GRANDE PRAIRIE REGIONAL COLLEGE
ACADEMIC UPGRADING DEPARTMENT
MA0130A2 COURSE OUTLINE
Fall, 2004

INSTRUCTOR: Sukhvir Sandhu

CLASS TIME: Monday, Tuesday, Friday: 8:30 – 9: 50 a.m.
                    Wednesday, Thursday: 8:30 – 9:20 a.m.

LOCATION: Monday, Tuesday, Friday   A314
                    Wednesday, Thursday   A211

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OFFICE: C310

**CALANDER
DESCRIPTION:**   **MA 0130 5 (6-0-0) HS 90 Hours Mathematics Grade 12 Equivalent**

                    This course explores transformations, exponents and logarithms,
                    sequences, series, limits, trigonometry (including the unit circle,
                    graphs, identities, and equations), quadratic relations, conics,
                    permutations and combinations, probability and statistics.

                    Prerequisites: MA0120 or equivalent, or equivalent math placement
                    test score.

TEXT: Math Power 12, Western Edition (2000) McGraw-Hill Publishing

REQUIRED: *Scientific* calculator, graph paper, transparent folders

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 than 20% of
                    scheduled class time may be denied the privilege of writing the final
                    exam.

EXTRA HELP: Small questions can be answered before the class starts.
                    More assistance is available most days upon request in C310.

Note: A few changes may have to make in order to adjust unpredictable circumstances.

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. A few assignments have two parts. 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 (4)	20%
Assignments (5)	21%
Mid-term	15%
Final Exam	40%
Attendance/Participation	4%

Final grades are given as follows:

Alpha Grade	4-Point Equivalent	Percentage Guidelines	Designation
A+	4.0	90 – 100	Excellent
A	4.0	85 – 89	
A-	3.7	80 – 84	First Class Standing
B+	3.3	76 – 79	
B	3.0	73 – 75	Good
B-	2.7	70 – 72	
C+	2.3	67 – 69	Satisfactory
C	2.0	64 – 66	
C-	1.7	60 – 63	
D+	1.3	55 – 59	Minimal Pass
D	1.0	50 – 54	
F	0.0	0 – 49	*Fail*

MA0130

<h1 align="center">UNIT DESCRIPTION</h1>

1.   **Transformations** (Chapter 1)
        -graphs of linear, quadratic, square root, rational, cubic, and absolute value functions; Horizontal and vertical translations, 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; graphing

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; classifying events; probability and combination; conditional probability; binomial distribution; mean and 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. REVIEW / FUNCTIONS AND TRANSFORMATIONS: On completing this unit, you should be able to
$ Factor a given polynomial, where possible (common factor, grouping, difference of squares, sum and difference of cubes, trinomials).
$ Solve linear, quadratic and polynomial equations.
$ Plot the graphs of quadratic, cubic, and higher polynomial functions. Also be able to plot rational, absolute value, and square root functions.
$ Given the graph of any of the above functions, be able to plot the graph of a related function using translations (horizontal and vertical), reflections (in x-axis, in y-axis, in line $y=x$), and stretches (expansions and compressions).
$ Identify invariant points.
$ Identify transformation(s) from an equation.
$ Write an equation to reflect a given transformation.
$ 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 or decay.
$ Solve related problems.
$ Solve exponential equations.
$ Determine the doubling period, or any other time period, for exponential growth or 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.
$ Evaluate common and natural logarithms using a calculator.
$ Solve problems based on logarithmic formulas, including Richter and pH scales, and continuous growth or decay.
$ Solve logarithmic equations.

Write a test worth 5% of the course on this unit.

UNIT 3. TRIGONOMETRY: On completing this unit, you should be able to
$ Define radian measure of an angle; be able to convert radians to degrees and vice-versa.
$ Solve related problems.
$ Define the primary and reciprocal trigonometric ratios of an angle.
$ Given one trigonometric ratio of an angle, determine the other 5 ratios.
$ Define principal and conterminal angles, and state relationship between them.
$ Determine exact values of trigonometric ratios for selected angles on the unit circle.
$ Define period and amplitude of periodic functions.
$ Plot graphs of the basic 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 a sinusoidal function given its graph.
$ Use transformations to plot the graphs of more complex sine and cosine functions.
$ Develop models using sinusoidal functions, and be able to solve related problems.
$ 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 differences of two angles.
$ Solve related problems
$ Prove trigonometric identities.

A test worth 5% of the course will cover the material up to and including graphing and an assignment worth 4% will cover equations and identities. The assignment is in two parts.

WRITE A MIDTERM EXAM WORTH 15% OF THE FINAL GRADE..

UNIT 4. CONIC SECTIONS: On completing this unit, you should be able to
$ Define the four conic sections (circle, ellipse, hyperbola, and 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.
$ Convert a given equation of a conic section from general to standard form and vice-versa.
$ 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. Also, be able to sketch the graph.
$ 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 given some of the characteristics (centre, vertices, foci, length of axes, point on the curve, etc) of the ellipse.
- $ 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. Also, be able to sketch the graph.
- $ 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 given some of the characteristics of the hyperbola.
- $ 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 sketch the graph.
- $ Solve related problems.
- $ Define the focus, the directrix, and the axis of symmetry of the **parabola**.
- $ Determine the equation of the parabola given some of the characteristics (vertex, focus, directrix, point on the curve, etc) of the parabola.
- $ 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 sketch the graph.
- $ Solve related problems.

An assignment worth 7% of the total grade will follow this unit. **The assignment is in two parts.**

UNIT 5. SEQUENCES AND SERIES: On completing this unit, you should be able to
- $ Define explicit and recursive formula for a sequence.
- $ Solve related problems.
- $ Define **arithmetic sequence**, common difference, and general term. Also, be able to identify an arithmetic sequence.
- $ 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.
- $ 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.
- $ Solve related problems.

Write test at the end of this unit worth 5% 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 objects when all, or 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 from 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.

An assignment worth 4% of the final grade will follow this unit. **The assignment may be in two parts.**

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 combinations.
$	Solve related problems.
$	Define mean, mode, and median for a given set of data, and determine each of them for the data.
$	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.

Complete an assignment worth 2% and write test worth 5% of the final grade on this unit.

WRITE FINAL EXAM WORTH 40% OF THE FINAL GRADE.