

CIVL2060: Numerical Methods

Singapore BCA and Callaghan
Semester 1 - 2024



THE UNIVERSITY OF
NEWCASTLE
AUSTRALIA

OVERVIEW

Course Description This course introduces students to the development and application of numerical methods to provide solutions to common problems formulated in engineering. Its purpose is to provide foundation material for later year courses in water, structural, and geotechnical engineering.

Academic Progress Requirements Nil

Requisites You cannot enrol in this course if you are active in one of the Engineering program codes of 10478, 12282, 12288, 12289, 12290, 12298, 12299 or 40005.

Assumed Knowledge Course content covered in ENGG1003 Introduction to Procedural Programming (previously ENGG1002), and content covered in MATH1120 Mathematics for Engineering, Science and Technology 2.

Contact Hours
**Singapore BCA
Computer Lab**
Face to Face On Campus
1 hour(s) per week(s) for 12 week(s) starting Week 1

Lecture
Face to Face On Campus
4 hour(s) per week(s) for 13 week(s) starting Week 1

Tutorial
Face to Face On Campus
1 hour(s) per week(s) for 12 week(s) starting Week 1

**Callaghan
Computer Lab**
Face to Face On Campus
1 hour(s) per week(s) for 12 week(s) starting Week 1

Lecture
Face to Face On Campus
4 hour(s) per week(s) for 13 week(s) starting Week 1

Tutorial
Face to Face On Campus
1 hour(s) per week(s) for 12 week(s) starting Week 1

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

COURSE OUTLINE

CONTACTS

Course Coordinator **Singapore BCA and Callaghan**
A/Prof. Klaus Thoeni
Klaus.Thoeni@newcastle.edu.au
(02) 4921 5735
Consultation: by appointment, office EA215

Teaching Staff Other teaching staff will be advised on the course Canvas site.

School Office **School of Engineering**
EAG02
EA Building
Callaghan
9.00am-1.00pm and 2.00pm-5.00pm (Monday to Friday)
School of Engineering (Callaghan)
SENG-ADMIN@newcastle.edu.au

SYLLABUS

Course Content The content of the course includes:

- Nonlinear equations and numerical solutions
- Systems of linear equations, direct and iterative solutions
- Functions, interpolation and curve fitting
- Differentiation and integration: concepts and numerical approximations
- Ordinary differential equations and numerical solutions
- Partial Differential equations and numerical solutions

Course Learning Outcomes **On successful completion of this course, students will be able to:**

1. Select and implement an appropriate numerical method to solve a single nonlinear equation based on accuracy, efficiency, and convergence requirements.
2. Select and implement an appropriate numerical method to solve a system of linear equations based on accuracy, efficiency, and convergence requirements.
3. Select and implement an appropriate numerical method to perform interpolation, curve fitting on field data sets.
4. Select and implement an appropriate numerical method to perform numerical differentiation and numerical integration.
5. Solve ordinary differential equations through selection and implementation of appropriate numerical methods, suited to the physical nature of specified ordinary differential equations.
6. Interpret the physical significance of partial differential equations enabling application of appropriate finite difference method for their solution.

Course Materials

ASSESSMENTS

This course has 8 assessments. Each assessment is described in more detail in the sections below.

	Assessment Name	Due Date	Involvement	Weighting	Learning Outcomes
1	Progressive Written Assignment 1	Week 3	Individual	5%	1
2	Progressive Written Assignment 2	Week 5	Individual	5%	2
3	Progressive Written Assignment 3	Week 7	Individual	5%	3
4	Progressive Written Assignment 4	Week 9	Individual	5%	4
5	Progressive Written Assignment 5	Week 11	Individual	5%	5
6	Progressive Written Assignment 6	Week 13	Individual	5%	6
7	Mid Term Test	Week 8	Individual	30%	1, 2
8	Formal Examination	Exam period	Individual	40%	3, 4, 5, 6

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 - Progressive Written Assignment 1

Assessment Type	Written Assignment
Description	Relevant assignments on weekly topics.
Weighting	5%
Due Date	Week 3
Submission Method	Online
Assessment Criteria	Assessment criteria are available on the course Canvas site.
Return Method	Online
Feedback Provided	Online - .
Opportunity to Reattempt	Students WILL NOT be given the opportunity to reattempt this assessment.

Assessment 2 - Progressive Written Assignment 2

Assessment Type	Written Assignment
Description	Relevant assignments on weekly topics.
Weighting	5%
Due Date	Week 5
Submission Method	Online
Assessment Criteria	Assessment criteria are available on the course Canvas site.
Return Method	Online
Feedback Provided	Online - .
Opportunity to Reattempt	Students WILL NOT be given the opportunity to reattempt this assessment.

