SEP. 1 8 2001

INSTRUCTOR:	Christine Frattini
CLASS TIME:	Mon. Tues. Thur. Fri. 8:30 - 9:35 a.m. Wed. 8:30 - 9:20 a.m.
PHONE:	Bus. 539-2010; Res. 539-7465
OFFICE:	C416
PREREQUISITE:	MA20/MA0120 OR MA0130 placement Recommended: at least 65% in MA20/MA0120
TEXT:	Mathpower 12, Western Edition (2000) McGraw-Hill Publishing
REQUIRED:	*Scientific* calculator, graph paper

COURSE GOALS: This course is designed to provide the student with an understanding of transformations, logarithms, trigonometry, sequences and series, conics, statistics, permutations and combinations, and probability. This course prepares the student for university transfer mathematics courses. The student will develop problem solving skills and gain an appreciation of the mathematics of modern society.

ATTENDANCE: Regular attendance is expected from all students and is essential for passing the course. Students who miss classes will find themselves falling behind and failing. Any students missing more that 20% of scheduled class time may be denied the privilege of writing the final exam.

EXTRA HELP: Extra assistance is available in C416 immediately following math class each day and at various other times in the Math Lab (A210). Consult your instructor.

TESTS AND ASSIGNMENTS: There are seven units in this course. Each unit will have a test and/or assignment which will count towards the final grade. Any student not attending class on a test date will receive a grade of zero for that test unless a phone call is made *prior* to the time of the test and an explanation of the absence satisfactory to the instructor is provided. There will be a mid-term exam after the first three units. There will be a final exam after the course is completed with emphasis on the last half of the course.
Assignments should be handed in on the specified dates. Late assignments will be decreased by 10% per day and will not be marked once assignments have been returned to the rest of the class.

EVALUATION:

Tests (5)	30%
Assignments (3)	15%
Mid-term	15%
Final Exam	40%

UNIT DESCRIPTION

1. **Transformations** (Chapter 1)
   -graphs of linear, quadratic, square root, rational, cubic, and absolute value functions; horizontal and vertical slides, reflections, expansions and compressions

2. **Exponential and Logarithmic Functions** (Chapter 2)
   - laws and properties of exponents and logarithms; exponential and logarithmic functions; solving exponential and logarithmic equations; graphing exponential and logarithmic functions; applications

3. **Trigonometry** (Chapters 4 and 5)
   - radian measure; exact values of the Unit Circle; trigonometric functions of an angle; graphing trigonometric functions including all parameters; trigonometric identities and sum and difference identities; solving trigonometric equations; applications

MIDTERM

4. **Conic Sections** (Chapter 3)
   - circles; parabolas; ellipses; hyperbolas; equations and problem solving involving conic sections; general quadratic equation in two variables

5. **Sequences and Series** (Chapter 6)
   - arithmetic and geometric sequences and series; terms and sums; summation notation and expanding a series; infinite geometric series; applications

6. **Permutations and Combinations** (Chapter 7)
   - fundamental counting principle; permutations; combinations; Pascal's Triangle; Binomial Theorem; applications

7. **Probability and Statistics** (Chapters 8 and 9)
   - probability and sample space; reasonable assumptions; classifying events; probability and combinatorics; mean, median and mode; standard deviation; z-scores; normal distribution; applications

FINAL EXAM

OBJECTIVES OF THE COURSE

The following are the minimum objectives which must be achieved by you over the semester. Some changes to objectives may be introduced later as per the need.

UNIT 1. FUNCTIONS AND TRANSFORMATIONS: On completing this unit, you should be able to

- Factor a given polynomial, where possible, using the formulas of difference of two squares, the sum and the difference of two cubes, and by taking a common factor.
- Plot the graphs of quadratic, cubic, and higher polynomial functions. Also be able to plot rational, absolute value, and square root functions.
- Given a graph of any of the above functions, be able to plot the graph of a related function using horizontal and vertical translations, reflections, and stretching.
- Solve related problems

   An assignment worth 4% of the course will follow this unit

UNIT 2. EXPONENTS AND LOGARITHMS: On completing this unit, you should be able to

- Define the terms - base and the exponent · of an exponential relation.
- Develop a model for exponential growth, and decay.
- Solve related problems.
- Solve exponential equations.
- Determine the doubling period, or any other time period for an exponential growth, or exponential decay.
- Solve related problems.
- Plot graphs of exponential and logarithmic functions
- Define logarithmic relationships, and be able to interconvert exponential and logarithmic relations.
- State laws of logarithms, and apply them to solve related problems.
- Evaluate logarithms.
- Solve problems based on logarithmic formulas, including Richter, and pH scales, and continuous growth or decay.
- Solve logarithmic equations.
- Prove logarithmic identities.

