**MATH 0110 Developmental Math Skills Review, 1 Credit, 3 hours lab**

Description

MATH 0110 is established to accommodate students desiring non-course based remediation in developmental mathematics. This structure will best serve students whose assessment score is borderline for an entry course in college level mathematics or a subsequent course in the developmental sequence. The course may be delivered in a traditional or hybrid format, so students must be able to thrive in a self-directed study environment. A subset of outcomes for MATH 0306, 0308 and 0310 will be covered in this course, depending on student needs. This course carries institutional credit but will not transfer nor be used to meet degree requirements.

Prerequisite: Instructor approval

Outcomes

* A subset of outcomes for MATH 0306, 0308 and 0310 will be covered in this course, depending on student needs. Learning Outcomes for MATH 0306: Demonstrate basic skills in computations, estimations, order of operations, and applications involving whole numbers and decimals. Demonstrate basic skills in computations, estimations, order of operations, and applications involving fractions. Demonstrate basic skills in computations, estimations, order of operations and applications involving rational numbers. Perform operations using the Commutative, Associative, Distributive, and Identity Properties of Addition and Multiplication. Solve linear equations in one unknown. Solve ratio and proportion and percent problems including applications. Recognize simple geometric figures, angle relationships, and triangle relationships using their defining properties. Calculate quantities related to basic geometric figures using both the U.S. and metric systems.
* Learning Outcomes for MATH 0308: Solve linear equations and inequalities in one variable and compound inequalities in one variable. Use linear equations to solve applications. Sketch graphs of linear relations. Simplify expressions using definitions and laws of integer exponents. Add, subtract, multiply, and divide polynomials. Factor polynomial expressions. Solve quadratic equations using the factoring method. Solve systems of linear equations in two variables. Identify restricted values of rational expressions; reduce, multiply and divide rational expressions; and add and subtract rational expressions with like denominators.
* Learning Outcomes for MATH 0310: Sketch graphs of linear relations and determine a linear equation in two variables given pertinent information. Solve applications using systems of linear equations in two variables. Solve linear inequalities in one and two variables. Recognize functions defined by sets of ordered pairs, graphs, and equations, and apply function notation to applications. Factor higher degree polynomials. Perform operations and solve equations and applications involving rational expressions. Perform operations and solve equations involving radicals and rational exponents. Perform operations on complex numbers. Solve quadratic equations and applications using methods including the quadratic formula, factoring, completing the square, and extracting roots.

**MATH 0306 Pre-Algebra Mathematics, 3 Credits**

Description

Topics for all formats include basic arithmetic operations on integers and rational numbers, order of operations, introduction to basic geometric concepts, simplification of algebraic expressions and techniques of solving simple linear equations. This course carries institutional credit but will not transfer and will not meet degree requirements

Prerequisite

Placement by testing

Textbook for Math 0306 and Math 0308

*PreAlgebra with P.O.W.E.R. Learning;* Sherri Messersmith, Lawrence Perez, Robert S. Feldman

Softcover, bundled with ConnectMath access code card, McGraw-Hill Publishing; 1st edition

ISBN‐13: 9781259569678

Math 0306 Outcomes

* Calculate perimeter and area of quadrilaterals, triangles, and circles. Calculate volume of rectangular solids.
* Demonstrate basic skills in computations, estimations, order of operations and applications involving rational numbers.
* Demonstrate basic skills in computations, estimations, order of operations, and applications involving integers.
* Demonstrate basic skills in computations, estimations, order of operations, and applications involving whole numbers and decimals.
* Perform operations using the Commutative, Associative, Distributive, and Identity Properties of Addition and Multiplication.
* Recognize and Calculate angle relationships, and triangle relationships.
* Solve linear equations in one variable.
* Solve ratio and proportion and percent problems including applications.

**Math 0306 Sections**

A.1 Adding Whole Numbers

A.2 Subtracting Whole Numbers

A.3 Multiplying Whole Numbers

A.4 Introduction to Division and Short Division

A.5 Long Division of Whole Numbers

1.1 Place Value and Rounding

1.2 Introduction to Integers

1.3 Adding Integers

1.4 Subtracting Integers

1.5 Estimating a Sum or Difference

1.6 Multiplying Integers and Estimation

1.7 Dividing Integers and Estimation

1.8 Exponents, Roots and Order of Operations

2.1 Introduction to Algebra

2.2 Simplifying Expressions

2.3 Solving Linear Equations Part I

2.4 Solving Linear Equations Part II

2.5 Solving Linear Equations Part III

2.6 Solve Applied Problems Involving One Unknown

2.7 Solve Applied Problems Involving Two Unknowns

3.1 Introduction to Signed Fractions

3.2 Writing Fractions in Lowest Terms

3.3 Multiplying and Dividing Signed Fractions

3.4 Adding and Subtracting Like Fractions and Finding a Least Common Denominator

3.5 Adding and Subtracting Unlike Fractions

3.6 Operations with Mixed Numbers

3.7 Order Relations and Order of Operations

3.8 Solving Equations Containing Fractions

4.1 Introduction to Geometry

4.2 Rectangles, Squares, Parallelograms, and Trapezoids

4.3 Triangles

4.4 Volume and Surface Area (Objectives 1& 2 only)

*4.5\* Solving Geometry Applications Using Algebra*

5.1 Reading and Writing Decimals

5.2 Rounding Decimals

5.3 Adding and Subtracting Signed Decimals

5.4 Multiplying Signed Decimals

5.5 Dividing Signed Decimals and Order of Operations

5.6 Writing Fractions as Decimals

*5.7\* Mean, Median, and Mode (optional)*

5.8 Solving Equations Containing Decimals

5.9 Square Roots and the Pythagorean Theorem

5.10 Circles, Spheres, Cylinders, and Cones

6.1 Ratios

6.2 Rates

6.3 Proportions

6.4 Solve Proportions

6.5 Solve Applied Problems Involving Proportions

6.6 Angles

6.7 Solve Applied Problems Involving Congruent and Similar Triangles

8.1 Percents, Fractions, and Decimals

8.2 Compute Basic Percents Mentally

8.3 Use an Equation to Solve Percent Problems

8.4 Solve Applications Involving Percents

*8.5\* More Applications with Percents*

**MATH 0308 Introductory Algebra, 3 Credits**

Description

Topics for all formats include basic algebraic operations, solving linear equations and inequalities, laws of integer exponents, factoring, rational expressions, the Cartesian coordinate system, graphing lines, finding equations of lines and solving linear systems. This course carries institutional credit but will not transfer and will not be used to meet degree requirements.

