Common Course Outline

A. Course Prefix, Number, and Title    MATH 1210 Pre-Calculus

MNTC     Area 4B

B. Semester Credit Value    5 Credits

C. Prerequisites    Appropriate score on the math placement test, or recommendation from your MATH 0210 instructor, or equivalent

D. Catalog Description
This course is intended to be a one-semester path to Calculus for students who have had at least three years of high school mathematics, including trigonometry. This course consists of material from MATH 1200 and MATH 1201. Topics include polynomial, rational, exponential, logarithmic, and trigonometric functions and their inverses; systems of equations and inequalities; matrices, and determinants; trigonometric identities; equations and applications; parametric equations; polar coordinates; sequences and series; probability; conics; and modeling. (Cannot be taken for credit if student has received credit for both MATH 1200 and MATH 1201.)

E. Course Information
1. Total classroom hours per week:    5 hours
2. Total laboratory hours per week:    0 hours
3. Total clinical hours per week:    0 hours
4. Other (rehearsals, online discussion, etc.) hours per week:    
5. Additional fee to student:    No
6. Degree for which course is required:    AA, AS, and AAS
7. Program of study for which course is required:    Transfer or Career

F. Learner Outcomes
At the conclusion of the course, the student should be able to:
1. identify, transform and/or produce the graph for a given function (including constant, linear, polynomial, parabolic, cubic, square root, absolute value, rational, logarithmic, and exponential).
2. identify, transform and/or produce the graph of a circle.
3. find an equation of a line given sufficient information.
4. translate an applied problem into an equation of inequality and provide a solution through algebraic manipulation.
5. interpret an expression, equation, or inequality by utilizing a graph, table, or diagram.
6. define a function along with its domain and range.
7. combine functions through the operations of addition, subtraction, multiplication, division, and composition.
8. determine the inverse function for a given function.
9. solve any equation of first or second degree.
10. solve an exponential equation.
11. solve a logarithmic equation.
12. solve a system of linear equations with row reduction.
13. state the definition of an infinite sequence.
14. find a particular term or sequence of terms for a particular infinite sequence.
15. state the definition of an arithmetic sequence and give examples thereof.
16. state the definition of a geometric sequence and give examples thereof.
17. work back and forth readily between expanded and closed forms of summation notation.
18. apply the concepts of experiment, outcome, and sample space to a given model.
19. state the definition of probability of an event for a given sample space and apply such to simple problems.
20. convert from degrees to radians and vice versa.
21. define the six trigonometric functions and find values of them with and without a calculator.
22. prove identities that make use of the eight fundamental identities, sum and difference formulas, and double and half angle formulas.
23. graph the six trigonometric functions with emphasis on graphs of the form \( y = a \sin bx + c \) and \( y = a \cos bx + c \).
24. solve application problems that involve solving triangles using right triangle trigonometry, the Law of Sines and the Law of Cosines.
25. apply trigonometric identities to the solution of trigonometric equations.
26. demonstrate elementary properties of inverse trigonometric functions.
27. find the real, rational, and/or complex zeros of a polynomial function.
28. find the determinant for a 2 x 2 or 3 x 3 matrix.
29. identify, transform, and/or produce the graph for a given parabola, ellipse or hyperbola.
30. eliminate the parameter for a plane curve defined parametrically.
31. sketch certain curves defined parametrically.
32. sketch the graphs of equations given in polar coordinates.
33. readily convert back and forth between Cartesian equations and polar equations.
34. create, analyze, and discuss the validity of a mathematical model for a set of data.
35. use a graphing utility and interpret the results where applicable in the above outcomes.
36. apply the definition(s) of a permutation and combination to counting problems as appropriate.

G. **ARCC Guiding Principles Satisfied**
Identify the learner outcomes from F that relate to each of the guiding principles below or describe how the guiding principles are used in this course.
1. Clear Thinking 1–36
2. Effective Communication 4, 5, 24, 34, 35
3. Accepting Diversity
4. Ethical Decision Making

H. **Minnesota Transfer Curriculum** Goal Area 4
Identify the learner outcomes from F that relate to each of the competencies for the Emphasis Area(s) selected.
1. Name of Emphasis Area: Mathematical and Logical Reasoning
2. Competency: A
3. Learner Outcome(s): 1–36

1. Name of Emphasis Area: Mathematical and Logical Reasoning
2. Competency: B
3. Learner Outcome(s): 1–36

1. Name of Emphasis Area: Mathematical and Logical Reasoning
2. Competency: C
3. Learner Outcome(s): 7, 8, 22
1. Name of Emphasis Area: Mathematical and Logical Reasoning
2. Competency: D
3. Learner Outcome(s): 4, 5, 8 – 12, 24, 34 – 36

I. Entry Level Skills/Knowledge
What level of skills should students have prior to taking this course? (1 = basic, 2 = pre-college, 3 = college)
1. Mathematics: 3
2. Reading: 3
3. Writing: 2
4. Ability to use a scientific calculator

J. Major Areas of Course Content
These areas should be covered by everyone teaching this course.
1. Functions (linear, polynomial, rational, exponential, logarithmic)
2. Systems of equations
3. Matrices and Determinants
4. Sequences, Series, and Probability
5. Conics
6. Parametric Equations and Polar coordinates
7. Trigonometric Functions
8. Analytic Trigonometry (identities, equations, and inverse functions)
9. Applications of Trigonometry
10. Modeling

K. Course Assessment
At the present time we have no scheduled assessment of learner outcomes.

L. Program Assessment
Does this course provide assessment data for any of the following assessment plans? (Check any that apply.)
X General Education (MnTC): Which area(s)? 4
☐ AA degree
☐ AS degree: Which program(s)?
☐ AAS degree: Which program(s)?
Briefly describe the type of data provided and how it is collected:

M. Procedure for Credit by Examination
For a “P” grade the student must pass the exam with at least 70%. For a letter grade other than “P” the student must pass the exam according to the following percentages: 90 – 100% - A; 80 – 89% - B; 70 – 79% - C; 69 – 60% - D.

N. Proposed Implementation Date: Spring 2007

O. Common Course Outline Review
Courses should be reviewed on a rotating basis every three years. Please document review dates below.

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<tr>
<th>Reviewed by:</th>
<th>Date:</th>
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<tbody>
<tr>
<td>Math Department</td>
<td>September 1998</td>
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<tr>
<td>Math Department</td>
<td>January 2007</td>
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