, from Roman Gaul to modern times
- Basic geography of France, French territories, and other French-speaking nations
- French education system
- Present-day government of France
- French holidays and customs

German

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Adjectives
- Adjective Endings
- Comparative & Superlative
- Definite & Indefinite Articles
- *Der-* & *ein*-Words
- Extended Adjective Modifiers
- Present & Past Participles

Adverbs
- Expressions of Time
- Negation

Conjunctions
- Coordinating Conjunctions
- Subordinating Conjunctions
- Main and Subordinate Clauses

Nouns
- Appositives
- Case: Nominative, Accusative, Dative, & Genitive
- Gender

Prepositions
- Accusative, Dative, Genitive, & Two-way
- *da-* & *wo*-compounds
- Idiomatic Use of Prepositions

Pronouns
- Personal, Interrogative, Demonstrative, Indefinite, Possessive, Relative, & Reflexive

Punctuation
- Comma Rules

Verbs
- Conjugation
- Imperative
- Indirect Discourse & Subjunctive I
- Infinitival Constructions (*um…zu, (an)statt…zu, ohne…zu*)
- Modal Verbs
- Passive Voice, Statal Passive, Alternatives to Passive
- Regular & Irregular Verbs
- Subjunctive II
- Tense: Present, Present Perfect, Simple Past, Past Perfect, Future & Future Perfect
- Verbs with Separable & Inseparable Prefixes

Word Order

Italian

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Basic Sentence Structure
- Italian alphabet, special characteristics
- Regular verbs
- Greetings
- Common salutations
- Expressing opinions
- Masculine versus feminine nouns
- Pronouns

Numbers/currency

Date

Time

Weather/seasons

Action verbs

Direction, travel

Culinary, food

Advances sentence structure
- Irregular verbs
- Direct pronouns
- Indirect-object pronouns
- Reflexive verbs
- Adjectives
- Using prepositions
- Imperfect subjunctive
- Il congiuntivo trapassato
- Il congiuntivo passato
- Il congiuntivo futuro
- Modal verbs
- Articulated prepositions
- Double object pronouns
- Future perfect
- Words with dual meaning
- Adverb
- Negative statements
- Conosce/Sapere
- Prepositions

Anatomy/Medical/Dental
- Body parts
- Symptoms
- Study of

Italian lifestyle
- Culture
- Politics
- Current affairs
- Business
- Professional writing
- Culinary, food

Elementary Reading Methods

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Reading Development

- Signs student is ready for reading instruction
- Discourse-Oral Language Development
- Print/Book Awareness
- Listening and Retelling
- Phonemic Awareness
- Letter Recognition
- Letter-Sound Correlations/ Language Development

Instructional Strategies for Reading

- Identifying Student's Current Reading Level
- Reading Theories
- The 5 Components of Reading
- Balanced Literacy/ Whole Language/ Phonics
- Developing Curriculum
- Vocabulary
- Creating Activities for Instruction
- Fluency
- Comprehension strategies
- Scaffolding Instruction
- Differentiating Instruction
- Technology Use

Types of Assessment

- Affective Reading assessments
- Summative Assessment for the 5 Components of Reading
- Formative Assessment for the 5 Components of Reading
- Analyzing Student Assessment Data
- Diagnosing Reading Issues
- Maintaining student records/portfolios
- Identifying Students Who May Need Additional Intervention

General Education

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Active Learning
- Collaborative discussion
- Independent Learning
- Critical Thinking
- Creative thinking
- Brainstorming
- Journaling
- Group Work
- Focused listening
- Formulating Questions
- Note-taking
- Annotating
- Role-playing
- Scaffolding
- Assessment

Hybrid Learning (Blended Learning)
- On-line activities
- Project based learning
- Peer instruction
- Small group discussion
- Just-in-time teaching
- Flipped learning

Critical Thinking
- Deep learning
- Concept mapping (mind-mapping)
- Goal setting
- Considering alternatives
- Utilizing past strategies
- Time Management
- Self-reflection
- Activating prior Knowledge
- Reviewing
- Summarizing
- Study skills

Emotional Intelligence
- Assertive communication
- Conflict resolution
- Active listening skills
- Promoting positive attitude
- Self-awareness
- Student engagement strategies
- Empathy
- Responding to Criticism
- Developing Leadership skills
- Journaling
- Peer Conferences
- Teacher-student Conferencing
- Self-regulated learning
- Organizing and transforming information
- Keeping Records
- Rehearsing and memorizing
- Environmental awareness
- Recognizing Individual learning styles
- Goal-setting
- Reflective dialogue
- Constructive feedback
- Abstract Thinking
- Link new learning to prior learning

Professional Learning
- Self-evaluating
- Adapting new strategies to individuals
- Accept leadership opportunities

Growth mindset
- Learning from failure
- Accepting challenge
- Process over result
- Sense of purpose
- Growth over speed
- Effort before talent
- Learning from others' mistakes

Bias
- Test anxiety and performance
- Ignore triggers
- Cross-group interactions
- Positive role models
- Managing stress and threat
- High standards for all
- Personal value affirmation
- Positive role models

Community and service learning
- Volunteer project learning
- Community involvement

Rhetorical communication
- Production of discourse
- Response to discourse
- Effective communication in the classroom
- Problem-solving communication

Curriculum Development
- Identifying overarching objectives
- Lesson plans
- Grading standards
- Common core/benchmarks
- Rubrics

Early Childhood Education

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Development Stages (Milestones)
- Birth-18 months
- 18 months-2 Years
- 3 years-5 years
- 6 years-8 years

Theorists
- Urie Bronfenbrenner
- Erik Erikson
- Abraham Maslow
- Maria Montessori
- Jean Piaget
- Lev Vygotsky
- Reggio Emilia
- BF Skinner

Observation and Assessment
- Anecdotal Records
- Work Samples
- Observations
- Why is it important?

