



Wollongong College Australia

A College of the University of Wollongong

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Wollongong

ITC Education Ltd trading as
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CRICOS 02723D
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University Access Program

Subject Outline Summer 2009/10

UAP 012 Mathematics

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WCA-UAP 012-S0/4

Mathematics

Subject description

This subject provides an introduction to the study of mathematics as a foundation for further study at university in Science and Engineering courses. Mathematics focuses on reinforcing the fundamental concepts of basic mathematics, familiarising students with mathematical terminology. The subject develops analytical problem solving skills and provides opportunity for students to apply mathematical methods through problem solving and discussion. Students are also introduced to some fundamental statistics.

Subject structure

Mathematics is a 6 credit point subject consisting of 3 hours of scheduled classes per week. The session is of 14 weeks' duration with face-to-face classes scheduled for the first 12 weeks and a study/examination period in weeks 13 and 14.

In addition to scheduled class sessions, students are expected to spend additional time in individual study, revision and homework. As a general guideline students will need to spend at least 1 hour in private study (including completing homework and revision) for every hour of scheduled class time.

Teachers will be available for a consultation time each week. Students will be notified of the time and location of the consultation session during week 1 of session. It is recommended that students experiencing difficulty with this subject arrange to consult with the teacher as difficulties are encountered.

Learning resources

There is no set textbook for this subject. Students will be supplied with lecture notes and exercises to accompany the weekly topics.

Reference Book:

S.B. Jones and K.E. Couchman. 2 Unit Mathematics Book 1, Shakespeare Head Press, 1982 (reprinted 2001)

Calculators

Students will be required to bring a scientific calculator to all classes. Students who need to purchase a calculator for this subject are strongly recommended to purchase a Casio FX-82 series (approximately \$25 – \$40) calculator.

Only approved scientific calculators will be permitted in exams. The list of approved calculators is located on the college website (www.wca.uow.edu.au). Students should refer to this list to confirm their calculator has been approved for use in exams.

Programmable calculators are not permitted. Programmable calculators usually have a RUN, EXE, CALC or SOLVE button.

Subject outcomes

Successful completion of Mathematics will enable students to:

- Understand the fundamental concepts of mathematics.
- Use algebraic techniques to solve linear and quadratic functions.
- Demonstrate an understanding of mathematical terminology and notation relating to: basic arithmetic, basic algebra, functions, differential calculus and basic statistics.
- Identify appropriate mathematical techniques required to solve a particular problem
 - solve algebraic problems using a systematic approach
 - use rules of differentiation to solve problems involving rates of change.
- Construct and interpret statistical graphs.
- Obtain measures of centre and variation for sets of data.
- Determine probabilities in normal distributions.

Participation

Active participation in classes is expected of all students in all classes in the University Access Program. Participation in class discussions will help develop the student's confidence in questioning and commenting on material presented, encourage critical thinking and allow the tutor to evaluate the student's progress.

Participation includes:

- Constructive contribution to general class discussion
- Active participation in tutorial support classes where recommended
- Proactive consultation with class teacher and/or tutorial support where relevant
- Completion of non-assessable tasks including homework and practice tasks
- Preparation for teacher-student consultation sessions
- Active participation in group work

Subject outline in weeks

The following guide to lessons and activities may be adjusted to suit the needs of the group as long as subject outcomes and assessment criteria are met.

Week 1 – Basic Arithmetic

Introduction to use of the scientific calculator

Positive and negative numbers, order of operations, reciprocals, percentages, fractions and decimals

Indices

Week 2 – Basic Arithmetic

Significant figures, scientific notation

Units of measurement, including SI units, conversion of units

Pythagoras' Theorem

Ratio, using ratio to solve problems, dividing a quantity in a given ratio

Week 3 – Basic Arithmetic and Basic Algebra

Logarithms, with examples from scientific areas, e.g. pH

Collecting like algebraic terms, removing grouping symbols

Multiplication of algebraic expressions, binomial products, square of a binomial, other products

Substitution into formulas

Week 4 – Factorisation, Algebraic Fractions, Simple Equations

Common factors, difference of two squares, quadratic trinomials

Multiplication, division, addition and subtraction of algebraic fractions

Solving simple equations

Week 5 – Formulas, Solving Quadratic and Simultaneous Equations

Solving equations resulting from substitution into formulas, rearranging formulas

