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The published on-line version of the Course Profile is the authoritative version and by the publication of the Course Profile on-line the University deems the student has been notified of and read the course requirements.

1. General Course Information

1.1 Course Details

COURSE CODE	2202NSC
COURSE TITLE	Numerical Methods and MATLAB
ACADEMIC ORGANISATION	ESC School of Environment and Science
TRIMESTER	Trimester 2 2019
MODE	In Person
LEVEL	Undergraduate
LOCATION	Gold Coast, On Campus
CREDIT POINT VALUE	10

Course Description:

This course introduces students to numerical methods for the solution of basic mathematical problems that cannot be solved by hand. Topics covered include nonlinear equations, linear systems, data fitting, integration and the solution of systems of differential equations. This course also develops solid skills in the use of MATLAB including built-in functions, data visualization and typical programming concepts. Prerequisites: 1201BPS Mathematics 1A or 1011SCG Mathematics 1A or 1201SCG Linear Algebra AND 1202BPS Mathematics 1B or 1012SCG Mathematics 1B or 1202SCG Calculus I.

1.2 Course Introduction

This course addresses the basic computational needs of science students. It uses real examples to introduce a variety of standard problems (nonlinear equations, linear systems, data fitting, integration and the solution of systems of differential equations) and then discusses reliable ways to solve these problems, to assess the accuracy of the solution. It also discusses the advantages and disadvantages of alternative numerical approaches.

Previous Student Feedback

Previously, students have been generally very happy with the use of different types of assessment in this course and also the mixture of pre-recorded lectures plus face-to-face tutorials and workshops where students can practice using material. In 2019, student feedback from 2018 PebblePad assignments has been incorporated in updates to the computer workshops.

1.3 Course Staff

Primary Convenor **Dr Barbara Johnston**

PHONE	(07) 3735 4405
EMAIL	barbara.johnston@griffith.edu.au
CAMPUS	Nathan Campus
BUILDING	Technology (N44)
ROOM	3.14
CONSULTATION	Please contact me in person or by email to arrange a meeting.

1.4 Timetable

Timetables are available on [the Programs and Courses website](#).

NB: Details contained in this Section of the course profile and Section 4.1 Learning Activities are to be read in conjunction with the official class timetable. The published class timetable which is the authoritative source for timetabling information for all campuses can be located by clicking on the above link.

Additional Timetable Information

There are about 12 one-hour workshops and 12 two-hour computer laboratories in this course, all of which should be attended. Prior to the workshops students are expected to watch pre-recorded lecture material and read the course notes, so that the workshops can be used to clarify concepts and practice problems. An optional one-hour workshop will be held prior to the weekly workshop to allow students to receive help, ask questions and work on tutorial problems.

1.5 Lecture Capture

It is standard practice at Griffith University that lectures timetabled in lecture capture-enabled venues are recorded and made available to students on the relevant course site, in accordance with the University's [Lecture Capture Policy](#).

The lecture series delivered as part of this course will be recorded and accessible via the Learning@Griffith course site.

2. Aims, Outcomes & Graduate Attributes

2.1 Course Aims

This course addresses the basic computational needs of science students. It uses real examples to introduce a variety of standard problems (nonlinear equations, linear systems, data fitting, integration and the solution of systems of differential equations) and then discusses reliable ways to solve these problems, to assess the accuracy of the solution. It also discusses the advantages and disadvantages of alternative numerical approaches.

2.2 Learning Outcomes

After successfully completing this course you should be able to:

- 1 Use MATLAB to implement the methods studied in this course, as well as to solve a variety of numerical problems and represent the solutions in graphical form.
- 2 Demonstrate the effect that the representation of numbers on a computer has on the solutions obtained to simple problems.
- 3 Solve a single nonlinear equation by a number of methods and calculate the error involved in the approximations.
- 4 Solve systems of linear equations using various numerical methods and analyse the resulting errors in the solutions.
- 5 Derive, apply and compare methods for numerical integration and analyse the resulting errors.
- 6 Derive, apply and compare methods for numerical differentiation and analyse the resulting errors.
- 7 Derive and apply methods for fitting a function to data and analyse the resulting errors.
- 8 Analyse and implement methods for solving systems of first order and single second order ordinary differential equations numerically.
- 9 Critically recognise and reflect on non-academic skills that you are developing through your course of study.

