MASTER COURSE OUTLINE

A. MATH 1115 Pre-Calculus

B. COURSE DESCRIPTION:

This course is for students requiring further experience with advanced algebra prior to calculus. Topics include trigonometric functions and their inverses, Law of Sines, Law of Cosines, polar coordinates and graphing, parametric equations, linear and non-linear inequalities and equations; mathematical induction, analytic trigonometry, sequences, series, higher order rational, polynomial, exponential and logarithmic functions. Optional: conic sections, matrices, and vectors.
Prerequisite: Math 1110 with a grade of C or better or appropriate placement in course based on Multiple Measures for Course Placement – Math Decision Band Chart.
MnTC (Goals 4/MA and 2/CT); (5 Cr – 5 lect, 0 lab)

C. *Core Theme: Critical Thinking **Discipline Area (if MnTC): Mathematical/Logical Reasoning

D. RIVERLAND INSTITUTIONAL LEARNING OUTCOMES:

This course addresses the following Riverland Institutional Learning Outcome(s):
☒ ILO 1: critical thinking *(Core Theme Goal 2)*
☐ ILO 2: awareness of the larger global community *(Core Theme Goal 7 or 8)*
☐ ILO 3: ethical, engaged citizenship *(Core Theme Goal 9 or Goal 10)*
☐ ILO 4: communication and collaboration *(Discipline Goal 1 and by any learning outcome(s) involving communication or collaboration)*

E. MAJOR CONTENT AREAS:

- Review of linear and quadratic equations and inequalities
- Review of functions and graphing functions
  - Linear and quadratic functions
  - Composition of functions
  - Inverse functions
  - Polynomial functions
  - Rational functions, including oblique asymptotes
  - Exponential functions
  - Logarithmic functions
  - Regression models of data
- Introduction to trigonometric functions
  - Angles
  - Sine and cosine functions

    - Other trigonometric functions
    - Right triangle trigonometry
- Graphs of trigonometric functions
    - Sine and Cosine graphs
    - Graphs of other trigonometric functions
    - Inverse trigonometric functions
- Trigonometric identities and equations
    - Verifying and using basic trigonometric identities
    - Sum and difference formulas
    - Half and double angle formulas
    - Sum-to-product formulas (optional)
    - Trigonometric equations
- Applications of trigonometry
    - Law of Sines, Law of Cosines
    - Graph polar coordinates and equations
    - Convert between polar and rectangular coordinates
    - Convert between polar and rectangular equations
    - Define and graph parametric equations
    - Convert parametric equations to rectangular equations
- Sequences and series
    - Sequences and their notation
    - Arithmetic and geometric sequences
    - Series and their notation
    - Arithmetic and geometric series
    - Applications of series
    - Mathematical induction

F. GOAL TYPES, OBJECTIVES, AND OUTCOMES:

GOAL	**OBJECTIVES** **Students will be able to**	**OUTCOMES** **The student will successfully**
MnTC Goal 2a	gather factual information and apply it to a given problem in a manner that is relevant, clear, comprehensive, and conscious of possible bias in the information selected.	1. analyze models created and determine which would be the most applicable to the situation. 2. use graphs to make generalizations to assist in predicting the shape of other functions.
MnTC Goal 2b	imagine and seek out a variety of possible goals, assumptions, interpretations, of perspectives which can give alternative meanings or solutions to given situations or problems.	1. use more than one method to solve similar problems. 2. share methods used to interpret and solve application problems with other students.
MnTC Goal 2c	analyze the logical connections among the facts, goals, and implicit assumptions relevant to a problem or claim; generate and evaluate implications that follow from them.	1. list the assumptions and limitations needed to accept a mathematical model.
MnTC Goal 4a	illustrate historical and contemporary applications of mathematical/logical systems.	1. apply properties of real numbers along with the systematic properties of algebra in such fields as science, business, statistics, and personal decision making.

MnTC Goal 4c	explain what constitutes a valid mathematical/logical argument (proof).	1. use properties of trigonometric functions to prove trigonometric identities. 2. use properties such as definitions, axioms, postulates, and theorems to generate equivalent equations until either the resulting equation provides a solution or until a contradiction is established.
MnTC Goal 4d	apply higher-order problem-solving and/or modeling strategies.	1. use modeling strategies to solve applied problems.
CS	demonstrate knowledge of parametric equations.	1. graph parametric equations. 2. convert between parametric equations and rectangular equations.
CS	demonstrate familiarity in working with polar coordinates.	1. graph polar coordinates and equations. 2. convert between polar equations and rectangular equations.
CS	recognize and demonstrate proficiency in working with the six trigonometric functions: sine, cosine, tangent, cotangent, secant, and cosecant.	1. calculate the six trigonometric ratios of a variety of angles. 2. identify and show understanding of working with graphs of the six trigonometric functions.

G. SPECIAL INFORMATION:

This course may require use of the Internet, the submission of electronically prepared documents and the use of a course management software program. Students who have a disability and need accommodations should contact Accessibility Services at the beginning of the semester. This information will be made available in alternative format, such as Braille, large print, or current media, upon request. A graphing calculator is required.

H. COURSE CODING INFORMATION:

Course Code A/Class Maximum 48; Letter Grade

Revision date: 09/01/16; 09/20/16; 09/29/22; 03/14/23; 10/01/24
AASC Approval date: 02/19/19; 10/18/22; 03/28/23; 11/19/24

*These five MnTC Goals have been identified as Riverland Community College Core Themes. Every course in the Riverland Community College curriculum shall meet outcomes from one of these themes.

**These five MnTC Goals have been identified as Riverland Community College Disciplines. Riverland's MnTC courses also shall meet outcomes from a Discipline Area.

NOTE: The Minnesota Transfer Curriculum "10 Goal Areas of Emphasis" are reflected in the five required discipline areas and five core themes noted in the Riverland Community College program of study guide and/or college catalog.

*Riverland Community College Core Themes	MnTC Goal Number
Critical Thinking (CT)	**2**
Human Diversity (HD)	**7**
Global Perspective (GP)	**8**
Ethical and Civic Responsibility (EC)	**9**
People and the Environment (PE)	**10**

**Riverland Community College Discipline Areas	MnTC Goal Number
Communication (CM)	**1**
Natural Sciences (NS)	**3**
Mathematics/Logical Reasoning (MA)	**4**
History and the Social & Behavioral Sciences (SS)	**5**
Humanities and Fine Arts (HU)	**6**