Solving quadratic equations by (i) factorising, (ii) use of the formula

Week 6 – Functions

Class Test 1

Functions

Introduction to linear functions

Graphs of functions – straight line, circle, parabola, logarithmic function

Week 7 – Linear Functions

Formula for gradient, gradient-intercept formula, point-gradient formula, two-point formula

Parallel and perpendicular lines, intersection of two straight lines

Application of straight lines, e.g. scatter plots

Week 8 – Calculus

Overview of calculus

Introduction to differentiation

Finding gradient function of polynomials using rules of differentiation

Derivative as rate of change

Week 9 – Equations of Tangents and Normals, Stationary Points

Applying differentiation to find equation of tangent and normal

Applying differentiation to finding stationary points

Identification of stationary points

Week 10 – Introduction to Statistics, Measures of Centre

Class Test 2

Statistics – population and sample, types of data

Display and summarisation of data

Measures of centre – mean, median, mode

Week 11 – Measures of Dispersion, Normal Distribution

Measures of dispersion – range, IQR, standard deviation, variance

Simple probability

Normal distribution

Week 12 – Standardized Normal Distribution

Open Book Test – Science students

Self-Study Module Test – Engineering students

Standardized normal distribution, z-scores

Use of normal tables – application to examples

Weeks 13 & 14 Final examination Period

Examination and study period. Please refer to examination timetable for the exact date, time and location of the final exam.

Self-Study Module – Engineering Students Only

Surds – simplification, addition, subtraction and multiplication, rationalising denominators

Trigonometry – definition of trigonometric ratios, problem solving involving right angled triangles, Sine Rule, Cosine Rule, angles of elevation and depression

Calculus - Product Rule, Quotient Rule, Function of a function Rule

Assessment

Assessment and plagiarism policy

All written assessment tasks, with the exception of examinations and in-class tasks, must be word-processed unless students are otherwise advised.

Students must keep copies of all assessment tasks submitted for marking with the exception of class tests and examinations.

Plagiarism is a form of cheating or stealing that happens when a student uses someone else's work and presents it as his/her own without showing where it comes from. To avoid this, students are expected to submit their own original work for assessment and to accurately acknowledge all references and sources used in essays and assignments.

For information regarding assessment, plagiarism, acknowledging sources and examination rules, please refer to the Wollongong College Australia Student Handbook <http://www.wca.uow.edu.au/handbook>

Assessment schedule

| Task | Due | Weighting | Length/Time |
|--|------------|-----------|-------------|
| Class Test 1 | Week 6 | 20% | 50 mins |
| Class Test 2 | Week 10 | 25% | 1 hour |
| Open Book Test /Self-Study Module Test | Week 12 | 10% | 30 mins |
| Final examination | Week 13/14 | 45% | 2.5 hours |

Marking Guidelines

WCA best practice is that students can normally expect to have assessment tasks handed back within two weeks, and before the next assessment task is due. On occasion there may be exceptions to this time frame due to, for example, the size of the task, the size of the class, teacher illness or teacher leave.

Where there are several teachers marking a major assessment task, tasks will be handed back by all the teachers within the same week.

Assessment criteria and explanation of components

All assessment components are marked according to set marking criteria.

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|---------------------|------------|
| Class Test 1 | 20% |
|---------------------|------------|

Test 1 covers topics in weeks 1-5 inclusive.

| | |
|---------------------|------------|
| Class Test 2 | 25% |
|---------------------|------------|

This test covers topics in weeks 1 - 9 inclusive, with an emphasis on Weeks 6 - 9.

| | |
|---|------------|
| Open Book Test /Self-Study Module Test | 10% |
|---|------------|

Science Students will complete an open book test covering topics from weeks 1-11, but with an emphasis on weeks 6 –11.

Engineering Students will complete a closed book test covering topics in the self-study module. The Open Book Test undertaken by Science students will be made available, with solutions, to Engineering students to take home and complete in their own time.

| | |
|--------------------------|------------|
| Final examination | 45% |
|--------------------------|------------|

The final exam covers all topics with an emphasis on weeks 6 – 12.

Topics in the Self-Study Module for Engineering Students will not be included.

Only non-programmable calculators may be taken into examinations. Students are not permitted to share calculators and other resources while the examination is in progress.