2.3. Graduate Attributes

For further details on the Griffith Graduate please [click here](#)

Griffith University prepares influential graduates to be:

- [Knowledgeable and skilled, with critical judgement](#)
- [Effective communicators and collaborators](#)
- [Innovative, creative and entrepreneurial](#)
- [Socially responsible and engaged in their communities](#)
- [Culturally capable when working with First Australians](#)
- [Effective in culturally diverse and international environments](#)

This table demonstrates where each of the Griffith Graduate Attributes is taught, practised and assessed in this course.

For further details on the Griffith Graduate Attributes please refer to [The Griffith Graduate policy](#).

University wide attributes

GRADUATE ATTRIBUTE	TAUGHT	PRACTISED	ASSESSED
Knowledgeable and skilled, with critical judgement	•	•	•
Effective communicators and collaborators	•	•	•
Innovative, creative and entrepreneurial	•	•	•

4. Teaching & Learning Activities

4.1 Learning Activities

Week Commencing	Activity	Learning Outcomes
8 Jul 19	Numbers and Computers (Lecture Series):	1, 2
22 Jul 19	Solving nonlinear equations (Lecture Series):	1, 3
29 Jul 19	Solving a system of linear equations (Lecture Series):	1, 4
19 Aug 19	Numerical integration (Lecture Series):	1, 5
26 Aug 19	Numerical differentiation (Lecture Series):	1, 6
2 Sep 19	Curve fitting and interpolation (Lecture Series):	1, 7
16 Sep 19	Ordinary differential equations (Lecture Series):	1, 8
30 Sep 19	Revision (Review):	1, 2, 3, 4, 5, 6, 7, 8

4.2 Other Teaching and Learning Activities Information

Disability. If any student has a disability and/or health condition that may impact on their ability to successfully undertake required learning activities in this course, they are encouraged to complete the Griffith University Disclosure Statement and advise their Course Convenor.

Classes that fall on Public Holidays will be re-scheduled to a different day of the week.

5. Assessment Plan

5.1 Assessment Summary

This is a summary of the assessment in the course. For detailed information on each assessment, see [5.2 Assessment Detail](#) below.

ASSESSMENT TASK	DUE DATE	WEIGHTING	MARKED OUT OF	LEARNING OUTCOMES	MAXIMUM EXTENSION PERIOD
<i>Log of Learning Activities</i> Participation and Completion of MATLAB tutorials	8 Jul 19 - 23 Sep 19	8%	8 marks	1, 2, 3, 4, 5, 6, 7, 8	
<i>Test or quiz</i> Weekly in-class quiz	15 Jul 19 - 27 Sep 19 Duration: 10 mins	5%	5 marks	1, 2, 3, 4, 5, 6, 7, 8	
<i>Academic development holistic assessment</i> PebblePad Reflection	15 Jul 19 - 23 Sep 19 This task is due one week after the student takes their turn as one of the MATLAB workshop leaders.	3%	3 marks	1, 9	
<i>Assignment - Problem Solving</i> Assignment Assignment 1	9 Aug 19	8%	50 marks	1, 2, 3	
<i>Assignment - Problem Solving</i> Assignment Assignment 2	6 Sep 19	8%	50 marks	1, 4, 5, 6	
<i>Assignment - Problem Solving</i> Assignment Assignment 3	27 Sep 19	8%	50 marks	1, 7, 8	
<i>Test or quiz</i> MATLAB Quiz	2 Oct 19 - 4 Oct 19	15%	60 marks	1	
<i>Exam - constructed response</i> End of Semester	Examination Period	45%	100 marks	2, 3, 4, 5, 6, 7, 8	

5.2 Assessment Detail

Title: Participation and Completion of MATLAB tutorials

Type: Log of Learning Activities

Learning Outcomes Assessed: 1, 2, 3, 4, 5, 6, 7, 8

Due Date:

8 Jul 19 - 23 Sep 19

Weight: 8%

Marked out of: 8

Task Description:

Students are required to attend at least 9 out of 11 two-hour MATLAB tutorials and complete the tutorial exercises. In addition, small groups of students will complete the MATLAB tutorial exercise ahead of class and then take a lead role during one of these tutorials in assisting other students with the work (this will be assessed via the PebblePad exercise).

