



Grande Prairie Regional College
Department: Academic Upgrading

COURSE OUTLINE – Fall 2008

MA0130 - Mathematics Grade 12 Equivalent (Pure)

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Calendar Description:

MA 0130 - Mathematics Grade 12 Equivalent (Pure) 5 (6-0-0) HS

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

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

Required Text/Resource Materials:

Pure Math 30 Workbook, (Appleby, Letal, Ranieri) Absolute Value Publishers
Scientific calculator (graphing calculators are *not* permitted for tests), graph paper, 3-ring binder

Credit/Contact Hours: 5 credits; 6 contact hours per week

Objectives:

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.

Course Delivery and Evaluation:

Students are guided through the workbook/textbook. First, background concepts and rules are reviewed; then investigative work is done leading to new concepts, laws and formulas. Students are expected to participate as these new concepts are applied to class example problems. As well, several related problems are assigned daily to reinforce new ideas and skills; in order to succeed in this course, students must commit to a minimum of two hours of homework per day.

Transferability:

This course is listed in the Alberta Transfer Guide. It is accepted at colleges and universities in Alberta as equivalent to Math 30 Pure.

UNIT DESCRIPTIONS with Corresponding Textbook Lessons and Projected Timelines

Unit 1 Transformations **(Workbook Lessons 1-10) 8 days**

- Solve polynomial, linear, quadratic, rational, absolute value, radical and cubic equations.
- Graph polynomial, linear, quadratic, rational, absolute value, radical and cubic functions.
- Understand function notation and write an inverse function.
- Given the graph of any function, be able to plot the graph of a related function using translations (horizontal and vertical), stretches (about the x or y -axis), and reflections (in x -axis, in y -axis, in line $y=x$).
- Identify transformation(s) from an equation.
- Write an equation to reflect a given translation, reflection, or stretch.
- Identify and perform combinations of transformations on functions.

Complete an assignment at the end of this unit worth 5% of the total grade.

Unit 2 Exponents and Logarithms **(Workbook Lessons 1-7, 9) 9 days**

- Use the laws of exponents to simplify expressions.
- Solve exponential & logarithmic equations.
- Plot graphs of exponential & logarithmic functions.
- Identify transformations of exponential & logarithmic functions.
- Define logarithmic relationships and be able to interconvert exponential and logarithmic relations.
- Evaluate logarithms to find exact values.
- Evaluate common and natural logarithms using a calculator.

Write a test at the end of this unit worth 5% of the final grade

Unit 3 Sequences and Series

(Workbook Lessons 1-6)

7 days

- 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 term as well as specific terms of a geometric sequence.
- Determine the sum of a given geometric sequence to a desired number of terms.
- Solve related problems.
- Develop a model for exponential growth or decay and solve related problems.
- Determine the doubling period, half-life or any other time period for exponential growth or decay and solve related problems.
- Solve problems based on logarithmic formulas, including Richter, decibel, and pH scales.

Complete an assignment at the end of this unit worth 5% of the total grade.

Unit 4 Trigonometry: Functions and Graphs

(Workbook Lessons 1-10)

10 days

- Define radian measure of an angle; be able to convert radians to degrees and vice-versa.
- 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 coterminal angles, and state relationship between them.
- Determine reference angle and apply the CAST rule.
- Determine exact values of trigonometric ratios for selected angles on the unit circle.
- Define period and amplitude of a periodic function.
- Plot graphs of the basic sine, cosine and tangent 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.
- Identify reciprocal trigonometric functions from their graphs.

Write a test at the end of this unit worth 5% of the total grade.

WRITE A MIDTERM WORTH 20% OF THE TOTAL GRADE.

Unit 5 Trigonometry – Equations and Identities (Workbook Lessons 1,2,4-9) **7 days**

- Solve first and second degree trigonometric equations giving specific and general solutions.
- State mathematical relations between different trigonometric functions. (8 basic identities)
- Verify an identity is true for a specific value of the variable.
- Prove trigonometric identities for all defined values of the variable.
- Apply sum and differences identities as well as double angle identities.

Complete two assignments worth 5% of the total grade.

Unit 6 Permutations and Combinations (Workbook Lessons 1-7) **7 days**

- Apply the fundamental counting principle to determine the number of different ways to perform multi-step operations.
- Define permutations of n objects, and factorials.
- Determine the number of linear 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.
- Define combinations of n objects.
- Determine the number of different combinations when r objects are selected from n different objects.
- Apply the principle of combinations to different situations, and solve related problems.
- Explain Pascal's triangle and how it is related to combinations and the Binomial Theorem.
- Use the Binomial Theorem to expand a binomial or to find a specific term in the expansion of a binomial where the exponent n is a natural number.