Prerequisite

MATH 0306 or placement by testing

Textbook for Math 0306 and Math 0308

*Introductory Algebra with P.O.W.E.R. Learning;* Sherri Messersmith, Lawrence Perez, Robert S. Feldman

Softcover, bundled with ConnectMath access code card, McGraw-Hill Publishing; 1st edition

ISBN‐13: 9781259573941

Math 0308 Outcomes

* Add, subtract, multiply, and divide polynomials.
* Factor polynomials.
* Simplify, multiply and divide rational expressions.
* Simplify expressions using definitions and laws of integer exponents.
* Sketch graphs of linear relations and determine a linear equation in two variables given pertinent information.
* Solve linear equations and inequalities in one variable and compound inequalities in one variable.
* Solve quadratic equations using the factoring method.
* Solve systems of linear equations in two variables, including applications.
* Use linear equations to solve applications.
* Find the slope and x and y- intercepts of a linear relation.

**Math 0308 Sections**

1.3 Geometry Review

2.1 Solving Linear Equations Part I

2.2 Solving Linear Equations Part II

2.3 Solving Linear Equations Part III

2.4 Applications of Linear Equations

*2.5\* Geometry Applications and Solving Formulas*

2.8 Solving Linear Inequalities in One Variable

3.1 Introduction to Linear Equations in Two Variables

3.2 Graphing by Plotting Points and Finding Intercepts

3.3 The Slope of a Line

3.4 The Slope-Intercept Form of a Line

3.5 Writing an Equation of a Line

4.1 Solving Systems by Graphing

4.2 Solving Systems by the Substitution Method

4.3 Solving Systems by the Elimination Method

4.4 Applications of Systems of Two Equations

5.1 (Parts A and B) Basic Rules of Exponents

5.2 (Parts A and B) Integer Exponents

5.3 The Quotient Rule

5.4 Scientific Notation

6.1 Addition and Subtraction of Polynomials

6.2 Multiplication of Polynomials

6.3 Dividing a Polynomial by a Monomial

6.4 Dividing a Polynomial by a Polynomial

7.1 The Greatest Common Factor and Factoring by Grouping

7.2 Factoring Trinomials of the Form

7.3 Factoring Trinomials of the Form

7.4 Factoring Special Trinomials and Binomials

7.5 Solving Quadratic Equations by Factoring

7.6 Applications of Quadratic Equations

8.1 Simplifying Rational Expressions

8.2 Multiplying and Dividing Rational Expressions

**NOTE: Geometry Sections are review sections only (Choose from Section 1.3 and Section 2.5).**

**MATH 0309 Foundations of Mathematical Reasoning, 3 Credits**

Description

This course surveys a variety of mathematical topics needed to prepare students for college level statistics or quantitative reasoning or for algebra-based courses. Topics include: numeracy with an emphasis on estimation and fluency with large numbers; evaluating expressions and formulas; rates, ratios, and proportions; percentages; solving equations; linear models; data interpretations including graphs and tables; verbal, algebraic and graphical representations of functions; exponential models. This course carries institutional credit but will not transfer and will not be used to meet degree requirements.

Prerequisite

MATH 0306 or placement by testing.

Corequisite

EDUC 1300

Math 0309 Outcomes

* Students will develop number sense and the ability to apply concepts of numeracy to investigate and describe quantitative relationships and solve real-world problems in a variety of contexts.
* Students will use proportional reasoning to solve problems that require ratios, rates, proportions, and scaling.
* Students will transition from specific and numeric reasoning to general and abstract reasoning using the language and structure of algebra to investigate, represent, and solve problems.
* Students will understand and critically evaluate statements that appear in the popular media (especially in presenting medical information) involving risk and arguments based on probability.
* Students will understand, interpret, and make decisions based on financial information commonly presented to consumers.
* Students will understand that quantitative information presented in the media and by other entities can sometimes be useful and sometimes be misleading.

**MATH 0310 Intermediate Algebra, 3 Credits**

Description

Topics for all formats include special products and factoring, rational expressions and equations, rational exponents, radicals, radical equations, quadratic equations, absolute value equations and inequalities, complex numbers, equations of lines, an introduction to the function concept, and graphing. This course carries institutional credit but will not transfer and will not be used to meet degree requirements.

Prerequisite: MATH 0308 or placement by testing

Textbook for Math 0310 and Math 1314

*Introductory Algebra with P.O.W.E.R. Learning;* Sherri Messersmith, Lawrence Perez, Robert S. Feldman

Softcover, bundled with ConnectMath access code card, McGraw-Hill Publishing; 1st edition

ISBN‐13: 9781259573941

Math 0310 Outcomes

* Define, represent, and perform operations on real and complex numbers.
* Recognize, understand, and analyze features of a function.
* Recognize and use algebraic (field) properties, concepts, procedures (including factoring), and algorithms to combine, transform, and evaluate absolute value, polynomial, radical, and rational expressions.
* Identify and solve absolute value, polynomial, radical, and rational equations.
* Identify and solve absolute value and linear inequalities.
* Model, interpret and justify mathematical ideas and concepts using multiple representations.
* Connect and use multiple strands of mathematics in situations and problems, as well as in the study of other disciplines.
* Solve quadratic equations and applications using methods including the quadratic formula, factoring, completing the square, and extracting roots.