   Write test worth 6% of the course on this unit

UNIT 3. TRIGONOMETRY: On completing this unit, you should be able to
- Define the radian as a measure of an angle; and be able to convert radians into degrees and vice-versa.
- Define principal, and coterminal angles, and state relation between them.
- Define the trigonometric ratios - sine, cosine, and tangent - of an angle, and determine the exact values of the above trigonometric ratios for selected angles.
- Solve problems based on the above ratios.
- Define period, and amplitude of periodic functions, and plot graphs of sine and cosine functions.
- Determine the period and the amplitude of a periodic function from a given graph, and be able to write the equation of the function.
- Use transformations to plot the graphs of sine and cosine functions.
- Develop models using sinusoidal functions, and be able to solve related problems.
- Define other trigonometric (reciprocal) functions, and state mathematical relations between different trigonometric functions. (8 basic identities)
- Solve trigonometric equations giving specific, and general solutions.
- State the trigonometric identities involving the sums, and the differences of two angles.
- Solve related problems
- Prove trigonometric identities.

A test worth 6% of the course will cover the material up to and including graphing and an assignment worth 4% will cover equations and identities.

MIDTERM EXAM, WORTH 15% OF THE FINAL GRADE, WILL ALSO BE GIVEN AT THE END OF THIS UNIT

UNIT 4. CONIC SECTIONS: On completing this unit, you should be able to
- Define all the four conic sections - the circle, the ellipse, the hyperbola, and the parabola - in mathematical terms.
- Give the general equation of each of the individual conic sections, and the common general equation for all of them.
- Identify the appropriate conic section from the general equation.
- Give the standard equation for each of the four conic sections.
- Determine the equation of the **circle** when the coordinates of the centre, and either the radius, or the coordinates of a point lying on the circle, are given.
- Determine the coordinates of the centre, and the radius of the circle for which the equation is given. And be able to draw the sketch of the circle.
- Solve related problems.
- Define the major and the minor axes, and the foci of the **ellipse.** Also state the relation between a, b, and c.
- Determine the equation of the ellipse for which the coordinates of the centre, and those of the foci are given.

- Determine the coordinates of the centre, the lengths of the two axes, and the coordinates of the vertices and the foci of the ellipse for which the equation is given. Be able to draw the sketch of the ellipse.
- Solve related problems.
- Define the transverse axis, the conjugate axis, the foci, and the vertices of the **hyperbola**. Also state the relation between a, b, and c.
- Define asymptotes.
- Determine the equation of the hyperbola for which the coordinates of the centre, and those of the vertices are known.
- Determine the centre, the vertices, the lengths of the axes and the asymptotes of the hyperbola for which its equation is given. Also be able to draw the sketch of the hyperbola.
- Solve related problems.
- Define the focus, the directrix, and the axis of symmetry of the **parabola**.
- Determine the equation of the parabola when the coordinates of the focus (or vertex), and the equation of the directrix are given.
- Determine the equation of the parabola when the coordinates of the vertex (or the focus), and those of a point lying on the parabola are given.
- Determine the coordinates of the vertex, the equation of the directrix, and the axis of symmetry for the parabola for which the equation is given. Also be able to draw the sketch of the parabola.
- Solve related problems

Assignment worth 7% of the total grade will follow this unit

UNIT 5. SEQUENCES AND SERIES: On completing this unit, you should be able to
- Define arithmetic sequence, common difference, general term, and recursive formula. Also be able to identify an **arithmetic sequence**.
- To determine the general term and specific terms of an arithmetic sequence.
- Determine the sum of a given arithmetic sequence to a desired number of terms.
- Solve related problems.
- Expand and evaluate expressions written in Sigma notation.
- Define geometric sequence, common ratio, and general term. Also be able to identify a **geometric sequence**.
- To determine the general, and specific terms of a geometric sequence.
- Determine the sum of a given geometric sequence to a desired number of terms.
- Determine the sum of an infinite geometric sequence, and convert a repeating decimal into corresponding fraction.
- Solve related problems.

Write test at the end of this unit worth 6% of the total grade.

UNIT 6: COMBINATORICS - PERMUTATIONS AND COMBINATIONS: On completing this unit, you should be able to

- State the fundamental counting principle.
- Define **permutations** of n objects, and factorials.
- Determine the number of permutations of n different objets when all, or a part are used at a time.
- Determine the number of permutations of n objects when some of them are alike.
- Solve related problems.
- Define **combinations** of n objects.
- Determine the number of different combinations when r objects are selected out of n different objects.
- Explain Pascal's triangle, and how it is related to combinations.
- Apply the principle of combinations to different situations, and solve related problems.
- Apply combinations to the Binomial Theorem.

Write test worth 5% of the final grade, on this unit

UNIT 7. PROBABILITY AND STATISTICS: On completing this unit, you should be able to

- Explain probability of an event, probability tree, sample space, Venn diagrams, and statistical sampling.
- Determine probability of an event using probability tree and Venn diagrams.
- Determine probability using combinatorics.
- Solve related problems.
- Define mean, mode, and median for a given set of data, and determine each of them for the data.
- Explain binomial distribution.
- Define standard deviation, and determine standard deviation for given data.
- Apply standard deviation to analyse given data.
- Define z-score, and calculate z-score for a given set of data.
- Apply z-score to solve related problems.
- Explain standard normal curve, and normal distribution.
- Use area under the standard normal curve, and z-scores to solve related problems.

Write test worth 7% of the final grade, on this unit

WRITE FINAL EXAM WORTH 40% OF THE FINAL GRADE