MATH130
Mathematics IE
FY1 Day 2017
Dept of Mathematics

Contents

General Information 2
Learning Outcomes 2
General Assessment Information 3
Assessment Tasks 3
Delivery and Resources 5
Unit Schedule 6
Policies and Procedures 9
Graduate Capabilities 10

Disclaimer
Macquarie University has taken all reasonable measures to ensure the information in this publication is accurate and up-to-date. However, the information may change or become out-dated as a result of change in University policies, procedures or rules. The University reserves the right to make changes to any information in this publication without notice. Users of this publication are advised to check the website version of this publication [or the relevant faculty or department] before acting on any information in this publication.
General Information

Unit convenor and teaching staff
Dilshara Hill
dilshara.hill@mq.edu.au
E7A 7.11
Monday, Tuesday, Thursday

Credit points
3

Prerequisites

Corequisites

Co-badged status

Unit description
This unit is an elementary unit designed for Engineering, Mathematics and Physics students whose mathematics background has not met the recommended standard for students entering these programs. The unit provides a basic introduction to the ideas and techniques of differentiation and integration which are pervasive in the theoretical models that underpin most areas of science, engineering, economics and technology. The unit also has a strong focus on developing the algebraic skills and techniques commonly associated with the application of these ideas. Students who have not studied mathematics for several years should consult the Learning Centre for Numeracy Skills regarding refresher courses.

Important Academic Dates
Information about important academic dates including deadlines for withdrawing from units are available at http://students.mq.edu.au/student_admin/enrolmentguide/academicdates/

Learning Outcomes

1. Develop a good understanding and demonstrate knowledge of the basic concepts of elementary algebra, and calculus in one variable.
2. Demonstrate the ability to construct logical, clearly presented and justified mathematical arguments on elementary level especially in the context basic calculus and algebra.
3. Be able to apply the principles, concepts, and techniques learned in this unit to solve practical and abstract problems.
4. Demonstrate appropriate interpretation of information communicated in mathematical form. Be able to understand what is being said in mathematical expressions and be able
to formulate ideas using mathematical form in the context of introductory calculus and algebra.

5. Ethical application of mathematical approaches to solving problems and appropriately reference and acknowledge sources in a mathematical context.

6. Be able to work effectively, responsibly and safely in an individual or team context.

**General Assessment Information**

**HURDLES:** This unit has no hurdle requirements. This means that there are no second chance examinations and assessments if you happen to fail at your first attempt. Students should aim to get at least 60% for the course work in order to be reasonably confident of passing the unit.

**IMPORTANT:** If you apply for Disruption to Study for your final examination, you must make yourself available for the supplementary exam period in December, 2017. If you are not available at that time, there is no guarantee an additional examination time will be offered. Specific examination dates and times will be determined at a later date.

**Assessment Tasks**

<table>
<thead>
<tr>
<th>Name</th>
<th>Weighting</th>
<th>Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>Four assignments</td>
<td>20%</td>
<td>See iLearn</td>
</tr>
<tr>
<td>Mid-Year Test</td>
<td>20%</td>
<td>See iLearn</td>
</tr>
<tr>
<td>In-Tutorial Assessment</td>
<td>20%</td>
<td>Weekly</td>
</tr>
<tr>
<td>Final examination</td>
<td>40%</td>
<td>University Examination Period</td>
</tr>
</tbody>
</table>

**Four assignments**

Due: See iLearn  
Weighting: 20%

Two Assignments due per Session.

This Assessment Task relates to the following Learning Outcomes:

- Develop a good understanding and demonstrate knowledge of the basic concepts of elementary algebra, and calculus in one variable.

- Demonstrate the ability to construct logical, clearly presented and justified mathematical arguments on elementary level especially in the context basic calculus and algebra.

- Be able to apply the principles, concepts, and techniques learned in this unit to solve practical and abstract problems.
• Demonstrate appropriate interpretation of information communicated in mathematical form. Be able to understand what is being said in mathematical expressions and be able to formulate ideas using mathematical form in the context of introductory calculus and algebra.
• Ethical application of mathematical approaches to solving problems and appropriately reference and acknowledge sources in a mathematical context.
• Be able to work effectively, responsibly and safely in an individual or team context.

Mid-Year Test
Due: See iLearn
Weighting: 20%
Test at the end of Session 1

This Assessment Task relates to the following Learning Outcomes:
• Develop a good understanding and demonstrate knowledge of the basic concepts of elementary algebra, and calculus in one variable.
• Demonstrate the ability to construct logical, clearly presented and justified mathematical arguments on elementary level especially in the context basic calculus and algebra.
• Be able to apply the principles, concepts, and techniques learned in this unit to solve practical and abstract problems.
• Demonstrate appropriate interpretation of information communicated in mathematical form. Be able to understand what is being said in mathematical expressions and be able to formulate ideas using mathematical form in the context of introductory calculus and algebra.
• Ethical application of mathematical approaches to solving problems and appropriately reference and acknowledge sources in a mathematical context.
• Be able to work effectively, responsibly and safely in an individual or team context.

