Unit study package code: MATH1004
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 1 Hours Weekly
Workshop: 1 x 2 Hours Weekly
This unit does not have a fieldwork component.
Credit Value: 25.0
Pre-requisite units: Nil
Co-requisite units: Nil
Anti-requisite units: 7062 (v.0) Mathematics 101 or any previous version
AND
MATH1010 (v.0) Advanced Mathematics 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:

Title: Dr
Name: Ian van Loosen
Phone: +618 9266 4959
Email: I.Loosen@curtin.edu.au
Location: Building: 314 - Room: 358
Consultation times: See the Announcements on Blackboard for times

Teaching Staff:

Administrative contact: Name: Aimee Tournay
Phone: +61 8 9266 3534
Email: Maths.Admin@curtin.edu.au
Location: Building: 314 - Room: 345

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

This unit will consider problems arising from science, engineering and business related fields. Students will learn the necessary skills to solve such problems through the application of commonly occurring simple mathematical functions and techniques of differentiation, integration, linear algebra as well as complex analysis. The topics covered include functions and their graphs; Limits and Continuity; Differentiation and Integration; Transcendental functions; Vectors; matrices; Systems of Linear Equations and Solution Methods; Eigenvalues and Eigenvectors; Complex numbers. This unit is designed for those students who have passed WACE Mathematics 3C/3D or equivalent. Those students who have passed WACE Mathematics: Specialist 3C/3D with a mark of >65% should enrol in Advanced Mathematics. Those who have passed WACE Mathematics 3A/3B should enrol in Calculus and Linear Algebra and those that have passed WACE Mathematics 2C/2D should enrol in Pre and Introductory Calculus.

Introduction

The Department of Mathematics and Statistics offers a range of courses and units which will equip students with the necessary mathematical expertise to deal with problems encountered in an increasing technological world.

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 relationship between variables through differential and integral calculus, and simple numerical techniques</td>
<td>🎓 📩 🌐</td>
</tr>
<tr>
<td>2: Select and apply the rules of differentiation and integration to simple mathematical functions</td>
<td>🎓 📩 🌐</td>
</tr>
<tr>
<td>3: Apply complex arithmetic to solve polynomial equations</td>
<td>🎓 📩 🌐</td>
</tr>
<tr>
<td>4: Execute routine vector and matrix manipulations, including the determination of solutions of systems of linear algebraic equations and calculating inverses of matrices</td>
<td>🎓 📩 🌐</td>
</tr>
<tr>
<td>5: Generate and use basic logical mathematical arguments in the solution of problems</td>
<td>🎓 📩 🌐</td>
</tr>
</tbody>
</table>
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

Lectures & iLectures.
Workshops.
Three in-class tests.

Online quizzes (Please note these quizzes do not form part of your assessment, they are strictly for practice purposes).

**Online Quizzes:** There are 10 weekly online quizzes starting in the first week. The “due date” for each quiz is given on the quiz itself, however there will be no quiz due in the first week or the sixth week of semester. Revision online quizzes will be made available as well. You can access these quizzes through the Mathematics 1 section of Blackboard. Under Online Quizzes you will find Online Quiz Info (easy-to-navigate information describing how the AiM (Online) Quizzes work; please read this before you attempt any of the quizzes), and Access Online Quizzes (a link to the (AiM) web server that hosts the quizzes). Each quiz (except the first quiz) tests any work covered up to its due date. Note that if Blackboard is down, you may access the online quizzes directly on http://aim03.curtin.edu.au. Also, in the Blackboard site, there is a Discussion Board, a forum with a section denoted Online Quizzes where you are encouraged to post any queries regarding the quizzes. Please make the subject of such queries something like: Quiz 4, Question 3 (in this way, you may find a thread actually already answers a query that you were about to pose). Dr Greg Gamble (room 314.353) will promptly respond to your queries. Note that your AiM Online quiz password is not the same as your OASIS/Blackboard password (read Online Quiz Info!).
Learning Resources

Recommended texts

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

- Sadler, A.J. (2010). Specialist Mathematics Unit 3C
- Sadler, A.J. (2010). Specialist Mathematics Unit 3D

Other resources

Lecture Notes.
Workshop Sheets.
Practice Quizzes.
Exercise Sheets.
iLecture links.
Online Quiz Links & Information.
A Discussion Forum.
A Mail Tool to Contact your Lecturer, Tutor or Fellow Students.

LMS (Blackboard): Support materials will be under Unit Materials. It will also be used for discussions and electronic correspondence. The address is http://lms.curtin.edu.au. Blackboard also provides a link to the Online Quizzes and Discussion Board for posting queries.

Calculator and Computer

In this unit you will only be permitted to use a scientific calculator. You will be allowed to use the calculator during the mid semester tests and final examination provided sufficient working of intermediate steps is shown. Graphical calculators, Programmable calculators and ClassPad calculators will not be permitted in neither the in-class quizzes, mid semester test nor the final examination. If you are unsure as to whether your calculator meets the requirements please contact the Unit Coordinator.