**Math 0310 Sections**

3.1 Linear Inequalities in One Variable

3.2 Compound Inequalities in One Variable

3.3 Absolute Value Equations and Inequalities

4.1 Introduction to Linear Equations in Two Variables

4.2 Slope of a Line and Slope Intercept Form

4.3 Writing an Equation of a Line

4.4 Linear and Compound Linear Inequalities in Two Variables

4.5 Introduction to Functions

7.1 The Greatest Common Factor and Factoring by Grouping

7.2 Factoring Trinomials

7.3 Special Factoring Techniques

7.4 Solving Quadratic Equations by Factoring

7.5 Applications of Quadratic Equations

8.1 Simplifying, Multiplying, and Dividing Rational Expressions and Functions

8.2 Adding and Subtracting Rational Expressions

8.3 Simplifying Complex Fractions

8.4 Solving Rational Equations

8.5 Applications of Rational Equations

9.1 Radical Expressions and Functions   
(Objectives 1, 2, 3 and 4 only)

9.2 Rational Exponents

9.3 Simplifying Expressions Containing Square Roots

9.4 Simplifying Expressions Containing Higher Roots

9.5 Adding, Subtracting, and Multiplying Radicals

9.6 Dividing Radicals

9.7 Solving Radical Equations

9.8 Complex Numbers

10.1 The Square Root Property and Completing the Square

10.2 The Quadratic Formula

10.3 Equations in Quadratic Form

*10.4\* Formulas and Applications*

10.5 Quadratic Functions and their Graphs

10.6 Applications of Quadratic Functions and Graphing Other Parabolas (Objectives 1, 2 and 3 only)

**MATH 1314 College Algebra, 3 Credits**

Description

In-depth study and applications of polynomial, rational, radical, absolute value, piecewise-defined, exponential and logarithmic functions, equations, inequalities, graphing skills and systems of equations using matrices. Additional topics such as sequences, series, probability, conics, and inverses may be included.

Prerequisites

MATH 0310 or placement by testing; Course may be taken as a corequisite with ENGL 0305 or ENGL 0365 and ENGL 0307

Textbook for Math 0310 and Math 1314

*College Algebra;* Rockswold, 5th edition

Loose leaf bundled with a MyMathLab access code card; Pearson Publishing

ISBN-13: 978-126-9891042

Math 1314 Outcomes

* Demonstrate and apply knowledge of properties of functions, including domain and range, operations, compositions, inverses and piecewise defined functions.
* Recognize, graph and apply polynomial, rational, radical, exponential, logarithmic and absolute value functions and solve related equations.
* Apply graphing techniques.
* Evaluate all roots of higher degree polynomial and rational functions.
* Recognize, solve and apply systems of linear equations using matrices.
* Solve absolute value, polynomial and rational inequalities.

**Math 1314 Sections**

*1.2\* Visualizing and Graphing Data*

1.3 Functions and Their Representations

1.4 Types of Functions and Their Rates of Change

*2.1\* Equations of Lines (first 3 objectives only)*

2.2 Linear Equations

2.3 Linear Inequalities

2.4 More Modeling with Functions (first two objectives only)

2.5 Absolute Value Equations and Inequalities

3.1 Quadratic Functions and Models

3.2 Quadratic Equations and Problem Solving

*3.3\* Complex Numbers*

3.4 Quadratic Inequalities

3.5 Transformations of Graphs

4.1 More Nonlinear Functions and Their Graphs

4.2 Polynomial Functions and Models

*4.3\* Division of Polynomials*

4.6 Rational Functions and Models (include optional objective)

4.7 More Equations and Inequalities

4.8 Radical Equations and Power Functions

5.1 Combining Functions

5.2 Inverse Functions and Their Representations

5.3 Exponential Functions and Models

5.4 Logarithmic Functions and Models

5.5 Properties of Logarithms

5.6 Exponential and Logarithmic Equations

*6.1\* Functions and Systems of Equations in Two Variables (first 6 objectives only)*

*6.2\* Systems of Inequalities in Two Variables (first objective only)*

*6.3\* Linear Equations in Three Variables*

6.4 Solutions to Linear Systems Using Matrices

**(Unless otherwise noted, exclude optional objectives as noted in textbook)**

**MATH 1316 Trigonometry, 3 Credits**

Description

Trigonometric functions and their applications, solutions of right and oblique triangles, trigonometric identities and equations, inverse trigonometric functions, graphs of the trigonometric functions, vectors and polar coordinates

Prerequisite

MATH 1314 OR placement by testing; ENGL 0305 or ENGL 0365 OR higher level course (ENGL 1301), OR placement by testing;

Corequisite

ENGL 0307

Textbook for Math 1316 and Math 2412

*PreCalculus*

Michael Sullivan

Addison Wesley; 9th edition

ISBN-10: 0321716833

ISBN-13: 978-0321716835

Math 1316 Outcomes

* Compute the values of trigonometric functions for key angles in all quadrants of the unit circle measured in both degrees and radians.
* Compute values of the six basic inverse trigonometric functions.
* Graph trigonometric functions and their transformations.
* Prove trigonometric identities.
* Solve trigonometric equations.
* Solve right and oblique triangles.
* Use the concepts of trigonometry to solve applications.
* Compute operations of vectors.
* Represent complex numbers in trigonometric form.

**Math 1316 Sections**

6.1 Angles and Their Measure

6.2 Trigonometric Functions: Unit Circle Approach

6.3 Properties of the Trigonometric Functions

6.4 Graphs of the Sine and Cosine Functions

6.5 Graphs of the Tangent, Cotangent, Cosecant, and Secant Functions

6.6 Phase Shift; Sinusoidal Curve Fitting (optional)

7.1 The Inverse Sine, Cosine, and Tangent Functions

7.2 The Inverse Trigonometric Functions (continued)

7.3 Trigonometric Equations

7.4 Trigonometric Identities

7.5 Sum and Difference Formulas

7.6 Double-angle and Half-Angle Formulas

7.7 Product-to-Sum and Sum-to-Product Formulas

8.1 Right Triangle Trigonometry; Applications

8.2 The Law of Sines

8.3 The Law of Cosines

8.4 Area of a Triangle

9.1 Polar Coordinates (optional)

9.3 The Complex Plane; De Moivre’s Theorem

9.4 Vectors

9.5 The Dot Product (optional)

9.6 Vectors in Space (optional)

**MATH 1324 Finite Mathematics, 3 Credits**

Description

Applications of common algebraic functions, including polynomial, exponential, logarithmic, and rational, to problems in business, economics, and the social sciences are addressed. The applications include mathematics of finance, including simple and compound interest and annuities; systems of linear equations; matrices; linear programming; and probability, including expected value.

