

Math2155 Calculus II – Objectives

Upon successful completion of this course a student will be able to:-

Identify the 6 trigonometric functions, sketch their graphs

Solve trig equations, understand identity properties and common first quadrant angular measures

Convert from angular to radian measure and vice versa

Identify coterminal and reference angles

Evaluate limits for trig functions (using L'Hôpital's rule where necessary)

Find the derivatives of trig functions including products, quotients and applying the chain rule

Find extrema and points of inflection for trig related functions

Integrate trig functions

Find area, volumes of revolution and arc length for trig functions

Identify inverse trig functions including domain and range for each

Sketch graphs of inverse trig functions

Evaluate derivatives of inverse trig functions

Integrate inverse trig functions (including use of completing the square and substitution)

Show knowledge of hyperbolic functions, their inverses, derivatives and integrals, understand the graphs of these functions.

Demonstrate integration techniques including

- Functions with or without a trig component

- Integration by parts

- Trig product integrals

- Using trig substitution

- Partial fraction expansion for linear and quadratic factors

- Use of tables

- Improper integrals

Define a sequence, determine its limit and convergence

Define a series and determine its convergence using

- Telescoping series

- Geometric series

- Integral test

- p-series

- Comparison of series

- Alternating series (including absolute and conditional convergence)

- Ration Test

- Root Test

Know which of the above tests to use for a given series

Generate a power series for a given function using

- Taylor's and Maclaurin series

- Geometric method

- Power series for elementary series

Determine radius and intervals of convergence for a power series, its derivatives and integrals

Approximate functions, to desired accuracy, using a Taylor polynomial

Determine equations for parabolas, ellipses and hyperbolas, including, where appropriate vertices, axes, directrix, foci, center, eccentricity (include standard form equations)

Sketch graphs of second order equations with rotations, identify by discriminant

Define a plane curve

Determine a set of parametric equations and convert to rectangular form (adjusting the domain if necessary)

Find the derivative of a curve determined by parametric equations

Find slope and concavity of parametric equations and sketch their graph

Determine arc length and surface area for functions described by parametric equations

Use a polar coordinate system to plot points and sketch curves

Determine a point's representation in rectangular and polar coordinates

Use tests for symmetry in polar coordinates

Sketch curves in polar coordinates using tangent lines as an aid

Find area, arc length and surface area of curves described by polar equations

Determine polar equations for conic sections, convert from polar to rectangular

Define Kepler's Laws

Define a vector in space in component form and standard unit vector form

Perform addition, subtraction and scalar multiplication of vectors

Determine a unit vector in the same direction

Determine the dot product of vectors

Find the angle between two vectors, determine orthogonality, parallel or neither

Find the projection of one vector onto another

Represent a plane curve as a vector-valued function

Find the limit of a vector valued function and determine continuity

Find the derivatives of a vector-valued function

Find the integral of a vector-valued function

Determine the velocity and acceleration for a vector-valued function, also determine speed

Determine the position by integration

Determine the position of a projectile

Determine the tangent and (principal) normal unit vectors for a smooth curve

Determine the tangential and normal components of acceleration for a smooth curve

Find the arc length and curvature for a smooth curve

Sketch a vector in 3 space

Find the distance between points in 3 space, and the equation of a sphere

Determine the direction cosines for a vector in 3 space

Determine the cross product for 2 vectors in space

Determine the triple scalar product of 2 vectors

Determine a normal vector to 2 vectors

Find the volume of a parallelepiped given adjacent vectors

Find the parametric and symmetric equations for vectors in space

Find the equation of plane in space

Determine the normal vector for a plane in space

Find the angle between two planes in space (if it exists)

Find the distance between

Two planes in space

A point and a line in space

A point and a plane

A student will be able to apply the objectives to real world problems.