Complete an assignment at the end of this unit worth 5% of the final grade.

Unit 7 Statistics and Probability Distribution (Workbook Lessons 1-4) **5 days**

- Use permutations, combinations, or the fundamental counting principle to solve probability problems
- Define the measures of central tendency (mean, mode, median) and determine the value for each of them for a set of data.
- Define the measures of dispersion (range, standard deviation).
- Calculate standard deviation for a population.
- Apply standard deviation to analyse given data.
- Define and display a probability distribution.
- Determine the probability for a binomial experiment.
- Define z-score, and calculate z-score for a given set of data.
- Apply z-score to solve related problems.

- Explain normal distribution and standard normal curve.
- Use area under the standard normal curve and z-scores to solve related problems.

Write a test at the end of this unit worth 5% of the final grade.

Unit 8 Conic Sections (Quadratic Relations) (Workbook Lessons 1-6,8) 7 days

- Identify the parts of a double-napped cone.
- Given information on how a plane intersects a cone, determine whether the conic formed is a circle, ellipse, parabola, hyperbola, or a degenerate of one of these.
- Explain how the values for A and C in the general form of the equation of a conic section determine the shape of the conic.
- Identify the appropriate conic section from an equation given in general form.
- Given an equation in standard form, identify the conic.
- Determine the series of transformations necessary to transform the graph of one conic to the graph of another or the equation of one conic to the equation of another.
- Determine the equation of a conic given an original equation and a series of transformations.
- Write an equation of a conic given specific characteristics.
- Given the equation of a parabola in standard form, determine the direction, vertex, domain and range, intercepts and sketch the graph.
- Given the equation of a circle, determine the centre, radius, domain and range and sketch the graph.
- Given the equation of an ellipse, determine the direction, centre, vertices, domain and range, lengths of major and minor axes, intercepts and sketch the graph.
- Given the equation of a hyperbola, determine the direction, centre, vertices, lengths of transverse and conjugate axes, domain and range, intercepts, slopes of asymptotes and sketch the graph.
- Convert a given equation of a conic section from general to standard form and vice-versa.

Write a test worth 5% of the total grade.

Write a Final Exam worth 40% of the final grade.

Course Evaluation

Grading Criteria:

Academic Upgrading Department Grading Conversion Chart

Unit Tests	20%
Assignments	20%
Midterm Exam	20%
Final Exam	40%

Alpha Grade	4-point Equivalent	Percentage Guidelines	Designation
A ⁺	4	90 – 100	EXCELLENT
A	4	85 – 89	
A ⁻	3.7	80 – 84	FIRST CLASS STANDING
B ⁺	3.3	76 – 79	
B	3	73 – 75	GOOD
B ⁻	2.7	70 – 72	
C ⁺	2.3	67 – 69	SATISFACTORY
C	2	64 – 66	
C ⁻	1.7	60 – 63	
D ⁺	1.3	55 – 59	MINIMAL PASS
D	1	50 – 54	
F	0	0 – 49	FAIL

Examinations:

There are eight units in this course. Each unit will have a test and/or an 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.

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, within 2 class days of the due date.

AUD STUDENT CLASSROOM DEPARTMENT GUIDELINES

The Academic Upgrading Department is an adult education environment. Students are expected to show respect for each other as well as faculty and staff. They are expected to participate fully in achieving their educational goals in a timely manner.

Certain activities are disruptive and not conducive to an atmosphere of learning. In addition to the *Student Rights and Responsibilities* as set out in the College calendar, the following guidelines will maintain an effective learning environment for everyone. We ask the cooperation of all students in the following areas of classroom department.

1. Students are expected to turn off cell phones during class time or in labs.
2. Refrain from disruptive talking or socializing during class time.
3. Be respectful of others regarding food or beverages in the classroom. Clean up your eating area and dispose of garbage.
4. Recycle paper, bottles and cans in the appropriate containers.
5. Students are expected to be punctual. Arrive on time for classes and remain for the duration of scheduled classes or related activities.
6. Children are not permitted in the classrooms.
7. Students are expected to notify his/her instructor of any extenuating circumstances.

Electronic Devices

No unspecified electronic devices will be allowed in exams.

Success Standard

Although 50% is considered a pass in most courses, if you wish to be successful at the next level, we strongly recommend that you have a mark of 60% or better in your pre-requisite courses.

Examinations:

The final exam will be 3 hours long and is scheduled by the registrars' office during December 10 – 19.

Statement on Plagiarism:

The instructor reserves the right to use electronic plagiarism detection services.