Prerequisites

MATH 0310 or placement by testing; ENGL 0305 or higher level course (ENGL 1301) or placement by testing

Corequisite

ENGL 0309

Textbook

*Finite Mathematics for Business, Economics, Life Sciences and Social Sciences*

Raymond A. Barnett, Michael R. Ziegler, and Karl Byleen

Prentice Hall; 12th edition

ISBN-10: 0321614011

ISBN-13: 978-0321614018

Math 1324 Outcomes

* Set up and solve systems of equations using matrix methods.
* Perform operations with matrices.
* Set up and solve linear programming applications using geometric and simplex methods.
* Compute probabilities using principles of sets and counting.
* Analyze data using basic principles of statistics.
* Solve financial applications involving simple and compound interest and annuities.

**Math 1324 Sections**

1.1 Linear Equations and Inequalities

1.2 Graphs and Lines

2.1 Functions

2.2 Elementary Functions: Graphs and Transformations

2.3 Quadratic Functions

2.4 Polynomial and Rational Functions

2.5 Exponential Functions

2.6 Logarithmic Functions

3.1 Simple Interest

3.2 Compound and Continuous Compound Interest

3.3 Future Value of an Annuity; Sinking Funds

3.4 Present Value of an Annuity; Amortization

4.1 Review: Systems of Linear Equations in Two Variables (optional)

4.2 Systems of Linear Equations and Augmented Matrices

4.3 Gauss-Jordan Elimination

4.4 Matrices: Basic Operations

5.1 Inequalities in Two Variables

5.2 Systems of Linear Inequalities in Two Variables

5.3 Linear Programming in Two Dimensions: A Geometric Approach

6.1 A Geometric Introduction to the Simplex Method

6.2 The Simplex Method

6.3 The Dual Problem

7.2 Sets

7.3 Basic Counting Principles

7.4 Permutations and Combinations

8.1 Samples Spaces, Events, and Probability

8.2 Union, Intersection, and Complement of Events: Odds

8.3 Conditional Probability, Intersection, and Independence

8.4 Bayes' Formula

8.5 Random Variable, Probability Distribution, and Expected Value

11.1 Graphing Data

11.2 Measures of Central Tendency

11.3 Measures of Dispersion

**MATH 1325 Elements of Calculus with Applications, 3 Credits**

Description

A one-semester calculus course for non-science majors. Topics include limits, continuity, rates of change, differentiation and integration techniques and applications, calculus of the logarithmic and exponential functions and partial derivatives.

Prerequisites

MATH 1314 or placement by testing; ENGL 0305 or ENGL 0365 OR higher level course (ENGL 1301), OR placement by testing.

Corequisite

ENGL 0307

Textbook

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

Raymond A. Barnett, Michael R. Ziegler, and Karl Byleen

Prentice Hall; 12th edition

ISBN-10: 0321613996

ISBN-13: 978-0321613998

Math 1325 Outcomes

* Evaluate limits functions from their graphs and/or equations.
* Determine derivative for selected functions and solve applications using these results.
* Integrate selected functions and solve applications using these results.
* Apply the concepts of limits, derivatives, and integrals to solve problems involving functions unique to business applications.

**Math 1325 Sections**

2.1 Functions

2.2 Graphs and Transformations (optional)

2.3 Quadratic Equations (optional)

2.4 Polynomial and Rational Functions

2.5 Exponential Functions

2.6 Logarithmic Functions

3.1 Introduction to Limits

3.2 Infinite Limits and Limits at Infinity (optional)

3.3 Continuity

3.4 The Derivative

3.5 Basic Differentiation Properties

3.6 Differentials (optional)

3.7 Marginal Analysis in Business and Economics

4.1 The Constant e and Continuous Interest

4.2 Derivatives of Exp and Logarithmic Functions

4.3 Derivatives of Products and Quotients

4.4 The Chain Rule

4.5 Implicit Differentiation (optional)

4.6 Related Rates (optional)

4.7 Elasticity of Demand (optional)

5.1 First Derivative and Graphs

5.2 Second Derivative and Graphs

5.3 L’Hôpital’s Rule (optional)

5.4 Curve Sketching Techniques

5.5 Absolute Maxima and Minima

5.6 Optimization

6.1 Anti‐derivatives and Indefinite Integrals

6.2 Integration by Substitution

6.3 Diff. Equations: Growth and Decay (optional)

6.4 The Definite Integral

6.5 The Fundamental Theorem of Calculus

7.1 Area between Curves

7.2 Applications in Business and Economics (optional)

7.3 Integration by Parts (optional)

8.1 Functions of Several Variables

8.2 Partial Derivatives

**MATH 1332 College Mathematics for Liberal Arts, 3 Credits**

Description

College Mathematics for Liberal Arts is a course designed for liberal arts and other nonmathematics, non-science, and nonbusiness majors, emphasizing an appreciation of the art, history, beauty, and applications of mathematics. Topics may include, but are not limited to, sets, logic, number theory, measurement, geometric concepts, and an introduction to probability and statistics.

Prerequisites

MATH 0310 or placement by testing; ENGL 0305 or ENGL 0365 OR higher level course (ENGL 1301), or placement by testing.