In-Tutorial Assessment
Due: Weekly
Weighting: 20%

Recorded tutorial attendance and marked In-Tutorial Quiz. Only students who attend the whole tutorial session can submit tutorial work and receive marks for the In-Tutorial Assessment. The best 16 quiz marks will contribute to 20% of the grade for the unit.

This Assessment Task relates to the following Learning Outcomes:
• Develop a good understanding and demonstrate knowledge of the basic concepts of elementary algebra, and calculus in one variable.
• Demonstrate the ability to construct logical, clearly presented and justified mathematical arguments on elementary level especially in the context basic calculus and algebra.
• Be able to apply the principles, concepts, and techniques learned in this unit to solve practical and abstract problems.
• Demonstrate appropriate interpretation of information communicated in mathematical form. Be able to understand what is being said in mathematical expressions and be able to formulate ideas using mathematical form in the context of introductory calculus and algebra.
• Be able to work effectively, responsibly and safely in an individual or team context.

Final examination
Due: University Examination Period
Weighting: 40%

Supervised task which assesses material from week 1 to week 13.

This Assessment Task relates to the following Learning Outcomes:
• Develop a good understanding and demonstrate knowledge of the basic concepts of elementary algebra, and calculus in one variable.
• Demonstrate the ability to construct logical, clearly presented and justified mathematical arguments on elementary level especially in the context basic calculus and algebra.
• Be able to apply the principles, concepts, and techniques learned in this unit to solve practical and abstract problems.
• Demonstrate appropriate interpretation of information communicated in mathematical form. Be able to understand what is being said in mathematical expressions and be able to formulate ideas using mathematical form in the context of introductory calculus and algebra.
• Ethical application of mathematical approaches to solving problems and appropriately reference and acknowledge sources in a mathematical context.
• Be able to work effectively, responsibly and safely in an individual or team context.

Delivery and Resources

Classes:
There will be 4 hours of class per week in Session 1. Classes start in Week 2. Students are expected to attend every class. Classes are NOT recorded.
Session 1 class times are:

Monday 5pm - 6pm: Lectorial
Tuesday 10am - 11am: Lectorial
Tuesday 2pm - 3pm: Lectorial
Thursday 4pm - 5pm: Tutorial

Note: Weekly In-Tutorial Assessments will be run during the Thursday class

Resources:

Recommended Textbook


Other resources

- Precalculus by Stitz and Zeager at http://stitz-zeager.com/
- MUMS Modules: www.maths.mq.edu.au/numeracy/mums
- Precalculus: Mathematics for Calculus by Stewart, Redlin and Watson; any edition

Workshops: available for students wanting to see more examples and ask further questions. Attendance is strongly recommended in Session 2.

Technology Used and Required

Students are expected to have access to an internet enabled computer with a web browser and Adobe Reader software. Several areas of the university provide wireless access for portable computers. There are computers for student use in the Library and in the Numeracy Centre (E7B G.22).

Difficulties with your home computer or internet connection do not constitute a reasonable excuse for lateness of, or failure to submit, assessment tasks.

Unit Schedule

Below is the proposed schedule of topics for this course. Please note there could be minor adjustments throughout the year.

Please see iLearn for details about the content covered each week.
### Session 1:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Orientation</td>
<td><em>There are no classes this week.</em></td>
</tr>
<tr>
<td>2</td>
<td>Foundational Mathematics</td>
<td>Types of Numbers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Arithmetic and Fractions</td>
</tr>
<tr>
<td>3</td>
<td>Algebra</td>
<td>Introduction to Algebra</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Algebraic Fractions</td>
</tr>
<tr>
<td>4</td>
<td>Algebra</td>
<td>Factorising</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Word Problems</td>
</tr>
<tr>
<td>5</td>
<td>Lines</td>
<td>Cartesian Plane</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gradients &amp; Lines</td>
</tr>
<tr>
<td>6</td>
<td>Quadratics</td>
<td>Vertex and Standard Form</td>
</tr>
<tr>
<td>7</td>
<td>Functions</td>
<td>Domain and Range</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Graphing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Composition</td>
</tr>
<tr>
<td>8</td>
<td>Functions</td>
<td>Modifying Functions</td>
</tr>
<tr>
<td>9</td>
<td>Exponentials</td>
<td>Indices</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Exponential Functions</td>
</tr>
<tr>
<td>10</td>
<td>Logarithms</td>
<td>Log Laws</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Logarithmic Functions</td>
</tr>
<tr>
<td>11</td>
<td>Exponentials &amp; Logarithms</td>
<td>Working with Exponentials &amp; Logs</td>
</tr>
<tr>
<td>Week</td>
<td>Topic</td>
<td>Details</td>
</tr>
<tr>
<td>-------</td>
<td>-------------------------------------------</td>
<td>----------------------------------------------</td>
</tr>
<tr>
<td>12</td>
<td>Polynomials</td>
<td>Operations and Long Division</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Factor and Remainder Theorem</td>
</tr>
<tr>
<td>13</td>
<td>Arithmetic &amp; Geometric Progressions</td>
<td>Working with Sequences</td>
</tr>
</tbody>
</table>

