## School of Information and Physical Sciences

# MATH1120: Mathematics for Engineering, Science and Technology 2

Singapore PSB

Trimester 3 - 2023 (Singapore)

THE UNIVERSITY OF NEWCASTLE AUSTRALIA

COURSE OUTLINE

www.newcastle.edu.au

CRICOS Provider 00109J

# OVERVIEW

**Course Description**

This course covers the mathematics necessary to perform calculations in, and create models for, the real world of Science and Engineering. Specifically, it will demonstrate how to do mathematics in a three-dimensional world. The course describes the fundamental ideas of calculus of functions of one and two variables, differential equations and linear algebra. It continues from MATH1110 to complete a first year of Mathematics suitable for Science and Engineering students, and others for whom Mathematics is a tool.

Students who wish to proceed to further mathematics studies at second year level are recommended to complete MATH2340 after MATH1120.

**Academic Progress Requirements**

Nil

**Requisites**

Students must have successfully completed MATH1110 or MATH1210 or SCIE1003 before they can enrol in this course.

**Contact Hours**

**Singapore PSB**
**Lecture**
Face to Face at **PSB Academy STEM** Campus
4 hour(s) per Week for Full Term

**Workshop**
Face to Face at PSB Academy STEM Campus
2 hour(s) per Week for 11 Weeks

**Unit Weighting**

10

**Workload**

Students are required to spend on average 120-140 hours of effort (contact and non-contact) including assessments per 10 unit course.

# CONTACTS

**Course Coordinator**

**Singapore PSB**
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**Teaching Staff**

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# SYLLABUS

**Course Content**

1. Sequences, series and approximation.
2. Introduction to functions of more than one variable and partial differentiation.
3. Elementary differential equations and applications.
4. Linear equations and matrices.
5. Eigenvectors and eigenvalues and applications.

**Course Learning Outcomes**

**On successful completion of this course, students will be able to:**
1. Apply methods of calculus to solve mathematical problems;

2. Use matrices and eigenvectors to solve problems in linear algebra;

3. Apply common mathematical themes such as linearity to solve problems across the different strands within this course.

**Course Materials**

**Other Resources:**

- Lecture notes and Task book. Available from course Canvas site.

# SCHEDULE

| Week | Week Begins | Topic | Learning Activity | Assessment Due |
|---|---|---|---|---|
| **1** | 4 Sep | Calculus (I) and (II) | Lectures | No Assessment |
| **2** | 11 Sep | Calculus (III) and (IV) | Lectures, Workshop | Quiz 1 Week 2 (covers week 1) |
| **3** | 18 Sep | Calculus (V) and (VI) | Lectures, Workshop | Quiz 2 Week 3 (covers week 2) |
| **4** | 25 Sep | Calculus (VII) and (VIII) | Lectures, Workshop | Quiz 3 Week 4 (covers week 3) |
| **5** | 2 Oct | Calculus Review<br>Differential Equations (I) | Lectures, Workshop | Quiz 4 Week 5 (covers week 4) |
| **6** | 9 Oct | Differential Equations (II) and (III) | Lectures | Midsemester Test 1 (Calculus) |
| **Mid-Term Break** | | | | |
| **7** | 23 Oct | Differential Equations (IV) and (V) | Lecture, Workshop | Quiz 5 Week 7 (covers weeks 5-6) |
| **8** | 30 Oct | Differential Equations (VI)<br>Differential Equations Review | Lectures, Workshop | Quiz 6 Week 8 (covers week 7) |
| **9** | 06 Nov | Linear Algebra (I) and (II) | Lectures | Midsemester Test 2 (Differential Equations) |
| **10** | 13 Nov | Linear Algebra (III) and (IV) | Lectures, Workshop | Quiz 7 Week 10 (covers weeks 8-9) |
| **11** | 20 Nov | Linear Algebra (V) and (VI) | Lectures, Workshop | Quiz 8 Week 11 (covers week 10) |
| **12** | 27 Nov | Linear Algebra Review, General Revision | Lectures, Workshop | Quiz 9 Week 12 (covers week 11) |
| **13** | 4 Dec | Revision | | |
| **Examination Period** | | | | |
| **Examination Period** | | | | |

# ASSESSMENTS

This course has 4 assessments. Each assessment is described in more detail in the sections below.

| | Assessment Name | Due Date | Involvement | Weighting | Learning Outcomes |
|---|---|---|---|---|---|
| **1** | Workshop Quizzes | Weeks 2-5, 7-8, 10-12.<br>Exact due dates will be announced on the course Canvas Site | Individual | 20% | 1, 2, 3 |
| **2** | Final Examination | Formal examination period | Individual | 40% | 1, 2, 3 |
| **3** | In Class Test 1 - On Calculus | Week 6 | Individual | 20% | 1, 2, 3 |
| **4** | In Class Test 2 - Differential Equations | Week 9 | Individual | 20% | 1, 2, 3 |

**Late Submissions** The mark for an assessment item submitted after the designated time on the due date, without an approved extension of time, will be reduced by 10% of the possible maximum mark for that assessment item for each day or part day that the assessment item is late. Note: this applies equally to week and weekend days.