Corequisite

ENGL 0307

Textbook

**The Nature of Mathematics**

Karl J. Smith

Brooks Cole; 12th edition

ISBN-10: 0538737581

ISBN-13: 978-0538737586

Math 1332 Outcomes

* Demonstrate a mastery of the language of sets.
* Solve counting applications using permutation and combinations.
* Compute probabilities, including conditional probabilities, using principles of sets and counting.
* Identify the use and misuse of statistics in the real world.
* Create and interpret various methods of statistical display.

**Math 1332 Sections**

2.1 Symbols and Terminology

2.2 Venn Diagrams and Subsets

2.3 Set Operations and Cartesian Products

2.4 Surveys and Cardinal Numbers

3.1 Statements and Quantifiers

3.2 Truth Tables and Equivalent Statements

3.3 The Conditional and Circuits

3.4 The Conditional and Related Statements

3.5 Analyzing Arguments with Euler Diagrams

3.6 Analyzing Arguments with Truth Tables

9.1 Points, Lines, Planes, Angles

9.2 Curves, Polygons, and Circles

9.3 The Geometry of Triangles: Congruence, Similarity and Pythagorean Theorem

9.4 Perimeter, Area, Circumference

9.5 Volume and Surface Area

10.1 Counting by Systematic Listing

10.2 Using the Fundamental Counting Principle

10.3 Using Permutations and Combinations

10.5 Counting Problems Involving “Not” and “Or”

11.1 Basic Concepts of Probability

11.2 Events Involving “Not” and “Or”

11.3 Conditional Probability: Events Involving “And”

12.1 Visual Displays of Data

12.2 Measures of Central Tendency

12.3 Measures of Dispersion

**MATH 1342 Statistics, 3 Credits**

Description

Collection, analysis, presentation and interpretation of data, and probability. Analysis includes descriptive statistics, correlation and regression, confidence intervals and hypothesis testing. Use of appropriate technology is recommended.

Prerequisites

MATH 1314 or placement by testing; ENGL 0305 or ENGL 0365 or higher level course (ENGL 1301), or placement by testing.

Corequisite

ENGL 0307

Textbook

*Elementary Statistics, A Brief Version*

Allan Bluman

McGraw-Hill Science/Engineering/Math; 6th edition

Language: English

ISBN-10: 0077567668

ISBN-13: 978-0077567668

Math 1342 Outcomes

* Explain the use of data collection and statistics as tools to reach reasonable conclusions.
* Recognize, examine and interpret the basic principles of describing and presenting data.
* Compute and interpret empirical and theoretical probabilities using the rules of probabilities and combinatorics.
* Explain the role of probability in statistics.
* Apply the Central Limit Theorem to the sampling process.
* Examine, analyze and compare various sampling distributions for both discrete and continuous random variables.
* Describe and compute confidence intervals.
* Solve linear regression and correlation problems.
* Perform hypothesis testing using statistical methods.

**Math 1342 Sections**

Chapter 1 is mainly for reading and terminology.

1.1 Descriptive and Inferential Statistics

1.2 Variables and Type of Data

1.3 Data Collection

1.4 Observational and Experimental Studies

1.5 Uses and Misuses

1.6 Computers and Calculators

2.1 Organizing Data

2.2 Histograms, Frequency Polygons and Ogives

2.3 Other Types of Graphs

2.4 Paired Data and Scatter Plots

3.1 Measures of Central Tenancy

3.2 Measures of Variation

3.3 Measures of Position

3.4 Exploratory Data Analysis

4.1 Sample Spaces and Probability

4.2 The Addition Rules

4.3 The Multiplication Rules

4.4 Counting Rules

4.5 Probability and Counting Rules

5.1 Probability Distributions

5.2 Mean, Variance, Standard Deviation and Expectation

5.3 The Binomial Distribution

6.1 Normal Distributions

6.2 Applications of the Normal Distribution

6.3 The Central Limit Theorem

7.1 Confidence Intervals for the Mean Standard Deviation Known

7.2 Confidence Intervals for the Mean, Standard Deviation Unknown

7.3 Confidence Intervals for Proportions

7.4 Confidence Intervals for Variances and Standard Deviation

8.1 Hypothesis Testing Traditional

8.2 z Test for a Mean

8.3 t Test for a Mean

8.4 z Test for a Proportion

8.5 Chi-Squared Test for a Variance and Standard Deviation

10.1 Correlation

10.2 Regression

11.1 Test for Goodness of Fit

11.2 Tests Using Contingency Tables

11.3 Analysis of Variance (ANOVA)

**MATH 1350 Foundations of Mathematics I, 3 Credits**

Description

This is designed specifically for students who seek elementary and middle school teacher certification. Topics include set theory, functions, numerations systems, number theory, emphasis on problem solving and critical thinking.

Prerequisite

MATH 1314 OR placement by testing; ENGL 0305 or ENGL 0365 OR higher level course (ENGL 1301), or placement by testing.

Corequisite

ENGL 0307

Textbook for Math 1350 and Math 1351

*Mathematical Reasoning for Elementary School Teachers*

Calvin T. Long, Duane W. De Temple, Richard S. Millman

Addison Wesley; 6th edition

ISBN-10: 0321693124

ISBN-13: 978-0321693129

Math 1350 Outcomes

* Use models and manipulatives to demonstrate the four basic operations of the rational numbers.
* Demonstrate an understanding of place value through multiple representations including the use of grouping manipulatives, place value manipulatives and abstract representations such as with exponents and different number bases.
* Demonstrate an understanding of the attributes of numeration systems.
* Analyze mathematical situations and solve problems using mathematical heuristics.