Session 2:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>Inequalities &amp; Absolute Value</td>
<td>Quadratic &amp; Fractional Inequalities</td>
</tr>
<tr>
<td>(S2, wk1)</td>
<td></td>
<td>Absolute Value Inequalities</td>
</tr>
<tr>
<td>15</td>
<td>Introduction to Trigonometry</td>
<td>Right Angled Triangles</td>
</tr>
<tr>
<td>(S2, wk2)</td>
<td></td>
<td>Trig Ratios</td>
</tr>
<tr>
<td>16</td>
<td>Trigonometry</td>
<td>Unit Circle and Exact Values</td>
</tr>
<tr>
<td>(S2, wk3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Trigonometry</td>
<td>Trig Identities</td>
</tr>
<tr>
<td>(S2, wk4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Introduction to Differentiation</td>
<td>Definition of the Derivative</td>
</tr>
<tr>
<td>(S2, wk5)</td>
<td></td>
<td>Differentiating Polynomials</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Differentiating special functions</td>
</tr>
<tr>
<td>19</td>
<td>Rules of Differentiation</td>
<td>Product, Quotient and Chain Rules</td>
</tr>
<tr>
<td>(S2, wk6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Applications of Differentiation</td>
<td>Tangents and Normals</td>
</tr>
<tr>
<td>(S2, wk7)</td>
<td></td>
<td>Second Derivatives</td>
</tr>
<tr>
<td>21</td>
<td>Applications of Differentiation</td>
<td>Curve Sketching</td>
</tr>
<tr>
<td>(S2, wk8)</td>
<td></td>
<td>Max and Min Problems</td>
</tr>
</tbody>
</table>
Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central. Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy http://mq.edu.au/policy/docs/academic_honesty/policy.html
Disruption to Studies Policy http://www.mq.edu.au/policy/docs/disruption_studies/policy.html The Disruption to Studies Policy is effective from March 3 2014 and replaces the Special Consideration Policy.

In addition, a number of other policies can be found in the Learning and Teaching Category of Policy Central.

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/support/student_conduct/

Results

Results shown in iLearn, or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your
Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific...
knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

**Learning outcomes**

- Develop a good understanding and demonstrate knowledge of the basic concepts of elementary algebra, and calculus in one variable.
- Demonstrate the ability to construct logical, clearly presented and justified mathematical arguments on elementary level especially in the context basic calculus and algebra.
- Be able to apply the principles, concepts, and techniques learned in this unit to solve practical and abstract problems.
- Demonstrate appropriate interpretation of information communicated in mathematical form. Be able to understand what is being said in mathematical expressions and be able to formulate ideas using mathematical form in the context of introductory calculus and algebra.
- Ethical application of mathematical approaches to solving problems and appropriately reference and acknowledge sources in a mathematical context.
- Be able to work effectively, responsibly and safely in an individual or team context.

**Assessment tasks**

- Four assignments
- Mid-Year Test
- In-Tutorial Assessment
- Final examination

**Problem Solving and Research Capability**

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

This graduate capability is supported by:

**Learning outcomes**

- Develop a good understanding and demonstrate knowledge of the basic concepts of elementary algebra, and calculus in one variable.
- Be able to apply the principles, concepts, and techniques learned in this unit to solve practical and abstract problems.
• Demonstrate appropriate interpretation of information communicated in mathematical form. Be able to understand what is being said in mathematical expressions and be able to formulate ideas using mathematical form in the context of introductory calculus and algebra.
• Be able to work effectively, responsibly and safely in an individual or team context.

Assessment tasks
• Four assignments
• Mid-Year Test
• In-Tutorial Assessment
• Final examination

Effective Communication
We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:

Learning outcomes
• Demonstrate the ability to construct logical, clearly presented and justified mathematical arguments on elementary level especially in the context basic calculus and algebra.
• Be able to apply the principles, concepts, and techniques learned in this unit to solve practical and abstract problems.
• Ethical application of mathematical approaches to solving problems and appropriately reference and acknowledge sources in a mathematical context.
• Be able to work effectively, responsibly and safely in an individual or team context.