Assessment 3 - Progressive Written Assignment 3

Assessment Type	Written Assignment
Description	Relevant assignments on weekly topics.
Weighting	5%
Due Date	Week 7
Submission Method	Online
Assessment Criteria	Assessment criteria are available on the course Canvas site.
Return Method	Online

Feedback Provided	Online - .
Opportunity to Reattempt	Students WILL NOT be given the opportunity to reattempt this assessment.

Assessment 4 - Progressive Written Assignment 4

Assessment Type	Written Assignment
Description	Relevant assignments on weekly topics.
Weighting	5%
Due Date	Week 9
Submission Method	Online
Assessment Criteria	Assessment criteria are available on the course Canvas site.
Return Method	Online
Feedback Provided	Online - .
Opportunity to Reattempt	Students WILL NOT be given the opportunity to reattempt this assessment.

Assessment 5 - Progressive Written Assignment 5

Assessment Type	Written Assignment
Description	Relevant assignments on weekly topics.
Weighting	5%
Due Date	Week 11
Submission Method	Online
Assessment Criteria	Assessment criteria are available on the course Canvas site.
Return Method	Online
Feedback Provided	Online - .
Opportunity to Reattempt	Students WILL NOT be given the opportunity to reattempt this assessment.

Assessment 6 - Progressive Written Assignment 6

Assessment Type	Written Assignment
Description	Relevant assignments on weekly topics.
Weighting	5%
Due Date	Week 13
Submission Method	Online
Assessment Criteria	Assessment criteria are available on the course Canvas site.
Return Method	Online
Feedback Provided	Online - .
Opportunity to Reattempt	Students WILL NOT be given the opportunity to reattempt this assessment.

Assessment 7 - Mid Term Test

Assessment Type	In Term Test
Description	The mid-term test
Weighting	30%
Due Date	Week 8
Submission Method	In Class
Assessment Criteria	Assessment criteria are available on the course Canvas site.
Return Method	
Feedback Provided	Online - .
Opportunity to Reattempt	Students WILL NOT be given the opportunity to reattempt this assessment.

Assessment 8 - Formal Examination

Assessment Type	Formal Examination
Description	Formal examination during exam period.
Weighting	40%
Due Date	Exam period
Submission Method	

Assessment Criteria	Assessment criteria are available on the course Canvas site.
Return Method	Not Returned
Feedback Provided	Online - .
Opportunity to Reattempt	Students WILL NOT be given the opportunity to reattempt this assessment.

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:

- Canvas Course Site: Students will receive communications via the posting of content or announcements on the Canvas course site.
- Email: Students will receive communications via their student email account.

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/respect-at-uni/policies-and-procedures> that support a safe and respectful environment at the University.

Graduate Profile Statements

This course builds students' capacity in the following University of Newcastle Bachelor of Engineering Graduate Profile Statements (based on 2011 Engineers Australia revised Stage 1 Competency Standards for Professional Engineers):

UON Att.	University of Newcastle Bachelor of Engineering Graduate Profile Statements/ Engineers Australia Stage 1 competency statements	Taught	Practised	Assessed	Skill Level (1-4)
	Professional Attributes				
11	3.1. Ethical conduct and professional accountability				
12	3.2. Effective oral and written communication in professional and lay domains.		X	X	2
13	3.3. Creative, innovative and pro-active demeanour.				
14	3.4. Professional use and management of information.				
15	3.5. Orderly management of self, and professional conduct.				
16	3.6. Effective team membership and team leadership.				
	Engineering Ability				
7	2.1. Application of established engineering methods to complex engineering problem solving.	X	X	X	2
8	2.2. Fluent application of engineering techniques, tools and resources.	X	X	X	2
9	2.3. Application of systematic engineering synthesis and design processes.				
10	2.4. Application of systematic approaches to the conduct and management of engineering projects.				
	Knowledge Base				
1	1.1. Comprehensive, theory-based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline.				
2	1.2. Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline.	X	X	X	2
3	1.3. In-depth understanding of specialist bodies of knowledge within the engineering discipline.	X	X	X	2
4	1.4. Discernment of knowledge development and research directions within the engineering discipline.				
5	1.5. Knowledge of contextual factors impacting the engineering discipline.				
6	1.6. Understanding of the scope, principles, norms, accountabilities and bounds of contemporary engineering practice in the specific discipline.				

This course outline was approved by the Head of School on the 02/02/24. 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.

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