**Math 1350 Sections**

1.1 An Introduction to Problem Solving

1.2 Pólya's Problem‐Solving Principles

1.3 More Problem‐Solving Strategies

1.4 Algebra as Problem‐Solving Strategy

1.5 Additional Problem‐Solving Strategies

1.6 Reasoning Mathematically

2.1 Sets and Operations on Sets

2.2 Sets, Counting, and the Whole Numbers

2.3 Addition and Subtraction of Whole Numbers

2.4 Multiplication and Division of Whole Numbers

3.1 Numeration Systems Past and Present

3.2 Non‐decimal Positional Systems

3.3 Algorithms for Adding and Subtracting

3.4 Algorithms for Multiplication and Division

3.5 Mental Arithmetic and Estimation

4.1 Divisibility of Natural Numbers

4.2 Tests for Divisibility

4.3 Greatest Common Divisors Least Common Multiples

5.1 Representations of Integers

5.2 Addition and Subtraction of Integers

5.3 Multiplication and Division of Integers

6.1 Basic Concepts of Fractions and Rational Numbers

6.2 Addition and Subtraction of Fractions

6.3 Multiplication and Division of Fractions

6.4 The Rational Number System

7.1 Decimals and Real Numbers

7.2 Computations with Decimals

7.3 Proportional Reasoning

7.4 Percent

8.1 Algebraic Expressions, Functions, and Equations

8.2 Graphing Points, Lines, and Elementary Functions

**MATH 1351 Foundations of Mathematics II, 3 Credits**

Description

This is designed specifically for students who seek elementary and middle school teacher certification. Topics include concepts of geometry, probability, and statistics, as well as applications of the algebraic properties of real numbers to concepts of measurement with an emphasis on problem solving and critical thinking.

Prerequisites

MATH 1314 OR placement by testing; ENGL 0305 or ENGL 0365 OR higher level course (ENGL 1301), or placement by testing.

Corequisite

ENGL 0307

Textbook for Math 1350 and Math 1351

*Mathematical Reasoning for Elementary School Teachers*

Calvin T. Long, Duane W. De Temple, Richard S. Millman

Addison Wesley; 6th edition

ISBN-10: 0321693124

ISBN-13: 978-0321693129

Math 1351 Outcomes

* Explore the geometric attributes of physical objects in order to classify and to form definitions.
* Analyze spatial characteristics such as direction, orientation, and perspective.
* Connect geometric ideas to numbers and measurement.
* Use geometric models to solve problems.
* Explore and understand measurement and estimation.
* Analyze data and statistics.
* Use probability with simple and complex experiments.
* Understand surface area and volume through discovery.

**Math 1351 Sections**

9.1 Graphical Representation of Data

9.2 Measures of Central Tendency and Variability

9.3 Statistical Inference and Sampling

10.1 Empirical Probability

10.2 Principles of Counting

10.3 Permutations and Combinations

10.4 Theoretical Probability

11.1 Figures in the Plane

11.2 Curves and Polygons in the Plane

11.3 Figures in Space

11.4 Networks

12.1 The Measurement Process

12.2 Area and Perimeter

12.3 The Pythagorean Theorem

12.4 Surface Area and Volume

13.1 Rigid Motions and Similarity Transformations

13.2 Patterns and Symmetries

13.3 Tilings and Escher-like Design

14.1 Congruent Triangles

14.2 Constructing Geometric Figures

14.3 Similar Triangles

**MATH 2318 Linear Algebra, 3 Credits**

Description

Matrices and linear systems, determinants, vector spaces, linear independence, basis and dimension, change of basis, linear transformations, similarity, inner product spaces, eigenvalues and eigenvectors, and diagonalization. Applications of these concepts will also be considered.

Prerequisites

MATH 2414; ENGL 0305 or ENGL 0365 or higher level course (ENGL 1301), or placement by testing.

Corequisite

ENGL 0307

Textbook

*Linear Algebra and Its Applications*

4/E, David C. Lay, University of Maryland

2012, Pearson

ISBN13: 978-0321385178

ISBN10: 0321385179

Math 2318 Outcomes

* Be able to solve systems of linear equations using multiple methods, including Gaussian elimination and matrix inversion.
* Be able to carry out matrix operations, including inverses and determinants.
* Demonstrate understanding of the concepts of vector space and subspace.
* Demonstrate understanding of linear independence, span, and basis.
* Be able to determine eigenvalues and eigenvectors and solve problems involving eigenvalues.
* Apply principles of matrix algebra to linear transformations.
* Demonstrate application of inner products and associated norms.
* Construct proofs using definitions and basic theorems.

**Math 2318 Sections**

1.1 Systems of Linear Equations

1.2 Row Reduction and Echelon Forms

1.3 Vector Equations

1.4 The Matrix Equation Ax = b

1.5 Solution Sets of Linear Systems

1.6 Applications of Linear Systems

1.7 Linear Independence

1.8 Introduction to Linear Transformations

1.9 The Matrix of a Linear Transformation

1.10 Linear Models in Business, Science, and Engineering

2.1 Matrix Operations

2.2 The Inverse of a Matrix

2.3 Characterizations of Invertible Matrices

2.4 Partitioned Matrices

2.5 Matrix Factorizations

2.7 Applications to Computer Graphics

2.8 Subspaces of Rn

2.9 Dimension and Rank

3. 1 Introduction to Determinants

3.2 Properties of Determinants

3.3 Cramer's Rule, Volume, and Linear Transformations

4.1 Vector Spaces and Subspaces

4.2 Null Spaces, Column Spaces, and Linear Transformations

4.3 Linearly Independent Sets; Bases

4.4 Coordinate Systems

4.5 The Dimension of a Vector Space

4.6 Rank

4.7 Change of Basis

5.1 Eigenvectors and Eigenvalues

5.2 The Characteristic Equation

5.3 Diagonalization

5.4 Eigenvectors and Linear Transformations

5.5 Complex Eigenvalues

6.1 Inner Product, Length, and Orthogonality

6.7 Inner Product Spaces

**MATH 2320 Differential Equations, 3 Credits**

Description

Linear equations, solutions in series, solutions using Laplace transforms, systems of differential equations and applications to problems in engineering and allied fields.

Prerequisites

MATH 2414; ENGL 0305 or ENGL 0365 or higher level course (ENGL 1301), or placement by testing.