Assessment tasks
• Four assignments
• Mid-Year Test
• Final examination

Capable of Professional and Personal Judgement and Initiative
We want our graduates to have emotional intelligence and sound interpersonal skills and to demonstrate discernment and common sense in their professional and personal judgement. They will exercise initiative as needed. They will be capable of risk assessment, and be able to
handle ambiguity and complexity, enabling them to be adaptable in diverse and changing environments.

This graduate capability is supported by:

Learning outcomes

- Develop a good understanding and demonstrate knowledge of the basic concepts of elementary algebra, and calculus in one variable.
- Demonstrate the ability to construct logical, clearly presented and justified mathematical arguments on elementary level especially in the context basic calculus and algebra.
- Be able to apply the principles, concepts, and techniques learned in this unit to solve practical and abstract problems.
- Demonstrate appropriate interpretation of information communicated in mathematical form. Be able to understand what is being said in mathematical expressions and be able to formulate ideas using mathematical form in the context of introductory calculus and algebra.
- Ethical application of mathematical approaches to solving problems and appropriately reference and acknowledge sources in a mathematical context.

Assessment tasks

- Mid-Year Test
- Final examination

Critical, Analytical and Integrative Thinking

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

Learning outcomes

- Develop a good understanding and demonstrate knowledge of the basic concepts of elementary algebra, and calculus in one variable.
- Demonstrate the ability to construct logical, clearly presented and justified mathematical arguments on elementary level especially in the context basic calculus and algebra.
- Be able to apply the principles, concepts, and techniques learned in this unit to solve practical and abstract problems.
• Demonstrate appropriate interpretation of information communicated in mathematical form. Be able to understand what is being said in mathematical expressions and be able to formulate ideas using mathematical form in the context of introductory calculus and algebra.
• Ethical application of mathematical approaches to solving problems and appropriately reference and acknowledge sources in a mathematical context.
• Be able to work effectively, responsibly and safely in an individual or team context.

Assessment tasks

• Four assignments
• Mid-Year Test
• In-Tutorial Assessment
• Final examination

Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

Learning outcomes

• Develop a good understanding and demonstrate knowledge of the basic concepts of elementary algebra, and calculus in one variable.
• Be able to apply the principles, concepts, and techniques learned in this unit to solve practical and abstract problems.
• Demonstrate appropriate interpretation of information communicated in mathematical form. Be able to understand what is being said in mathematical expressions and be able to formulate ideas using mathematical form in the context of introductory calculus and algebra.
• Be able to work effectively, responsibly and safely in an individual or team context.

Assessment tasks

• Four assignments
• Mid-Year Test
• In-Tutorial Assessment
• Final examination
Engaged and Ethical Local and Global citizens
As local citizens our graduates will be aware of indigenous perspectives and of the nation's historical context. They will be engaged with the challenges of contemporary society and with knowledge and ideas. We want our graduates to have respect for diversity, to be open-minded, sensitive to others and inclusive, and to be open to other cultures and perspectives: they should have a level of cultural literacy. Our graduates should be aware of disadvantage and social justice, and be willing to participate to help create a wiser and better society.

This graduate capability is supported by:

**Learning outcomes**

- Demonstrate the ability to construct logical, clearly presented and justified mathematical arguments on elementary level especially in the context basic calculus and algebra.
- Ethical application of mathematical approaches to solving problems and appropriately reference and acknowledge sources in a mathematical context.
- Be able to work effectively, responsibly and safely in an individual or team context.

**Assessment tasks**

- Four assignments
- Mid-Year Test
- In-Tutorial Assessment
- Final examination

Socially and Environmentally Active and Responsible
We want our graduates to be aware of and have respect for self and others; to be able to work with others as a leader and a team player; to have a sense of connectedness with others and country; and to have a sense of mutual obligation. Our graduates should be informed and active participants in moving society towards sustainability.

This graduate capability is supported by:

**Learning outcomes**

- Ethical application of mathematical approaches to solving problems and appropriately reference and acknowledge sources in a mathematical context.
- Be able to work effectively, responsibly and safely in an individual or team context.

**Assessment task**

- Final examination
Commitment to Continuous Learning
Our graduates will have enquiring minds and a literate curiosity which will lead them to pursue
knowledge for its own sake. They will continue to pursue learning in their careers and as they
participate in the world. They will be capable of reflecting on their experiences and relationships
with others and the environment, learning from them, and growing - personally, professionally
and socially.

This graduate capability is supported by:

**Learning outcomes**

- Develop a good understanding and demonstrate knowledge of the basic concepts of
elementary algebra, and calculus in one variable.
- Demonstrate the ability to construct logical, clearly presented and justified mathematical
arguments on elementary level especially in the context basic calculus and algebra.
- Demonstrate appropriate interpretation of information communicated in mathematical
form. Be able to understand what is being said in mathematical expressions and be able
to formulate ideas using mathematical form in the context of introductory calculus and
algebra.

**Assessment tasks**

- Mid-Year Test
- In-Tutorial Assessment
- Final examination