# Basic Concepts List

for All Available Subjects

Last updated July 2020

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## Math

<table>
<thead>
<tr>
<th>Elementary Math</th>
<th>Trigonometry</th>
<th>Statistics</th>
<th>Differential Equations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mid-level Math</td>
<td>Pre-Calculus</td>
<td>Intermediate Statistics</td>
<td>Quantitative Methods</td>
</tr>
<tr>
<td>Algebra</td>
<td>Calculus</td>
<td>Discrete Math</td>
<td>Quantitative Reasoning</td>
</tr>
<tr>
<td>Algebra II</td>
<td>Calculus BC</td>
<td>Finite Math</td>
<td>Data Analytics</td>
</tr>
<tr>
<td>Geometry</td>
<td>Multivariable Calculus</td>
<td>Linear Algebra</td>
<td>R Programming</td>
</tr>
</tbody>
</table>

## Science & Engineering

<table>
<thead>
<tr>
<th>Electrical Engineering</th>
<th>Biology</th>
<th>Elementary Science</th>
<th>Organic Chemistry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry</td>
<td>Microbiology</td>
<td>Physics – Calculus Based</td>
<td>Physics – Algebra Based</td>
</tr>
<tr>
<td>Earth Science</td>
<td>Environmental Science</td>
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</tbody>
</table>

## Health & Medical

<table>
<thead>
<tr>
<th>Anatomy &amp; Physiology</th>
<th>Health Administration</th>
<th>Medical Coding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursing RN (Pediatrics)</td>
<td>Nursing</td>
<td>Mental Health &amp; Psychiatric Nursing</td>
</tr>
</tbody>
</table>

## English/Humanities

<table>
<thead>
<tr>
<th>Essay Writing</th>
<th>College Essay Writing</th>
<th>Doctoral Writing</th>
<th>Literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading</td>
<td>Primary Reading</td>
<td>English</td>
<td>College English</td>
</tr>
<tr>
<td>Symbolic Logic</td>
<td>Art History &amp; Appreciation</td>
<td>Primary ESL</td>
<td>ESL</td>
</tr>
</tbody>
</table>

## Business

<table>
<thead>
<tr>
<th>Intro Accounting</th>
<th>Intermediate Accounting</th>
<th>Cost Accounting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Govt/Nonprofit Accounting</td>
<td>Managerial Accounting</td>
<td>Tax Accounting</td>
</tr>
<tr>
<td>Advanced Accounting</td>
<td>Intro Economics</td>
<td>Intermediate Macroeconomics</td>
</tr>
<tr>
<td>Intermediate Microeconomics</td>
<td>Intro Finance</td>
<td>Business Law</td>
</tr>
<tr>
<td>Principles of Management</td>
<td>Auditing</td>
<td>Marketing</td>
</tr>
</tbody>
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Basic Concepts List for All Available Subjects

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<table>
<thead>
<tr>
<th>Social Sciences</th>
<th>Technology</th>
<th>Computer Science</th>
<th>Foreign Languages</th>
<th>Teacher Education</th>
<th>Communication</th>
<th>Other</th>
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</thead>
<tbody>
<tr>
<td>Research Methods</td>
<td>MS Access</td>
<td>Java</td>
<td>German</td>
<td>Elem Reading Methods</td>
<td>Interpersonal/Group</td>
<td>Student Success</td>
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<tr>
<td>Intro Ethics</td>
<td>Windows</td>
<td>Network Engineering</td>
<td>Italian</td>
<td>General Education</td>
<td>Intercultural/Global</td>
<td>Career Help</td>
</tr>
<tr>
<td>Intro Sociology</td>
<td>Cisco Admin</td>
<td>C</td>
<td>Spanish</td>
<td>Early Childhood Ed</td>
<td>Public Speaking</td>
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<tr>
<td>Intro Philosophy</td>
<td>Adobe InDesign</td>
<td>Python</td>
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<tr>
<td>Cultural Anthropology</td>
<td>Adobe Photoshop</td>
<td>Network Security</td>
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<tr>
<td>Intro Psychology</td>
<td>MS Word</td>
<td>Database Systems</td>
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<tr>
<td>Political Science</td>
<td>A+</td>
<td>Cybersecurity</td>
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<td>Cloud Technologies</td>
<td>C#</td>
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<td>Web Design</td>
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<td>Comp Networking</td>
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Elementary Math (Grades 4-6)

