Unit study package code: MATH2003
Mode of study: Internal
Tuition pattern summary: Note: For any specific variations to this tuition pattern and for precise information refer to the Learning Activities section.
Lecture: 1 x 2 Hours Weekly
Tutorial: 1 x 1 Hours Weekly
Workshop: 1 x 2 Hours Weekly
This unit does not have a fieldwork component.
Credit Value: 25.0
Pre-requisite units:
7062 (v.0) Mathematics 101 or any previous version
OR
10926 (v.0) Mathematics 103 or any previous version
OR
311054 (v.0) Mathematics 146 or any previous version
OR
MATH1010 (v.0) Advanced Mathematics or any previous version
OR
MATH1004 (v.0) Mathematics 1 or any previous version
OR
MATH1009 (v.0) Calculus and Linear Algebra for Spatial Science or any previous version
Co-requisite units: Nil
Anti-requisite units: MATH1011 (v.0) Mathematics 2 or any previous version
Result type: Grade/Mark
Approved incidental fees: Information about approved incidental fees can be obtained from our website. Visit fees.curtin.edu.au/incidental_fees.cfm for details.
Unit coordinator:
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Location: Building: 314 - Room: 355
Learning Management System:  Blackboard (lms.curtin.edu.au)
Acknowledgement of Country
We respectfully acknowledge the Indigenous Elders, custodians, their descendants and kin of this land past and present.

Syllabus
Fundamental Theorem of Calculus

Introduction
The unit introduces students to integration techniques, function of multiple variables, differential equations and complex numbers. These techniques are often used in engineering, physics, science, computing and economics. The unit comprises of four parts. In the first part, fundamental theorem of calculus together with integration techniques and their applications are introduced. In the second part, students learns about functions of two or more variables, limits, continuity and partial derivatives. In the third part, students learns about differential equations and their applications. Finally, students are introduced to complex numbers.

Unit Learning Outcomes
All graduates of Curtin University achieve a set of nine graduate attributes during their course of study. These tell an employer that, through your studies, you have acquired discipline knowledge and a range of other skills and attributes which employers say would be useful in a professional setting. Each unit in your course addresses the graduate attributes through a clearly identified set of learning outcomes. They form a vital part in the process referred to as assurance of learning. The learning outcomes tell you what you are expected to know, understand or be able to do in order to be successful in this unit. Each assessment for this unit is carefully designed to test your achievement of one or more of the unit learning outcomes. On successfully completing all of the assessments you will have achieved all of these learning outcomes.

Your course has been designed so that on graduating we can say you will have achieved all of Curtin’s Graduate Attributes through the assurance of learning process in each unit.

<table>
<thead>
<tr>
<th>On successful completion of this unit students can:</th>
<th>Graduate Attributes addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Explain the concepts of definite and indefinite integrals and their relationship to differentiation through the Fundamental Theorem of Calculus</td>
<td>📖 ✏️ 🧠</td>
</tr>
<tr>
<td>2 Integrate using the techniques of substitution, integration by parts and partial fractions</td>
<td>📖 ✏️ 🧠</td>
</tr>
<tr>
<td>3 Apply integration techniques to various problems</td>
<td>🧠</td>
</tr>
<tr>
<td>4 Use basic logical arguments in the solution of problems</td>
<td>✏️ 🧠</td>
</tr>
</tbody>
</table>
| 5 Use ordinary differential equations and explain the solution techniques associated with them | 📖 🧠
Curtin's Graduate Attributes

<table>
<thead>
<tr>
<th>Apply discipline knowledge</th>
<th>Thinking skills (use analytical skills to solve problems)</th>
<th>Information skills (confidence to investigate new ideas)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication skills</td>
<td>Technology skills</td>
<td>Learning how to learn (apply principles learnt to new situations) (confidence to tackle unfamiliar problems)</td>
</tr>
<tr>
<td>International perspective (value the perspectives of others)</td>
<td>Cultural understanding (value the perspectives of others)</td>
<td>Professional Skills (work independently and as a team) (plan own work)</td>
</tr>
</tbody>
</table>

Find out more about Curtin’s Graduate attributes at the Office of Teaching & Learning website: ctl.curtin.edu.au

Learning Activities

Two hours lectures and two hours workshop per week.
One 1 hour tutorial per week. Tutorials begin in the second week of semester.

Learning Resources

Recommended texts

You do not have to purchase the following textbooks but you may like to refer to them.