## Assessment 1 – Workshop Quizzes

**Assessment Type** Quiz
**Purpose** Check your understanding of concepts and methods during the course
**Description** Workshop Quizzes are available online in the same weeks as the workshops: Weeks 2-5, 7-8, 10-12.

| | |
|---|---|
| | Each quiz is a mix of multiple choice and short written-answer questions, written online on Canvas. The best 8-out-of-9 quizzes will be counted. |
| **Weighting** | 20% |
| **Due Date** | Weeks 2-5, 7-8, 10-12. Submission schedule will be announced on Canvas. |
| **Submission Method** | Online |
| **Assessment Criteria** | Correct answers, and clear explanations for short answer questions |
| **Return Method** | Online |
| **Feedback Provided** | Online - Immediate for Multiple-choice questions, within 2 weeks for written-answer questions. |

## Assessment 2 – Final Examination

| | |
|---|---|
| **Assessment Type** | Formal Examination |
| **Purpose** | Test your overall knowledge of all topics covered in the course. |
| **Description** | Contains both multiple choice and written answer questions. |
| **Weighting** | 40% |
| **Length** | 120 minutes |
| **Due Date** | Formal examination period |
| **Submission Method** | Online |
| **Assessment Criteria** | Correct answers, and clear explanations for short answer questions. |
| **Return Method** | Not Returned |
| **Feedback Provided** | No Feedback |

## Assessment 3 - In Class Test 1 - On Calculus

| | |
|---|---|
| **Assessment Type** | In Term Test |
| **Purpose** | Test your knowledge of the calculus content. |
| **Description** | Multiple-choice and/or short-answer questions |
| **Weighting** | 20% |
| **Length** | 90 minutes |
| **Due Date** | Week 6 |
| **Submission Method** | In Class<br>Written in person during the scheduled Week 6 workshop |
| **Assessment Criteria** | Correct answers, and clear explanations for short answer questions. |
| **Return Method** | In Class |
| **Feedback Provided** | Returned Work - Within two weeks. Score per question |

## Assessment 4 - In Class Test 2 - Differential Equations

| | |
|---|---|
| **Assessment Type** | In Term Test |
| **Purpose** | Test your knowledge of the differential equations content. |
| **Description** | Multiple-choice and/or short-answer questions |
| **Weighting** | 20% |
| **Length** | 90 minutes |
| **Due Date** | Week 9 |
| **Submission Method** | In Class<br>Written in person during the scheduled Week 9 workshop |
| **Assessment Criteria** | Correct answers, and clear explanations for short answer questions. |
| **Return Method** | In Class |
| **Feedback Provided** | Returned Work - Within two weeks. Score per question |

# ADDITIONAL INFORMATION

**Grading Scheme**

This course is graded as follows:

| Range of Marks | Grade | Description |
|---|---|---|
| 85-100 | High Distinction (HD) | Outstanding standard indicating comprehensive knowledge and understanding of the relevant materials; demonstration of an outstanding level of academic achievement; mastery of skills*; and achievement of all assessment objectives. |
| 75-84 | Distinction (D) | Excellent standard indicating a very high level of knowledge and understanding of the relevant materials; demonstration of a very high level of academic ability; sound development of skills*; and achievement of all assessment objectives. |
| 65-74 | Credit (C) | Good standard indicating a high level of knowledge and understanding of the relevant materials; demonstration of a high level of academic achievement; reasonable development of skills*; and achievement of all learning outcomes. |
| 50-64 | Pass (P) | Satisfactory standard indicating an adequate knowledge and understanding of the relevant materials; demonstration of an adequate level of academic achievement; satisfactory development of skills*; and achievement of all learning outcomes. |
| 0-49 | Fail (FF) | Failure to satisfactorily achieve learning outcomes. If all compulsory course components are not completed the mark will be zero. A fail grade may also be awarded following disciplinary action. |

*Skills are those identified for the purposes of assessment task(s).

**Communication Methods**

Communication methods used in this course include:

1) Canvas: Students will receive communications via the posting of content or announcements on the Canvas course site.
2) Email: Students will receive communications via their student email account.
3) Face-to-face: Communication will be provided via face-to-face meetings or supervision.

**Course Evaluation**

Each year feedback is sought from students and other stakeholders about the courses offered in the University for the purposes of identifying areas of excellence and potential improvement.

**Oral Interviews (Vivas)**

As part of the evaluation process of any assessment item in this course an oral examination (viva) may be conducted. The purpose of the oral examination is to verify the authorship of the material submitted in response to the assessment task. The oral examination will be conducted in accordance with the principles set out in the Oral Examination (viva) Procedure. In cases where the oral examination reveals the assessment item may not be the student's own work the case will be dealt with under the Student Conduct Rule.

**Academic Misconduct**

All students are required to meet the academic integrity standards of the University. These standards reinforce the importance of integrity and honesty in an academic environment. Academic Integrity policies apply to all students of the University in all modes of study and in all locations. For the Student Academic Integrity Policy, refer to https://policies.newcastle.edu.au/document/view-current.php?id=35

**Adverse Circumstances**

The University acknowledges the right of students to seek consideration for the impact of allowable adverse circumstances that may affect their performance in assessment item(s). Applications for special consideration due to adverse circumstances will be made using the online Adverse Circumstances system where:

1. the assessment item is a major assessment item; or

2. the assessment item is a minor assessment item and the Course Co-ordinator has specified in the Course Outline that students may apply the online Adverse Circumstances system;
3. you are requesting a change of placement; or
4. the course has a compulsory attendance requirement.

Before applying you must refer to the Adverse Circumstance Affecting Assessment Items Procedure available at:
https://policies.newcastle.edu.au/document/view-current.php?id=236

**Important Policy Information**

The Help button in the Canvas Navigation menu contains helpful information for using the Learning Management System. Students should familiarise themselves with the policies and procedures at https://www.newcastle.edu.au/current-students/no-room-for/policies-and-procedures that support a safe and respectful environment at the University.

*This course outline was approved by the Head of School. No alteration of this course outline is permitted without Head of School approval. If a change is approved, students will be notified and an amended course outline will be provided in the same manner as the original.*