MATH 1113 - Precalculus (version 201003L)

Course Title	Course Development	Learning Support
Precalculus	Standard	No

Course Description

Prepares students for calculus. The topics discussed include an intensive study of polynomial, rational, exponential, logarithmic, and trigonometric functions and their graphs. Applications include simple maximum and minimum problems, exponential growth and decay.

Pre-requisites

Regular Admission and MATH 1111 with C or better OR appropriate math placement test score.

Regstr. Co-requisites

Regstr. Co-requisites: None

True Co-requisites

True Co-requisites: None

Course Length

	Lecture Contact Time	Regular Lab Type	Reg. Lab Contact Time	Other Lab Type	Oth. Lab Contact Time	Total Contact Hrs
Contact Hours Per Week	**3 hrs**	**N/A**	**0 hrs**	**N/A**	**0 hrs**	**3 hrs**
Contact Min/Hrs Per Semester	**2250 min**		**0 min**		**0 min**	**45 hrs**

	Lecture Credit Hours	Lab Credit Hours	Total Credit hours	WLU
Semester Credit Hours	**3**	**0**	**3**	**101.25**

Competencies & Outcomes

Order Description

1 **Define a logarithm and use logarithmic properties**

Order	Description	Learning Domain	Level of Learning
1	Define a logarithm	Cognitive	Knowledge
2	Use logarithmic properties to determine values of logarithmic expressions	Cognitive	Application
3	Solve logarithmic and exponential equations using properties of logarithms	Cognitive	Application

2 **Define and graph a logarithmic function; find domain and range; and solve applications**

Order	Description	Learning Domain	Level of Learning
1	Define a logarithmic function	Cognitive	Knowledge
2	Determine the domain and range of logarithmic functions	Cognitive	Application
3	Draw the graph of logarithmic functions	Cognitive	Application

4	Solve applications involving logarithmic functions	Cognitive	Application

3 **Define, determine domain and range, and graph the six circular functions**

Order	Description	Learning Domain	Level of Learning
1	Define the six circular functions	Cognitive	Knowledge
2	Describe the domain and range of the six circular functions	Cognitive	Knowledge
3	Draw the graph of circular functions using amplitude, period, and phase shift	Cognitive	Application

4 **Define the six trigonometric functions; use to solve right/oblique triangles and solve applications**

Order	Description	Learning Domain	Level of Learning
1	Define six trigonometric functions	Cognitive	Knowledge
2	Solve right triangles using trigonometric functions	Cognitive	Application
3	Solve applications involving right triangles using the trigonometric functions	Cognitive	Application
4	Solve oblique triangles using the law of sines and law of cosines	Cognitive	Application

5 **Use trigonometric identities to prove other identities and work with the inverse trig. functions**

Order	Description	Learning Domain	Level of Learning
1	Use the fundamental trigonometric identities to prove other identities	Cognitive	Application
2	Use the sum and difference identities to prove other identities	Cognitive	Application
3	Use the double angle and half-angle identities to prove other identities	Cognitive	Application
4	Determine the domain and range of the trigonometric functions and their inverses	Cognitive	Application
5	Draw the graph of the trigonometric functions and their inverses	Cognitive	Application

6 **Define and work with vectors**

Order	Description	Learning Domain	Level of Learning
1	Define vectors	Cognitive	Knowledge
2	Find the components of a vector	Cognitive	Knowledge
3	Perform operations on vectors	Cognitive	Application
4	Solve application problems involving vectors	Cognitive	Application

7 **Define and work with complex numbers**

Order	Description	Learning Domain	Level of Learning
1	Define a complex number	Cognitive	Knowledge
2	Describe complex numbers in standard, rectangular, polar, and trigonometric forms	Cognitive	Knowledge
3	Draw the graph of a complex number on the Argand diagram	Cognitive	Application
4	Perform operations on complex numbers	Cognitive	Application
5	Use DeMoivre's Theorem to find powers and roots of complex numbers	Cognitive	Application

8 **Define basic concepts related to functions and their graphs**

Order	Description	Learning Domain	Level of Learning
1	Define Function	Cognitive	Knowledge
2	Define domain and range of function	Cognitive	Knowledge
3	Define maximum and minimum values of a function	Cognitive	Knowledge
4	Define increasing, decreasing, and constant functions	Cognitive	Knowledge
5	Define end behavior of a function	Cognitive	Knowledge
6	Define zeros and roots of a function	Cognitive	Knowledge
7	Define transformation of a function	Cognitive	Knowledge

9 **Graph a function using a graphing calculator**

Order	Description	Learning Domain	Level of Learning
1	Draw the graph of a function using a graphing calculator	Cognitive	Knowledge

10 **Define and graph linear functions and solve applications involving them**

Order	Description	Learning Domain	Level of Learning
1	Define a linear function	Cognitive	Knowledge
2	Draw the graph of a linear function	Cognitive	Knowledge
3	Solve applications that involve linear functions	Cognitive	Application

11 **Define and graph quadratic functions and solve applications involving them**

Order	Description	Learning	Level of

		Domain	Learning
1	Define a quadratic function	Cognitive	Knowledge
2	Draw the graph of a quadratic function	Cognitive	Knowledge
3	Determine the vertex and the maximum or minimum value of a quadratic function	Cognitive	Application
4	Solve applications involving quadratic functions	Cognitive	Application

12 **Perform operations involving functions including finding the inverse of a function**

Order	Description	Learning Domain	Level of Learning
1	Determine the sum of two functions	Cognitive	Application
2	Determine the difference of two functions	Cognitive	Application
3	Determine the product of two functions	Cognitive	Application
4	Determine the quotient of two functions	Cognitive	Application
5	Determine the composition of two functions	Cognitive	Application
6	Compute a the value of a composition of two functions given a domain value	Cognitive	Application
7	Determine the inverse of a function	Cognitive	Application

13 **Define and graph polynomial functions including end behavior and zeros (real and imaginary)**

Order	Description	Learning Domain	Level of Learning
1	Define polynomial functions	Cognitive	Knowledge
2	Draw the graph of a polynomial function	Cognitive	Application
3	Determine the end behavior of a polynomial function using the leading term test	Cognitive	Application
4	Determine all the real and imaginary zeros of a polynomial function	Cognitive	Application
5	Draw the graph of transformations of polynomial functions	Cognitive	Application

14 **Define and graph rational functions including basic characteristics and transformations**

Order	Description	Learning Domain	Level of Learning
1	Define a rational function	Cognitive	Knowledge
2	Determine the domain and range of a rational function	Cognitive	Application
3	Determine the vertical and horizontal asymptotes of a rational function	Cognitive	Application
4	Draw the graph of a rational function	Cognitive	Application

5	Draw the graph of a transformation of a rational function	Cognitive	Application

15 **Define, evaluate, and graph exponential functions and use them to model phenomena**

Order	Description	Learning Domain	Level of Learning
1	Define an exponential function	Cognitive	Knowledge
2	Calculate the value of an exponential function	Cognitive	Application
3	Determine the domain and range of an exponential function	Cognitive	Application
4	Draw the graph of an exponential function	Cognitive	Application
5	Draw the graph of transformations of exponential functions	Cognitive	Application
6	Use exponential functions to model natural phenomena such as exponential growth and decay and practical situations such as compound interest	Cognitive	Application