Assessment

Assessment schedule

<table>
<thead>
<tr>
<th>Task</th>
<th>Value %</th>
<th>Date Due</th>
<th>Unit Learning Outcome(s) Assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignment</td>
<td>15 percent</td>
<td>Week: 4, 8, Day: Friday, Time: 5PM</td>
<td>2,3,4</td>
</tr>
<tr>
<td>Test</td>
<td>35 percent</td>
<td>Week: 6, 10, Day: Friday, Time: TBA</td>
<td>2,3,4</td>
</tr>
<tr>
<td>Final Exam</td>
<td>50 percent</td>
<td>TBA</td>
<td>1,4,5</td>
</tr>
</tbody>
</table>

Detailed information on assessment tasks

1. The exact due date will be given in the assignment.
2. The unit has 2 mini-tests during the workshops (weeks 6 and 10).
3. A Two hour final examination for the unit will be conducted during the university examination period.
   The following materials are allowed as aids during the examination:
   - To be supplied by University: Statistical Tables and Formulae book.
   - To be supplied by Student: One A4 sheet of paper with handwritten notes on both sides; and a scientific calculator, approved by the Department of Mathematics and Statistics. ClassPads (or equivalents) are not permitted at the final examination.

Pass requirements

To pass this unit you must achieve a grade greater than or equal to 5 out of 10 (i.e. a mark greater than or equal to 50 out of 100).

Fair assessment through moderation

Moderation describes a quality assurance process to ensure that assessments are appropriate to the learning outcomes, and that student work is evaluated consistently by assessors. Minimum standards for the moderation of assessment are described in the Assessment and Student Progression Manual, available from policies.curtin.edu.au/policies/teachingandlearning.cfm

Late assessment policy

This ensures that the requirements for submission of assignments and other work to be assessed are fair, transparent, equitable, and that penalties are consistently applied.

1. All assessments students are required to submit will have a due date and time specified on this Unit Outline.
2. Students will be penalised by a deduction of ten percent per calendar day for a late assessment submission (eg a mark equivalent to 10% of the total allocated for the assessment will be deducted from the marked value for every day that the assessment is late). This means that an assessment worth 20 marks will have two marks deducted per calendar day late. Hence if it was handed in three calendar days late and given a mark of 16/20, the student would receive 10/20. An assessment more than seven calendar days overdue will not be marked and will receive a mark of 0.

Assessment extension

A student unable to complete an assessment task by/on the original published date/time (eg examinations, tests) or due date/time (eg assignments) must apply for an assessment extension using the Assessment Extension form.
(available from the Forms page at students.curtin.edu.au/administration/) as prescribed by the Academic Registrar. It is the responsibility of the student to demonstrate and provide evidence for exceptional circumstances beyond the student's control that prevent them from completing/submitting the assessment task.

The student will be expected to lodge the form and supporting documentation with the unit coordinator before the assessment date/time or due date/time. An application may be accepted up to five working days after the date or due date of the assessment task where the student is able to provide an acceptable explanation as to why he or she was not able to submit the application prior to the assessment date. An application for an assessment extension will not be accepted after the date of the Board of Examiners' meeting.

**Deferred assessments**

If your results show that you have been granted a deferred assessment you should immediately check your OASIS email for details.

Deferred examinations/tests will be held from 18/07/2016 to 22/07/2016. Notification to students will be made after the Board of Examiners' meeting via the Official Communications Channel (OCC) in OASIS.

**Supplementary assessments**

Supplementary assessments, if granted by the Board of Examiners, will have a due date or be held between 18/07/2016 and 22/07/2016. Notification to students will be made after the Board of Examiners' meeting via the Official Communications Channel (OCC) in OASIS.

It is the responsibility of students to be available to complete the requirements of a supplementary assessment. If your results show that you have been granted a supplementary assessment you should immediately check your OASIS email for details.

**Referencing style**

The referencing style for this unit is Chicago.

More information can be found on this style from the Library web site: http://libguides.library.curtin.edu.au/referencing.

**Copyright**

© Curtin University. The course material for this unit is provided to you for your own research and study only. It is subject to copyright. It is a copyright infringement to make this material available on third party websites.

**Academic Integrity (including plagiarism and cheating)**

Any conduct by a student that is dishonest or unfair in connection with any academic work is considered to be academic misconduct. Plagiarism and cheating are serious offences that will be investigated and may result in penalties such as reduced or zero grades, annulled units or even termination from the course.

Plagiarism occurs when work or property of another person is presented as one's own, without appropriate acknowledgement or referencing. Submitting work which has been produced by someone else (e.g. allowing or contracting another person to do the work for which you claim authorship) is also plagiarism. Submitted work is subjected to a plagiarism detection process, which may include the use of text matching systems or interviews with students to determine authorship.

Cheating includes (but is not limited to) asking or paying someone to complete an assessment task for you or any use of unauthorised materials or assistance during an examination or test.