Corequisite

ENGL 0307

Math 2320 Outcomes

* Identify homogeneous equations, homogeneous equations with constant coefficients, and exact and linear differential equations.
* Solve ordinary differential equations and systems of equations using: Direct integration
* Separation of Variables
* Reduction of Order
* Methods of Undetermined Coefficients and Variation of Parameters
* Series Solutions
* Operator Methods for finding particular solutions
* Laplace Transform methods.
* Determine particular solutions to differential equations with given boundary conditions or initial conditions.
* Analyze real-world problems in fields such as Biology, Chemistry, Economics, Engineering, and Physics, including problems related to population dynamics, mixtures, growth and decay, heating and cooling, electronic circuits, and Newtonian mechanics

**MATH 2412 PreCalculus, 4 Credits**

Description

An integrated treatment of the concepts necessary for calculus beginning with a review of algebraic and transcendental functions including trigonometric functions. Topics also include the binomial theorem, analytic geometry, vector algebra, polar and parametric equations, mathematical induction and sequences and series.

Prerequisites

Math 1314 and Math 1316 OR placement by testing; ENGL 0305 or ENGL 0365 or higher level course (ENGL 1301), or placement by testing.

Corequisite

ENGL 0307

Textbook for Math 1316 and Math 2412

*PreCalculus*

Michael Sullivan

Addison Wesley; 9th edition

ISBN-10: 0321716833

ISBN-13: 978-0321716835

Math 2412 Outcomes

* Demonstrate and apply knowledge of properties of functions.
* Recognize and apply algebraic and transcendental functions and solve related equations.
* Apply graphing techniques to algebraic and transcendental functions.
* Compute the values of trigonometric functions for key angles in all quadrants of the unit circle measured in both degrees and radians.
* Prove trigonometric identities.
* Solve right and oblique triangles.
* Apply the binomial theorem.
* Determine equations of conic sections, and graph conics, including translation and identification of vertices, foci and asymptotes.
* Perform basic operations and solve applications using vector algebra.
* Perform operations and graph equations using polar and parametric equations.
* Prove statements using mathematical induction.
* Use properties of arithmetic and geometric sequences and series to identify terms, find sums and solve applications.

**Math 2412 Sections**

2.1 Functions

2.2 The Graph of a Function

2.3 Properties of Functions

2.4 Library of Functions; Piecewise-defined Functions

3.3 Quadratic Functions and Their Properties

3.4 Build Quadratic models from Verbal Descriptions and from Data

5.3 Exponential Functions

5.4 Logarithmic Functions

5.5 Properties of Logarithms

5.6 Logarithmic and Exponential Equations

6.1 Angles and Their Measure

6.2 Trigonometric Functions: Unit Circle Approach

6.3 Properties of the Trigonometric Functions

6.4 Graphs of the Sine and Cosine Functions

6.5 Graphs of the Tangent, Cotangent, Cosecant, and Secant Functions

6.6 Phase Shift; Sinusoidal Curve Fitting

7.1 The Inverse Sine, Cosine, and Tangent Functions

7.2 The Inverse Trigonometric Functions (continued)

7.3 Trigonometric Equations

7.4 Trigonometric Identities

7.5 Sum and Difference Formulas

7.6 Double-angle and Half-Angle Formulas

7.7 Product-to-Sum and Sum-to-Product Formulas

8.1 Applications Involving Right Triangles

8.2 Law of Sines

8.3 Law of Cosines

8.4 Area of a Triangle

9.1 Polar Coordinates

9.2 Polar Equations and Graphs

9.4 Vectors

9.5 The Dot Product

9.6 Vectors in Space

9.7 The Cross Product

10.2 The Parabola

10.3 The Ellipse

10.4 The Hyperbola

11.2 Systems of Linear Equations: Matrices

11.3 Systems of Linear Equations: Determinants

11.5 Partial Fraction Decomposition

12.1 Sequences

12.2 Arithmetic Sequences

12.3 Geometric Sequences; Geometric Series

12.4 Mathematical Induction

12.5 The Binomial Theorem

**MATH 2413 Calculus I, 4 Credits**

Description

Limits and continuity; the Fundamental Theorem of Calculus; definition of the derivative of a function and techniques of differentiation; applications of the derivative to maximizing or minimizing a function; the chain rule, mean value theorem, and rate of change problems; curve sketching; definite and indefinite integration of algebraic, trigonometric, and transcendental functions, with an application to calculation of areas.

Prerequisites

MATH 2412 OR placement by testing; ENGL 0305 or ENGL 0365 or higher level course (ENGL 1301), or placement by testing.

Corequisite

ENGL 0307

Textbook

*Calculus: Early Transcendentals*, Alternate Edition with EWA

James Stewart

Brooks Cole; 7th edition

ISBN-13: 9780840058454

Math 2413 Outcomes

* Develop solutions for tangent and area problems using the concepts of limits, derivatives, and integrals.
* Draw graphs of algebraic and transcendental functions considering limits, continuity, and differentiability at a point.
* Determine whether a function is continuous and/or differentiable at a point using limits.
* Use differentiation rules to differentiate algebraic and transcendental functions.
* Identify appropriate calculus concepts and techniques to provide mathematical models of real-world situations and determine solutions to applied problems.
* Evaluate definite integrals using the Fundamental Theorem of Calculus.
* Articulate the relationship between derivatives and integrals using the Fundamental Theorem of Calculus.
* Use implicit differentiation to solve related rates problems.

**Math 2413 Sections**

2.1 The Tangent and Velocity Problems

2.2 The Limit of a Function

2.3 Calculating Limits Using the Limit Laws

2.4 The Precise Definition of the Limit

2.5 Continuity

2.6 Limits at Infinity

2.7 Derivatives and Rates of Change

2.8 The Derivative as a Function

3.1 Derivatives of Polynomials and Exponential Functions

3.2 The Product and Quotient Rules

3.3 Derivatives of Trigonometric Functions

3.4 The Chain Rule

3.5 Implicit Derivatives

3.6 Derivatives of Logarithmic Functions

3.7 Rates of Change in the Natural and Social Sciences

3.8 Exponential Growth and Decay (optional)

3.9 Related Rates

3.10 Linear Approximations (optional)

3.11 Hyperbolic Functions

4.1 Maximum and Minimum Values

4.2 The Mean Value Theorem

4.3 How Derivatives Affect the Shape of the Graph

4.5 Summary of Curve Sketching

4.7 Optimization Problems

4.9 Anti-derivatives

5.1 Areas and distances

5.2 The Definite Integral

5.3 The Fundamental Theorem of Calculus

5.4 Indefinite Integral

**MATH 2414 Calculus II, 4 Credits**

Description

Differentiation and integration of exponential and logarithmic functions, techniques of integration, applications of the definite integral, the calculus of transcendental functions, parametric equations, polar coordinates, indeterminate forms and L’Hopital’s Rule, improper integrals, sequences and series.