**Algebraic Skills**
- Equations
- Functions
- Patterns

**Geometry**
- Composite and Real World Shapes
- Coordinates
- Lines and Angles
- Perimeter, Area, Volume
- Position and Direction
- Similar, Congruent, Symmetric Shapes
- Sorting and Classifying
- Three Dimensional Shapes
- Transformations
- Two Dimensional Shapes

**Measurement**
- Converting Units and Measurements
- Estimates
- Measuring
- Time
- Units and Tools

**Numbers**
- Coins, Bills, and Collections of Money
- Counting
- Decimals - Read, Write, Place Value, Compare
- Equivalent Numbers - Decimals and Fractions
- Fractions - Compare and Order
- Fractions - Read, Write, Model
- Integers
- Ordinal Numbers
- Whole Number - Place Value
- Whole Numbers - Compare and Order
- Whole Numbers - Read, Write, Characteristics

**Operations and Number Relationships**
- Decimals - Operations
- Estimation
- Fractions - Operations
- Number Properties
- Number Theory: Factors, Multiples, Primes, Divisibility
- Order of Operations
- Ratios, Rates, Proportions, Percents, Squares and Roots
- Solving Real World Problems with Operations
- Understanding Addition, Subtractions, Multiplication, and Division
- Whole Number Addition and Subtraction
- Whole Number Multiplication and Division

**Statistics and Probability**
- Collect and Organize Data
- Measures and Descriptions of Data
- Probability
- Read and Interpret Data
Elementary Math Methods

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)

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

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

**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

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
Complex Numbers

Introduction to Trigonometry

Introduction to Trigonometry: Linear Relationships and Functions

Trigonometric Ratios

Graphing Trigonometric Functions

Trigonometric Laws and Identities

Vectors

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

Angles and Angle Measures

Measuring angles using radian and degree measures

Right Triangles and Trigonometric Ratios

The Unit Circle

Trigonometric Ratios Unit Review

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 Ratios

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

Graphing and Operations with Vectors

Solving problems with Vectors
Pre-Calculus

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

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 compute 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

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
- Trigonometric graphs
- Perform translations for various conic sections
- Law of Cosines and Law of Sines
- Arithmetic and Geometric sequences
- Functions and Graphs (Linear and Polynomial)
- Trigonometric Ratios and Identities
- Exponential and Logarithmic Functions
- Particle motion (position, velocity, acceleration)
## Calculus BC

### 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
- Derivatives 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 Functions
- 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 Transcendental 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

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

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

- 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

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

Describing Data
- Numerical summary measures
- The effect of changing units on summary measures
- Tabular and graphical methods (dotplots, stemplots, boxplots)
- Comparing distributions (back to back stemplots, parallel boxplots)
- Comparing center and spread: within group, between group variation
- Comparing shapes
- Comparing outliers and other unusual features (clusters, gaps)

Probability
- Interpreting probability, including long run relative frequency interpretation
- "Law of Large Numbers" concept
- Addition rule, multiplication rule, conditional probability and independence
- Discrete random variables and their probability distributions, including binomial and geometric
- Mean (expected value) and standard deviation of a random variable
- Linear transformation of a random variable
- Combining independent random variables
- Notion of independence versus dependence
- Mean and standard deviation for sums and differences of independent random variables
- Simulation of random behavior and probability distributions

The Normal Distribution
- Properties of the normal distribution
- Using tables of the normal distribution
- The normal distribution as a model for measurements

Sampling and Experimentation: Planning and conducting a study
- Methods of data collection (census, sample survey, experiment, observational study)
- Planning and Conducting Surveys
- Characteristics of a well-designed and well-conducted survey
- Populations, samples, and random selection
- Sources of bias in sampling and surveys
- Sampling methods, including simple random sampling, stratified random sampling and cluster sampling
- Planning and Conducting Experiments
- Characteristics of a well-designed experiment
- Treatments, control groups, experimental units, random assignments and replication
- Sources of bias and confounding, including placebo effect and blinding
- Completely randomized design
- Randomized block design, including matched pairs design
- Generalizability of results and types of conclusions that can be drawn from observational studies, experiments and surveys

