



Syllabus

MAT 145 Survey of Functions I

General Information

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Department Mathematics

Course Prefix MAT

Course Number 145

Course Title Survey of Functions I

Course Information

Catalog Description This course is an introduction to the study of families of functions. Power, piecewise, quadratic, and polynomial functions are covered extensively. Right and non-right trigonometry is also studied in depth. The use of realistic applications and modeling with these families of functions are essential elements of this course. Emphasis on multiple methods of solving equations (algebraic, graphic, and numeric) is included as are multiple representations (algebraic, graphic, numeric, and verbal) of mathematical information.

Credit Hours 3

Lecture Contact Hours 4

Lab Contact Hours 0

Other Contact Hours 0

Grading Scheme Letter

Prerequisites

A grade of C- or better in MAT 097 or Placement into Math Level 2

Co-requisites

None

First Year Experience/Capstone Designation

This course DOES NOT satisfy the outcomes applicable for status as a FYE or Capstone.

SUNY General Education

This course is designated as satisfying a requirement in the following SUNY Gen Ed category

Mathematics (and Quantitative Reasoning)

FLCC Values

Institutional Learning Outcomes Addressed by the Course

Inquiry and Interconnectedness

Course Learning Outcomes

Course Learning Outcomes

1. Model realistic scenarios using power, piecewise, quadratic, and polynomial functions.
2. Apply concepts of trigonometry to solve problems.
3. Solve equations algebraically, graphically, and numerically (via tables) and evaluate the result for reasonableness.
4. Use function notation to express mathematical concepts.

Outline of Topics Covered

General Outline of Topics Covered:

1. **Graphing Utility usage (embed throughout the course)**
 - a. **Evaluating expressions and functions.**
 - b. **Using the table function**
 - c. **Graphing functions**
 - d. **Changing window bounds**
 - e. **Finding key points such as minimums, maximums, intersections, and intercepts.**
 - f. **Translating algebraic expressions into calculator input**
 - g. **Solving equations graphically**
 - h. **Expectations of hand-drawn graphs:**

- a. **Labeled axes, proper scale, intercepts, local minimums/maximums, and end behavior.**

2. **Common to piecewise, power, quadratic, and polynomial function families (embed throughout the course) where appropriate.**
 - a. **Understanding and using function notation including variables other than x and y.**
 - b. **Function evaluation**
 - c. **Characteristics of their graphs**
 - d. **Choosing bounds to graph functions in an appropriate window using a graphing utility**
 - e. **Finding the zeros and vertical intercept algebraically and graphically**
 - f. **Solving for the input of a function given an output graphically**
 - g. **Solving inequalities related to functions graphically**
 - h. **Interpreting the realistic meaning of the inputs and outputs, zeros and y-intercept**
 - i. **Stating domain and range: both abstract and realistic**
 - j. **Effects (graphical, algebraic, and verbal) of transformations**
 - k. **Defining a formula for a function from a given graph, table, and verbal expression**
 - l. **Describing end behavior of functions**
 - m. **Calculating and interpreting average rate of change (AROC).**

3. **Power Functions**
 - a. **Direct vs inverse variation**
 - b. **Definition of negative and rational exponents (and their relationship to radicals)**
 - c. **Simplifying and changing the form of power functions. e.g.**
 $f(x) = \sqrt[3]{x}$ into $f(x) = x^{1/3}$

- d. Solving equations involving power functions graphically and algebraically
- e. Modeling with power functions
- f. Properties of graphs of power functions
 - i. Even vs. odd positive integers
 - ii. Even vs. odd negative integers
 - iii. Reciprocals of even and odd integers

4. Piecewise defined functions

- a. Evaluating piecewise functions via a formula or graph
- b. Graphing piecewise functions by hand (e.g. absolute value, step, and linear)
- c. Modeling with piecewise functions (including linear, constant and step functions)

5. Quadratic Functions

- a. Solving quadratic equations algebraically
 - i. Factoring and taking square roots (review)
 - ii. quadratic formula (QF)
- b. Solving applied problems using quadratic equations
- c. Convert between forms of quadratic functions: standard, vertex, and zeros (factored)
- d. Quadratic functions and graphs: Finding and identifying vertex, axis of symmetry, x-intercepts and y-intercept algebraically and graphically
- e. Modeling with quadratic functions

6. Polynomial Functions

- a. Terminology of polynomial functions (degree, odd/even, etc.)

- b. End behavior as x approaches positive or negative infinity**
- c. Finding the zeros (with multiplicity) from graph or zeros (factored) form**
- d. Modeling with polynomial functions with zeros (factored) form from the given conditions: a graph of the function or given zeros and an another ordered pair.**

7. Trigonometry

- a. General triangle properties and terminology (e.g. sum of interior angles, area, etc)**
- b. Pythagorean Theorem**
- c. Finding the sine, cosine, tangent of an angle in a right triangle**
- d. Use sine, cosine, tangent to find missing sides and angles of a right triangle**
- e. Solving first degree trig equations (sine, cosine, and tangent) for angles between 0 and 180 degrees**
- f. Solving applied problems using right angle trigonometry (including angles of elevation/depression, etc.)**
- g. Solving non-right triangles using**
 - i. Law of sines including the ambiguous case.**
 - ii. Law of cosines**