Prerequisites

MATH 2413; ENGL 0305 or ENGL 0365 or higher level course (ENGL 1301), or placement by testing.

Corequisite

ENGL 0307

Textbook

*Calculus: Early Transcendentals*, Alternate Edition with EWA

James Stewart

Brooks Cole; 7th edition

ISBN-13: 9780840058454

Math 2414 Outcomes

* Use the concepts of definite integrals to solve problems involving area, volume, work, and other physical applications.
* Use substitution, integration by parts, trigonometric substitution, partial fractions, and tables of anti-derivatives to evaluate definite and indefinite integrals.
* Define an improper integral.
* Apply the concepts of limits, convergence, and divergence to evaluate some classes of improper integrals.
* Determine convergence or divergence of sequences and series.
* Use Taylor and MacLaurin series to represent functions.
* Use Taylor or MacLaurin series to integrate functions not integrable by conventional methods.
* Use the concept of parametric equations and polar coordinates to find areas, lengths of curves, and representations of conic sections.
* Apply L'Hôpital's Rule to evaluate limits of indeterminate forms.

**Math 2414 Sections**

4.4 Indeterminate Forms

5.5 The Substitution Rule

6.1 Areas Between Curves

6.2 Volumes

6.3 Volumes by Cylindrical Shells

6.4 Work

7.1 Integration by Parts

7.2 Trigonometric Integrals

7.3 Trigonometric Substitution

7.4 Integration of Rational Functions by Partial Fractions

7.5 Strategy for Integration

7.7 Approximate Integration

7.8 Improper Integrals

10.1 Curves Defined by Parametric Equations

10.2 Calculus with Parametric Curves

10.3 Polar Coordinates

10.4 Areas and Lengths in Polar Coordinates

11.1 Sequences

11.2 Series

11.3 The Integral Test and Estimates of Sums

11.4 The Comparison Tests

11.5 Alternating Series

11.6 Absolute Convergence and the Ratio and Root Tests

11.7 Strategy for Testing Series

11.8 Power Series

11.9 Representations of functions as Power Series

11.10 Taylor and Maclaurin Series

11.11 Applications of Taylor Polynomials

**MATH 2415 Calculus III, 4 Credits**

Description

Advanced topic in calculus, including three dimensional coordinate systems, limits and continuity of multivariable functions, partial derivatives, directional derivatives, the gradient, extreme values, multiple integration, the calculus of vector valued functions and line and surface integrals.

Prerequisites

MATH 2414; ENGL 0305 or ENGL 0365 or higher level course (ENGL 1301), or placement by testing.

Corequisite

ENGL 0307

Textbook

*Calculus: Early Transcendentals*, Alternate Edition with EWA

James Stewart

Brooks Cole; 7th edition

ISBN-13: 9780840058454

Math 2415 Outcomes

* Perform calculus operations on vector-valued functions, including derivatives, integrals, curvature, displacement, velocity, acceleration, and torsion.
* Perform calculus operations on functions of several variables, including partial derivatives, directional derivatives, and multiple integrals.
* Find extrema and tangent planes.
* Solve problems using the Fundamental Theorem of Line Integrals, Green's Theorem, the Divergence Theorem, and Stokes' Theorem.
* Apply the computational and conceptual principles of calculus to the solutions of real-world problems.
* Explore selected topics of solid analytic geometry pertaining to lines and planes.
* Use the cylindrical and spherical coordinate systems.
* Use three space vector operations.
* Acquire a graphic and algebraic understanding of quadratic surfaces.
* Analyze and apply the concepts of limits and continuity to multivariable functions.

**Math 2415 Sections**

10.1 Review, Curves Defined by Parametric Equations

10.2 Review, Calculus with Parametric Equations

10.3 Review, Polar Coordinates

10.4 Areas and Lengths in Polar coordinates

12.1 Three Dimensional Coordinate Systems

12.2 Vectors

12.3 The Dot Product

12.4 The Cross Product

12.5 Equations of Lines and Planes

12.6 Cylinders and Quadric Surfaces

13.1 Vector Functions and Space Curves

13.2 Derivatives and Integrals of Vector Functions

13.3 Arc Length and Curvature

13.4 Motion in Space: Velocity and Acceleration

14.1 Functions of Several Variables

14.2 Limits and Continuity

14.3 Partial Derivatives

14.4 Tangent Plane and Linear Approximations

14.5 The Chain Rule

14.6 Directional Derivatives and the Gradient Vector

14.7 Maximum and Minimum Values

14.8 Lagrange Multipliers

15.1 Double Integrals over Rectangles

15.2 Iterated Integrals

15.3 Double Integrals over General Regions

15.4 Double Integrals over Polar Coordinates

15.5 Application of Double Integrals

15.6 Surface Area

15.7 Triple Integrals

15.8 Triple Integrals in Cylindrical Coordinates

15.9 Triple Integrals in Spherical Coordinates

15.10 Change of Variables in Multiple Integrals

16.1 Vector Fields

16.2 Line Integrals

16.3 The Fundamental Theorem of Line Integrals

16.4 Green's Theorem

16.5 Curl and Divergence

16.6 Parametric Surfaces and Their Areas

16.7 Surface Integrals

16.8 Stokes’ Theorem

16.9 The Divergence Theorem

16.10 Summary