From Semester 1, 2016, all incoming coursework students are required to complete Curtin’s Academic Integrity Program (AIP). If a student does not pass the program by the end of their first study period of enrolment at Curtin, their marks will be withheld until they pass. More information about the AIP can be found at: https://academicintegrity.curtin.edu.au/students/AIP.cfm

Refer to the Academic Integrity tab in Blackboard or academicintegrity.curtin.edu.au for more information, including student guidelines for avoiding plagiarism.
Information and Communications Technology (ICT) Expectations
Curtin students are expected to have reliable internet access in order to connect to OASIS email and learning systems such as Blackboard and Library Services.
You may also require a computer or mobile device for preparing and submitting your work.
For general ICT assistance, in the first instance please contact OASIS Student Support: oasisapps.curtin.edu.au/help/general/support.cfm
For specific assistance with any of the items listed below, please contact The Learning Centre: life.curtin.edu.au/learning-support/learning_centre.htm
- Using Blackboard, the I Drive and Back-Up files
- Introduction to PowerPoint, Word and Excel

Additional information
Enrolment
It is your responsibility to ensure that your enrolment is correct - you can check your enrolment through the eStudent option on OASIS, where you can also print an Enrolment Advice.

Student Rights and Responsibilities
It is the responsibility of every student to be aware of all relevant legislation, policies and procedures relating to their rights and responsibilities as a student. These include:

- the Student Charter
- the University's Guiding Ethical Principles
- the University's policy and statements on plagiarism and academic integrity
- copyright principles and responsibilities
- the University’s policies on appropriate use of software and computer facilities

Information on all these things is available through the University's "Student Rights and Responsibilities" website at: students.curtin.edu.au/rights.

Student Equity
There are a number of factors that might disadvantage some students from participating in their studies or assessments to the best of their ability, under standard conditions. These factors may include a disability or medical condition (e.g. mental illness, chronic illness, physical or sensory disability, learning disability), significant family responsibilities, pregnancy, religious practices, living in a remote location or another reason. If you believe you may be unfairly disadvantaged on these or other grounds please contact Student Equity at eesj@curtin.edu.au or go to http://eesj.curtin.edu.au/student_equity/index.cfm for more information.
You can also contact Counselling and Disability services: http://www.disability.curtin.edu.au or the Multi-faith services: http://life.curtin.edu.au/health-and-wellbeing/about_multifaith_services.htm for further information.
It is important to note that the staff of the university may not be able to meet your needs if they are not informed of your individual circumstances so please get in touch with the appropriate service if you require assistance. For general wellbeing concerns or advice please contact Curtin's Student Wellbeing Advisory Service at: http://life.curtin.edu.au/health-and-wellbeing/student_wellbeing_service.htm
Recent unit changes

Students are encouraged to provide unit feedback through eVALUate, Curtin's online student feedback system. For more information about eVALUate, please refer to evaluate.curtin.edu.au/info/.

Recent changes to this unit include:

The assessment has been changed from 3 tests (2015) to 2 tests (2016).
# Program calendar

<table>
<thead>
<tr>
<th>WK</th>
<th>Lecture</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sections referenced below are from “Calculus” (6th Edition), by Stewart.</td>
</tr>
<tr>
<td>1</td>
<td>Review of basic principles of integration ($\S$4.9, $\S$5.1, $\S$5.2). Fundamental theorem of Calculus, Indefinite integration ($\S$5.3-$\S$5.4) (Integration of $e^x$, trig fn). The substitution rule ($\S$5.5). Integration by parts ($\S$8.1).</td>
</tr>
<tr>
<td>2</td>
<td>Trigonometric integrals ($\S$8.2). Trigonometric substitution ($\S$8.3). Integration by partial fractions ($\S$8.4). Strategies for integration ($\S$8.5).</td>
</tr>
<tr>
<td>3</td>
<td>Areas between curves ($\S$6.1). Volume of solids ($\S$6.2). Volumes by cylindrical shell method ($\S$6.3).</td>
</tr>
<tr>
<td>4</td>
<td>Length of curves ($\S$9.1). Area of surface of revolution ($\S$9.2). Curves defined by parametric equations ($\S$11.1). Calculus with parametric curves ($\S$11.2).</td>
</tr>
</tbody>
</table>

**Assignment 1**

Tuition Free Week

5 | Calculus with parametric curves ($\S$11.2) (continued). Polar coordinates ($\S$11.3). Areas and lengths in polar coordinates ($\S$11.4). |

6 | Conic sections ($\S$11.5). Conic sections in polar coordinates ($\S$11.6). |

**Test 1**

Tuition Free Week

7 | Functions of two and three variables ($\S$15.1). Limits and continuity ($\S$15.2). Partial derivatives ($\S$15.3). The chain rule and implicit differentiation ($\S$15.5). |

8 | Ordinary differential equations: $1^{st}$ order, $1^{st}$ degree ($\S$10.1). Variables separable type ($\S$10.3). Homogenous type (Notes). Exact type (Notes). |

**Assignment 2**

9 | Linear type ($\S$10.5). Applications. Second-order differential equations: types reducible to first-order (Notes). Second-order linear equations ($\S$18.1). |

10 | Method of undetermined coefficients and method of variation of parameters ($\S$18.2). Directional derivatives ($\S$15.6). The gradient vector and its properties ($\S$15.6). |

**Test 2**

11 | Tangent planes and normal lines ($\S$15.6). Complex numbers, Cartesian and polar forms (Appendix G). Properties, modulus, argument. |


**Study Week**

**Examinations**