Sampling distribution
- Sampling distribution of a sample proportion
- Sampling distribution of a sample mean
- Central Limit Theorem
- Sampling distribution of a difference between two independent sample proportions
- Sampling distribution of a difference between two independent sample means
- Simulation of sampling distributions
- t distributions
- Chi-square distributions
- F distributions
Statistical Inference: Estimating population parameters and testing hypotheses
- Estimation (point estimators and confidence intervals)
- Estimating population parameters and margin of error
- Properties of point estimators, including unbiasedness and variability
- Logic of confidence intervals, meaning of confidence level and confidence intervals, and properties of confidence intervals
- Confidence interval for a mean
- Confidence interval for a proportion
- Confidence interval for a difference between two means (unpaired and paired)
- Confidence interval for a difference between two proportions
- Confidence interval for a variance
- Confidence interval for a ratio of two variances
- Test of significance
- Logic of significance testing, null and alternative hypotheses; p-values; one and two sided tests; interpret the results; concepts of Type 1 and Types 2 errors; concept of power
- Test for a mean
- Test for a proportion
- Test for a difference between two means (unpaired and paired)
- Test for a difference between two proportions
- Test for a variance
- Test for a ratio of two variances
- Effect sizes

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

Exploring Categorical Data
- Frequency tables and bar charts
- Marginal and joint frequencies for two way tables
- Conditional relative frequencies and association
- Comparing distributions using bar charts
- Chi-square test for goodness of fit, test for homogeneity, and test of independence (one and two-way tables)

Nonparametric tests (sign test, Wilcoxon rank sum test, Wicoxon signed rank test)

Regression and Correlation
- Exploring bivariate data - analyzing patterns in scatter plots
- Correlation and linearity
- Simple linear regression - least-squares regression
- Interpreting intercept and slope
- Confidence interval for the slope of a least squares regression line
- Test for the slope of a least squares regression line
- Coefficient of determination
- Residual plots, outliers and influential points
- Transformations to achieve linearity: logarithmic and power transformations
- Multiple regression
- Test and confidence interval for parameters in a multiple regression model
- Interpreting parameters in a multiple regression model

Determine the type of hypothesis test to use for different types of data
Quantitative Reasoning

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

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 Clustering
  - ANOVA
  - Simulation
  - Probability Modeling
Data Analytics

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

Applications and Limitations of Quantitative Analysis
  Business and Decision Analysis
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  Data Quality and measures
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  Hurwicz
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  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

**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

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
Data Analytics

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Elementary Science

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

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
Contributoryes 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**

**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
- Translation
- 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

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
Models
Pseudo Sciences
Safety
Science and Society
Scientific Method
Scientific Quantities
Scientific Thinking
Scientists and Discoveries
Theories and Laws
Tools and Measurement
Graphical interpretations
Basic laboratory equipment identification

Atoms, Molecules, and Compounds
Matter
Atoms, Molecules, Compounds
Mixture
Homogeneous and Heterogeneous
Chemical and Physical Properties
Symbols
Ions
Polyatomic ions
Isotopes
Elements
Atomic Mass
Atomic Number
Mass Number
Periodic Table
Law of Definite Proportions
Creating compound based on their charges
Mole Concept
Molar Mass
Determining of a formula of a compound ionic and covalent
Nomenclature for ionic and covalent compounds including the rules for transition metals
Hydrates
Atmospheric Chemistry

Using Chemical Equations in Calculations
Density
Avogadro’s number
Conversions between atoms, molecules, moles, and masses
Percent composition
Balancing Chemical Equations
Classification of Reactions
Stoichiometry
Empirical formula
Molecular formula
Limiting Reagent

Gas Laws and Kinetic Theory
Kinetic-Molecular Theory
Pressure and equivalent units (ex. atm, psi, kPa, Pa, etc)
Volume and equivalent units (ex. mmHg, Torr, etc)
Temperature and equivalent units
STP
Maxwell-Boltzman Distribution
Graham’s Law
Diffusion
Effusion
Boyle’s Law
Charles’ Law
Guy-Lussac’s Law
Combined gas Law
Ideal Gas Law
Determine density and molar mass from ideal gas law
Dalton’s Law
Collecting gas over water and partial pressures
Avogadro’s Principle
Gas Mixtures and Partial Pressure
Kinetic Molecular Theory
Non-ideal Gases

Atomic and Molecular Structure
Atomic Theories and Structure
Octet Rule
Electron Configurations
Lewis Dot Structure
Periodic Trends
Chemical Bonding
Valence electrons
Orbitals
Orbital Geometry
Molecular Geometry
VSEPR theory
Quantum Theory
Atomic and Molecular Structure (cont’d)
- Polarity
- Dipole moment
- Hybridization
- Sigma bond
- Pi Bond
- Resonance structures