It is helpful, but not essential, that you have access to a computer with an Internet connection. You can access the computing facilities on campus if you do not have a computer at home.
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>Test 1</td>
<td>16 percent</td>
<td><strong>Week:</strong> Week 5</td>
<td>1,2,5</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Day:</strong> Monday 4th April</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Time:</strong> 9:00-10:00</td>
<td></td>
</tr>
<tr>
<td>Test 2</td>
<td>17 percent</td>
<td><strong>Week:</strong> Week 8</td>
<td>1,2,5</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Day:</strong> Monday 2nd May</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Time:</strong> 9:00-10:00</td>
<td></td>
</tr>
<tr>
<td>Test 3</td>
<td>17 percent</td>
<td><strong>Week:</strong> Week 12</td>
<td>4,5</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Day:</strong> Monday 30th May</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Time:</strong> 9:00-10:00</td>
<td></td>
</tr>
<tr>
<td>Examination</td>
<td>50 percent</td>
<td>TBA</td>
<td>2,3,4</td>
</tr>
</tbody>
</table>

Detailed information on assessment tasks

1. The test will be based on the topics taught during the first three teaching weeks (Week 1 - Week 3) and the test will be held on Monday 4th April 2016. You will be permitted to take in an A4 sheet of paper with handwritten notes on both sides as well as the use of a scientific calculator (see Page 4). The solutions to the mid semester test will be available on Blackboard after the evaluated tests have been returned.

2. The test will be based on the topics taught during Week 4 - Week 6 and the test will be held on Monday 2nd May 2016. You will be permitted to take in an A4 sheet of paper with handwritten notes on both sides as well as the use of a scientific calculator (see Page 4). The solutions to the mid semester test will be available on Blackboard after the evaluated tests have been returned.

3. The test will be based on the topics taught during Week 7 - Week 10 and the test will be held on Monday 30th May 2016. You will be permitted to take in an A4 sheet of paper with handwritten notes on both sides as well as the use of a scientific calculator (see Page 4). The solutions to the mid semester test will be available on Blackboard after the evaluated tests have been returned.

4. The exam will be based on all the topics taught during the semester. Students granted a Supplementary or Deferred assessment will be notified via OCC. Supplementary and Deferred assessments will be held during the week of 18th - 22nd July 2016. Please also note that the failure to attend the examination/assessment on the day and time set will result in a fail for the unit. Under no circumstances will alternative arrangements be made to suit individuals.

Pass requirements

To pass this unit you must:

- Achieve a grade/mark greater than or equal to 5/50.
- Obtain a minimum of 40% in the final examination.

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

UniPASS (University Peer Assisted Study Success)

You are lucky enough to have UniPASS support in this unit. **Regular attendees at UniPASS can improve their grades by over 10%!** That’s a Fail to a Pass, or a Credit to a Distinction, or a Distinction to a High Distinction! No matter where you start, **UniPASS will help you ‘level-up’ and maximise your grades.**

UniPASS is:

- Weekly structured, **informal**, study groups
- Led by a **successful senior student**
- Review unit content and **actively embed concepts** and ideas
- Improve **grades** and **study skills**
- Interactive study session with friends or make new ones – connect to others in your course!
- Free!

UniPASS is NOT:

- A replacement for lectures or tutorials – you should **attend/watch the lectures first** to get the most benefit!
- A rote learning environment or one-on-one tutoring

Why go to UniPASS?

- **Save time:** 1 hour of UniPASS equals approximately 3 hours studying by yourself!
- 2015 regular attendees averaged an **12% grade increase**
- Opportunity to **make new friends** – over 2000 students came last year
- Your facilitator has aced this unit, they have **great tips and tricks**!
- Learn **study skills** that will help with ALL your units
- Attend 5 times or more and get invited to a **special revision session** end of semester!
- You’ll regret it if you don’t: 59% of students surveyed who didn’t go, said they wished they had gone regularly!

Where do I sign up?!

- No registration – just turn up!
- Timetables will be posted on Blackboard by the end of week 1, sessions commence in week 2
- Follow the UniPASS link from your Blackboard unit list to find the room number and time
- Choose a session time and come along (bring a friend!) Be early – places are limited

Questions? Contact [unipass@curtin.edu.au](mailto:unipass@curtin.edu.au)

Student comments on the positive aspects of UniPASS: (from *UniPASS student survey, 2015 S2*)

“Great relaxed atmosphere and a very worthwhile class to attend”

“...very well structured and offered a different, more interesting and involved way of learning the content”

“It promotes interprofessional practice, builds cultural competency and members learn from their colleagues”

“Encourages discussion so that you are sure you understand the concepts”

“Great way to meet other students and a great forum to ask questions and expand your knowledge”

“Increase grades and gain more holistic knowledge of unit”
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 eesi@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/.