Diversity in the Classroom
- How to Promote Diversity

Curriculum Development
- Social/Emotional Development
- Cognitive Development
- Language/Literacy Development
- Math/Scientific Reasoning
- Physical Development
- Differentiation and Accommodations
- Music

Health, Safety and Nutrition
- Mandatory Reporter
- Safe Sleep Practices
- First Aid/CPR
- Abusive Head Trauma
- Importance of Physical Development
- Nutrition

Intercultural and Global Communication

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Culture & Cross-Cultural Values
- What is Culture?
- Defining Cross-Cultural
- Stereotypes vs. Cultural Values
- Communication Styles Reflective of Cultural Values
- Hofstede's Cultural Dimensions
- Ethics and Cross-Cultural Communication

Cross-Cultural Communication Comparisons
- Chinese vs. American Technical Communication
- Japanese vs. American Technical Communication
- Hispanic/Latino vs. American Technical Comm.
- Korean vs. American Technical Communication

Intercultural Communication
- Defining Intercultural Communication
- Intercultural vs. Cross-Cultural Communication

Challenges in Intercultural and Global Communication
- Intercultural Communication Conflicts
- Cross-Cultural and Global Communication Barriers

Practical Intercultural & Global Comm. Strategies
- Using Interpersonal Skills
- Practicing Relationship vs. Deal Focused Comm.
- Non-Verbal Communication
- Technical Skills
- Simplified and Plain English

Digital Communication
- Defining Digital Communication
- Text Messages
- E-mail
- Social Networks

Health Communication
- Healthcare Professional vs. Patient Understanding
- Plain Language
- Patient Considerations
- Multicultural Communication

Theoretical/Ideological Influences
- Survey of Communication Theories
- Leadership Communication Theories
- Importance of Effective Professional Communication

Practical Application
- Effective Written Communication
- Effective Oral Communication
- Interpersonal Communication
- Conflict Management
- Non-verbal Communication

Public Speaking

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Essentials of Communication
- Communcation Models
- Public Speaking Apprehension
- Communication Ethics

Language
- Language Characteristics
- Language Devices

Intercultural Communication
- Culture & Communication
- Cultural Identity & Co-Cultures

Interpersonal Communication
- Perception
- Defining Self, Self-Concept, Self-Esteem
- Self-Disclosure
- Conflict Management

Nonverbal Communication
- Principles of Nonverbal Communication
- Functions of Nonverbal Communication
- Types of Nonverbal Communication

Audience Analysis
- Methods of Audience Analysis
- Gathering Audience Information

Speech Organization & Topic Selection
- Brainstorming, Concept Maps
- Introductions, Conclusions, Connectives
- General and Specific Purpose Statements
- Narrowing the Topic

Research and Support
- Where to Locate Credible Sources
- How to Identify Credible Sources
- Using Examples, Testimony, and Statistics
- Source Documentation

Speech Delivery
- Types of Delivery
- Components of a Quality Delivery
- Delivery & Practice

Listening
- Active Listening Practices
- Challenges to Listening

Informative Speaking
- Types of Informative Speeches
- Effective Use of Research & Support

Persuasive Speaking
- Reasoning
- Types of Persuasive Speaking
- Persuasive Speech Organizational Patterns
- Emotional Appeals
- Rhetorical Appeals

Journalism

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News Writing/Reporting
- Lead
- Layout/Organization Styles
- Content

Feature/Magazine Writing
- Lead
- Layout/Organization Styles
- Content

Brodcast News Writing
- Content, Lead, Layout

Journalism and Theory
- Society/History
- Feminist Theory
- Ethics
- Policies
- Politics

Grammar/Copy Editing
- Basic Grammar concepts
- Copy editing concepts

Interviewing
- How to

Statistics
- Creating Statistics/Infographics
- Analyzing Statistics

Using Multimedia
- Twitter, Podcast, Web, video

Reaserch, Newsgathering
- Conducting research
- Newsgathering

News Writing/Reporting
- Essential Personal Communication Skills
- Self-Management
- Critical Thinking
- Leadership
- Problem Solving and Decision-Making
- Responsibility and Accountability
- Emotional Integrity

Principles of Interpersonal & Small Group Communication
- Culture
- Group Culture
- Hofstede's Cultural Dimensions
- Workplace Culture
- Written Communication
- Professional and Workplace Group Documents
- Verbal Communication
- Tone
- Clear Language
- Persuasion
- Rhetorical Strategies
- Non-Verbal Communication
- Team-Working
- Creating Relationships
- Observation
- Active Listening
- Questioning
- Social Awareness
- Diversity
- Assertiveness
- Conflict Management Skills

Constraints and Barriers
- Language Differences
- Cultural Differences
- Personality Differences
- Emotional Barriers
- Generational Differences
- Physical Disabilities
- Psychological Barriers

Computer-Mediated Group Communication
- Elements of Computer-Mediated Communication
- Physical Barriers

Ethics of Small Group Communication
- Ethical Responsibilities

Mass Communication

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Theory & Function
- Mass comm vs interpersonal communications
- Mass communication theories
- Mass media functions
- Audience analysis

Historical and Cultural Context
- Impacts of technological changes
- Ownership and economics of mass media
- Impact on politics & government
- Entertainment & mass culture
- Use in business

Mass Media Practices
- Newspapers
- Magazines
- Broadcast: Radio & TV
- Cable
- Advertising & PR
- Film

The Internet & Social Media
- Disruption of traditional media
- Impacts on audience
- Impacts on ownership
- Impact on content development
- Media representation

Ethics & Laws
- Legal protections: libel, false advertising, FCC role
- Content developer's responsibilities