Solids
- Crystalline Solids
- Bragg’s Law
- Unit cell

Liquids and Changes of State
- Compressibility
- Surface tension
- Transition states
- States of Matter
- Phase Diagram
- Kinetic Molecular Theory of Liquids

Physical Chemistry
- Colligative Properties of Solutions
- Enthalpy
- Hess’s Law

Aqueous Solutions
- Solution, Solvent, Solute
- Saturated, Unsaturated, Supersaturated
- Dilute
- Molarity, Molality, Normality
- Mole Fraction (X)
- Weight percent (wt%)
- Parts per million (ppm)

Acids, Bases and Salts
- Acid, Base, Salt
- Anion and Cation
- Electrolyte, Non-electrolyte
- Indicators
- Neutralization
- Dissociation
- Conjugate acid, Conjugate base
- Strong and weak acids and bases
- Monoprotic, Polyprotic
- Bronsted-Lowry Acid/Base
- Lewis Acid/Base
- pH and pOH
- Hydrolysis

Kinetics
- Chemical Reaction Rates
- Rate Expressions
- Reaction Mechanisms
- Activation Energy

Chemical Equilibria
- Le Chatelier Principle
- The Equilibrium Constant
- Equilibrium Calculations
- Factors Affecting Equilibria
- ICE Tables

Ionic Equilibrium: Acids and Bases
- Lewis Concept
- Strong and Weak Acids and Bases
- pKa and pKb
- Hydrolysis

Aqueous Equilibria
- Common Ion Effect and Buffer Solutions
- Henderson-Hasselbach Equation
- Titration, End Point, Equivalance point
- Acid-Base Titrations
- Acid-Base Indicators
- The Solubility Product Ksp
- Solubility and the Common Ion Effect
- Solubility and Complex Ions

Redox
- Reduction, Oxidation
- Oxidizing agent, Reducing agent
- Oxidation numbers
- Half reactions
- Activity series

Chemical Thermodynamics
- Heat of formation/reactions
- Enthalpy
- Spontaneity, Disorder and Entropy
- Exothermic and Endothermic
- Differentiate between heat and temperature
- Calories vs calories
- Specific heat capacity
- Various temperature scales (Fahrenheit, Celsius, and Kelvin)
- Entropy and the Second Law
- Gibbs Free Energy
- Equilibrium Constants

Electrochemistry
- Electrochemical Cells and Potentials
- Voltic Cells at Nonstandard Conditions
- Electrolytic Cells
- Faraday’s Law

Nuclear Chemistry
- Types of radiation
- Radioactive Decay
- Fission and Fusion
- Nuclear equations
- Half-life
Nuclear Chemistry (cont’d)
Isotopes
Bohr equations
Rydberg equation
Energy relationship to wavelength, frequency and period
Heisenberg Uncertainty Principle
Electromagnetic Radiation
Sources of energy

Basic Organic Chemistry
Carbon groups
Polymers
Names and chemical composition of functional groups
Basic nomenclature of organic compounds
Alkanes – Alkenes – Alkynes
Saturated
Unsaturated
Cyclic hydrocarbons
Aromatic Hydrocarbons

Biochemistry
Proteins – Carbohydrates – Nucleic acids

Lab techniques
Synthesis of compounds (solid and gas)
Separation techniques
Titration using indicators and meters
Spectrophotometry/calorimetry
Gravimetric Analysis
Physics – Algebra-based

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 current 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

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

**Electrical 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

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
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

**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

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

**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 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
- Otolarynchology
- 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
  - Antidysrhythmic 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
Ophthalmic and otic drugs
Hormones that regulate calcium and bone metabolism
Drugs used in oncologic disorders
OTC drugs, herbal and dietary supplements
Nursing RN (Pediatrics)

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

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
Medical Coding & Billing

- 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)
- Healthcare Common Procedure Coding Systems (HCPCS)
Electrical Engineering

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

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 Types of Violence
- Assessment and Physical Exam
- Nursing Interventions
# Social Studies

## Elementary (Grades 4-6)

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## Middle Grades (Grades 7-8)

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<th>North America</th>
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<td>War of 1812</td>
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<td>Colonial Settlements in America</td>
<td>Mapping</td>
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<td>Demographic Concepts</td>
<td>Middle East</td>
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<td>Monroe Doctrine</td>
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## High School (Grades 9-12)