To view previous student feedback about this unit, search for the Unit Summary Report at https://evaluate.curtin.edu.au/student/unit_search.cfm. See https://evaluate.curtin.edu.au/info/dates.cfm to find out when you can eVALUate this unit.

Recent changes to this unit include:
1. Reduced the total hours of contact lectures per week from 3 hours to 1 hour.
2. Eliminated tutorials.
3. Introduced a weekly 2 hour workshop.
4. Change and reduced the number of assessments. That is there are no more assessed weekly in-class quizzes and the single mid-semester test has been removed. In their place are 3 tests held during the semester.
# Program calendar

If you have a printed copy of this document, you may like to tear off this final page and keep the Study Calendar handy as you work through the unit. Sections referenced with a prefix “Pre” are from Precalculus (6th Edition), all other sections are from Calculus (7th Edition).

Semester 1 2016

<table>
<thead>
<tr>
<th>WK</th>
<th>Lecture</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Cartesian coordinates (Pre 1.8); Equations of lines (Pre 1.10); Functions and their graphs (Pre 2.1-2.3); Limits of functions (1.5-1.6, 1.8, 3.4, Pre 13.1-13.2, Pre 13.4); Graphing elementary nonlinear functions; Completing the square of quadratics (Pre 1.5); Transformation of graphs (1.3, Pre 2.5); Inverse functions and their graphs (6.1, Pre 2.7); Combinations of functions (1.3, Pre 2.6).</td>
</tr>
<tr>
<td>2.</td>
<td>Trigonometric ratios &amp; applications (Pre 5.2, Pre 6.1-6.2); Trigonometric functions (Pre 5.2-5.4); Trigonometric equations (Pre 7.4-7.5); Symmetry of functions (Pre 2.5); Sine and cosine rules (Pre 6.5-6.6); Radian measure (Pre 6.1); Wave functions (Pre 5.3).</td>
</tr>
<tr>
<td>3.</td>
<td>Trigonometric identities &amp; applications (Apdx D, Pre 7.1-7.3); Polar coordinates (10.3, Pre 8.1); The derivative (2.1-2.2); Power rule, derivatives of polynomials (2.3); Derivatives of trigonometric functions (2.4); Product &amp; Quotient rules (2.3); Higher order derivatives (2.2); Chain rule (2.5).</td>
</tr>
<tr>
<td>4.</td>
<td>Implicit differentiation (2.6); Tangent and Normal lines; Linearization (2.9); Elementary curve sketching (3.1, 3.3); Applied optimization (3.7); Indefinite integrals (4.4); Integration by substitution (4.5).</td>
</tr>
<tr>
<td>Tuition Free Week</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Definite integrals (4.2-4.3); Areas under and between curves (5.1); The logarithmic function (6.3-6.4, Pre 4.3); Logarithmic differentiation (6.4). TEST 1.</td>
</tr>
<tr>
<td>6.</td>
<td>The exponential function (6.2, Pre 4.1-4.2); Other bases &amp; applications (6.3, Pre 4.3-4.5); Exponential Growth &amp; Decay (6.5, Pre 4.6); L’Hôpital’s Rule (6.8); Geometric vectors; vector operations (12.2, Pre 9.1).</td>
</tr>
<tr>
<td>Tuition Free Week</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Scalar products (12.3, Pre 9.2); Orthogonal vectors and projections (12.3, Pre 9.2); Cross Product (12.4, Pre 9.5); Equations of lines (12.5); Distance between a point and a line; Distance between lines (12.5).</td>
</tr>
<tr>
<td>8.</td>
<td>Matrix algebra, identity and inverse (Pre 10.4-10.5); Elementary row operations (EROs) (Pre 10.3); Row echelon matrix (Pre 10.3); Solution of systems of m linear equations in n unknowns via Gaussian Elimination (Pre 10.3); Rank of a matrix; TEST 2.</td>
</tr>
<tr>
<td>9.</td>
<td>Homogeneous linear systems; Inverse of a matrix by EROs (Pre 10.5); Role of Inverses (Pre 10.5); Determinants (Pre 10.6); Applications of Determinants (Pre 10.6).</td>
</tr>
<tr>
<td>10.</td>
<td>Linear dependence and Independence; Eigenvalues and Eigenvectors.</td>
</tr>
<tr>
<td>11.</td>
<td>Complex numbers: Cartesian form, arithmetic, complex plane (Apdx H, Pre 3.5); Complex numbers: Polar form, modulus, argument and principal value (Apdx H, Pre 3.5); Regions of the complex plane; Exponential form (Apdx H); De Moivre’s Theorem (Apdx H).</td>
</tr>
<tr>
<td>12.</td>
<td>Root extraction and roots of polynomials (Pre 3.6); Revision; TEST 3.</td>
</tr>
<tr>
<td>Study Week</td>
<td></td>
</tr>
<tr>
<td>Examinations</td>
<td></td>
</tr>
</tbody>
</table>

Examinations