Rationale

This course is designed to provide students with the basic mathematical competencies for entry into the Bachelor of Science (other than Psychology and Mathematics), Bachelor of Technology and Associate Degrees of Engineering, Surveying, Mathematics and Computing. Students also need to develop and practise language and problem solving skills in English so that they can build upon their existing knowledge and express themselves adequately in the mathematical context.

Synopsis

There are two compulsory parts of the course. Part A consists of the mastery of the content of selected topics within algebra for calculus, algebra and graphs, trigonometry, application of calculus and integral calculus. Students are also expected to show competence in communicating using mathematical language in English. Part B consists of group work designed to develop the mathematical communication and problem solving skills of students. This work utilises some of the content mastered in Part A of the course.

Objectives

On successful completion of this course a student should be able to:

- MODULE 1 Managing Mathematics Level C
- Reflect on your attitude to mathematics;
- study mathematics more effectively;
- develop an action plan around the structure of the materials;
- formulate a study schedule;
- MODULE 2 Do you understand this?
- course and understand the importance of the following:
• Index laws;
• Algebraic expressions;
• Solving linear, quadratic, exponential & logarithmic equations;
• Graphing straight lines, parabolas, exponentials and logarithms;
• Trigonometrical ratios and functions;
• Matrices.
• Practice using the graphing package;
• MODULE 3 Relations and Functions
  • demonstrate an understanding of the concept of a function;
  • demonstrate an understanding of the concept of continuity;
  • use functional notation;
  • recognise, sketch and use polynomial,
  • exponential, and logarithmic functions;
  • demonstrate an understanding of the inverse of polynomial, exponential, and
  • logarithmic function;
  • recognize relations that are not functions;
  • investigate functions over the integer domain - Sequences and series;
  • understand the concept of limit;
  • recognize convergent and divergent sequences and functions;
  • find the sums of series;
• MODULE 4 Special functions: Trigonometrical functions
  • demonstrate an understanding of the concept of radian measurement;
  • convert from degrees to radians and vise versa;
  • use radian measure in various applications;
  • define and calculate trigonometric ratios for any angle;
  • describe and sketch trigonometric functions of sine, cosine and tangent;
  • calculate the amplitude, vertical shift, period and phase of a function from its
  • equation and graph;
  • understand the nature of inverse trigonometric functions and solve trigonometric
  • equations using trigonometric identities;
• MODULE 5 Analytical geometry - representing points, curves and planes
  • identify points using rectangular coordinates, polar coordinates, and vectors;
  • change from polar to rectangular coordinates and vise versa;
  • demonstrate an understanding of a vector;
  • identify characteristics of straight lines including equations, distance and mid-points;
  • identify characteristics of standard curves (polynomial, exponential, logarithmic,
  • circular, and hyperbolas);
  • examine transformations of linear, parabolic, exponential, logarithmic, circular
  • curves and rectangular hyperbolas; and
  • examine other curves and investigate the importance of parameters in their
  • equations.
• MODULE 6 Looking at change
  • use graphs and algebra to describe the rate of change of a function;
  • determine the instantaneous rate of change of a function;
  • apply the power, sum and difference rules to find the derivative of certain
  • polynomial functions;
  • apply calculus to velocity and acceleration and other real life problems;
• use gradient functions to determine the derivatives of trigonometric, exponential
  and logarithmic functions;
• locate local stationary points of a function; and solve optimization problems.
• MODULE 7: Total change - integration
• understand the relationship between differentiation and integration;
• find indefinite integrals;
• find definite integrals;
• use integration to find areas.
• OBJECTIVES PART B
• read tables and graphs from a variety of sources
• draw and interpret graphs from a variety of sources
• use arithmetic and statistical calculations in problem solving situations
• use a calculator efficiently
• use and develop formulae
• communicate confidently in English in pairs and small groups
• present results from class work and assignments to whole class groups
• read, speak and ask questions in class in English impromptu
• write sentences and paragraphs in class on class-related activities
• write prepared sentences, paragraphs and report on class-related activities

TOPICS

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<th>Description</th>
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<tr>
<td>1. Basic Algebra, arithmetic, graphing</td>
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<td>2. Functions and Relations</td>
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<td>3. Trigonometric Functions</td>
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<td>4. Analytical Geometry</td>
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<td>5. Introductory calculus Differentiation</td>
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<td>7. Statistics</td>
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TEXT and MATERIALS required to be PURCHASED or ACCESSED:

Books can be ordered by fax or telephone. For costs and further details use the 'Book Search' facility at http://bookshop.usq.edu.au by entering the author or title of the text.

11083 Mathematics Tertiary Preparation Level C - Study Package, USQ, Toowoomba.

Students are expected to have a scientific calculator.

STUDENT WORKLOAD REQUIREMENTS

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<th>ACTIVITY</th>
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<tr>
<td>Assessment</td>
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<td>Directed Study</td>
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ASSESSMENT DETAILS

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OTHER REQUIREMENTS

1. Students should have a knowledge of Part A of UNIPREP Mathematics Communication Level B or equivalent.
2. Students are not eligible for a pass in this course if they have not demonstrated mastery of all the required modules and if they have not attended at least 80% of the mathematics communications group work sessions.
3. Assignments submitted after the due date without an approved extension of time will have a 5% reduction in marks per day.
4. Items of assessment must be submitted to the satisfaction of the lecturer before a pass grade will be awarded.
5. The total score for all summative items of assessment must be at a minimum of 55% to gain a pass mark for the course.
6. Additional Notes: 1 Part A is predominantly a self paced course. Students work sequentially through the modules they are required to master at their own pace, completing this part of the work by the end of the term through completion of six assignments. 2 Part B consists of different activities each week. Students must participate actively in the group work of the problem solving sessions and the mathematics writing sessions. Students also must submit written work as required.