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<th>Africa</th>
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<td>Declaration of Independence</td>
<td>Native Americans</td>
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Student Success

Academic Strategies
- Note-taking Techniques
- Studying Techniques
- Homework
- Selecting a Major
- Non-traditional Students
- 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
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

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
- Hermeneutics
- 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

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

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

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

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

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

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

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

**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

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

**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
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 ESL

Use of English
- Articles
- Comparisons and Superlatives
- Conditionals
- Countable and non-countable nouns
- Determiners
- Indirect speech
- Irregular verb forms
- Modal verbs
- Participial adjectives
- Parts of a sentence
- Passive and active voice
- Passive causatives
- Phrasal verbs
- Phrase usage: Neither, nor, such, so
- Prepositions
- Pronouns
- Question formation
- Relative clauses
- Subject-verb agreement
- Tag questions
- Time expressions
- Uses of gerunds and infinitives
- Using dictionaries
- Verb tense formation and uses
- Vocabulary: definitions, usage, collocations, word families, and connotations.
- Vocabulary--finding meaning in context
- Word form/Morphology

English Writing
- Conventions of standard written English syntax
- Linking words and text organizers
- Essay structure and development
- Parallel structure
- Word order

Speaking
- Daily communication--giving directions, giving advice, etc.
- Differences between English pronunciation and spelling
- Presentations
- Pronunciation - Phonics as used in Primary ESL
- Pronunciation: Identification of cause of pronunciation errors
- Pronunciation: Phonetic (International Phonetic Alphabet) transcription
- Pronunciation: Stress and intonation patterns

Listening
- Identifying main ideas vs. details
- Listening comprehension strategies (scaffolding, note taking, predicting, etc)
- Processing contextual audio (lectures, presentations, videos, etc.)
- Visual Organizers (Venn diagrams, concept maps, etc.)

Reading
- Analysis of figurative language
- Identifying main ideas vs. details
- Reading comprehension strategies (note taking, predicting, skimming, etc)
- Visual Organizers (Venn diagrams, picture-walks, concept maps, etc.)

Pedagogy of ESL
- Error correction strategies (response-repetition, prompting, recasting, integration, metalinguistic information, etc).
- Concept of communicative competence
- Differences among languages (phonology, morphology, syntax, and semantics)
- Literacy learning strategies
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, concept maps, etc.)
- Predicting

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

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

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

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

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

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

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

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

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

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

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

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
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

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
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

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

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

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

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

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

**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: Cournot 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

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

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

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 Meaning
- 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

Commercial 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

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

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
- Operators 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 from a Template
- 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
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
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
Note: Proficiency with PowerPoint 2010 required, preferably older and newer versions as well. English version required.

Apply and change advanced options
Customizing the ribbon
Creating using macros
Using different view options
Proofreading options
Creating presenter notes
Setting up a slideshow
Adding animations
Utilizing transitions
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

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

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

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

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

**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
**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
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

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
**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**

*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
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
  - Topologies

LAN Switching
  - Configurations
  - Troubleshooting
  - Security

IP Addressing
  - IPv4
  - IPv6
  - Addressing schema

Routing
  - Configurations
  - Troubleshooting
  - Security
  - Protocols

WAN Technologies
  - DSL
  - VPN
  - Cellular 3G and 4G
  - ISDN
Cloud Technologies

**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
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 commissioning 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 permission 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

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
- Accessing 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/partitioning
- Mounting/Unmounting

Windows Services
- File services, NTFS/Sharing Drives
- Installing/Set 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
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**

**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**

**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 gathering/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)

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

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

**Access Control**
- Least Privilege
- Defense in Depth
- Physical Access Control
- Authentication Methods
Software Development & Engineering

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#**

**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
  - Iterators
  - Jump/Break/Continue
  - Exception Handling

- **OOP Concepts in C#**
  - Methods
  - Constructors
  - Classes
  - Inheritance
  - Polymorphism
  - Interfaces
Network Engineering

**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

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)
- CustomaryGreetings & Protocol
French

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

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

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

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

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

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

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
- 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
Business and Organizational 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

Essentials of Communication
- Communication 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
News Writing/Reporting
  Lead
  Layout/Organization Styles
  Content
Feature/Magazine Writing
  Lead
  Layout/Organization Styles
  Content
Broadcast 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
Research, Newsgathering
  Conducting research
  Newsgathering
Interpersonal and Small Group Communication

**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

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