Criteria & Marking:

Students are required to attend at least 9 of the 11 two-hour MATLAB tutorials and make a good attempt to complete the tutorial exercises. Three marks will be allocated for each workshop, depending on the amount of work attempted (1=very little attempted, 2=reasonable amount attempted, 3=most work attempted). Marks will be allocated as 1% for each of 8 tutorials. The assessment for the 9th tutorial (where the student is one of the tutorial leaders) will be via the PebblePad exercise.

This assessment item:

- is a school based activity
 - is an individual activity
 - does not include a self assessment activity
 - does not have a re-attempt provision
-

Title: Weekly in-class quiz

Type: Test or quiz

Learning Outcomes Assessed: 1, 2, 3, 4, 5, 6, 7, 8

Due Date:

15 Jul 19 - 27 Sep 19 Duration: 10 mins

Weight: 5%

Marked out of: 5

Task Description:

A short multiple-choice quiz (10 minutes) will be held at the end of each tutorial class in Weeks 2-12 inclusive.

Criteria & Marking:

The best 10 scores will count towards the final mark.

This assessment item:

- is a school based activity
 - is an individual activity
 - does not include a self assessment activity
 - does not have a re-attempt provision
-

Title: PebblePad Reflection

Type: Academic development holistic assessment

Learning Outcomes Assessed: 1, 9

Due Date:

15 Jul 19 - 23 Sep 19 This task is due one week after the student takes their turn as one of the MATLAB workshop leaders.

Weight: 3%

Marked out of: 3

Task Description:

Students will reflect the skills that they have gained while taking their turn acting as one of the leaders of the MATLAB workshop. This will be achieved by completing a simple PebblePad reflection worksheet.

Criteria & Marking:

A reasonable attempt at each of the three sections of the PebblePad worksheet is sufficient to gain full marks (3x1%=3%).

Submission: Online

This assessment item:

- is a school based activity
 - is an individual activity
 - includes a self assessment activity
-

Title: Assignment 1

Type: Assignment - Problem Solving Assignment

Learning Outcomes Assessed: 1, 2, 3

Due Date:

9 Aug 19

Weight: 8%

Marked out of: 50

Task Description:

Assignment to practise and explore content from lectures using MATLAB skills from workshops.

Criteria & Marking:

8% weighting

Submission: Assignments to be handed to lecturer or (Nathan students) placed in Assignment box on N44 level 3.

This assessment item:

- is a school based activity
 - is an individual activity
 - does not include a self assessment activity
 - does not have a resubmission provision
-

Title: Assignment 2

Type: Assignment - Problem Solving Assignment

Learning Outcomes Assessed: 1, 4, 5, 6

Due Date:

6 Sep 19

Weight: 8%

Marked out of: 50

Task Description:

Assignment to practise and explore content from lectures using MATLAB skills from workshops.

Criteria & Marking:

8% weighting

Submission: Assignment to be handed to lecturer or (Nathan students only) to be placed in the Assignment box on N44 level 3.

This assessment item:

- is a school based activity
- is an individual activity
- does not include a self assessment activity
- does not have a resubmission provision

Title: Assignment 3

Type: Assignment - Problem Solving Assignment

Learning Outcomes Assessed: 1, 7, 8

Due Date:

27 Sep 19

Weight: 8%

Marked out of: 50

Task Description:

Assignment to practise and explore content from lectures using MATLAB skills from workshops.

Criteria & Marking:

8% weighting

Submission: Assignment to be handed to lecturer or (Nathan students only) placed in the assignment box on N44 level 3.

This assessment item:

- is a school based activity
- is an individual activity
- does not include a self assessment activity
- does not have a resubmission provision

Title: MATLAB Quiz

Type: Test or quiz

Learning Outcomes Assessed: 1

Due Date:

2 Oct 19 - 4 Oct 19

Weight: 15%

Marked out of: 60

Task Description:

Written MATLAB Quiz, conducted during the MATLAB tutorial in Week 12, to assess student's knowledge of MATLAB and its use in solving problems numerically.

Criteria & Marking:

15% weighting

This assessment item:

- is a school based activity
- is an individual activity
- does not include a self assessment activity
- does not have a re-attempt provision

Title: End of Semester

Type: Exam - constructed response

Learning Outcomes Assessed: 2, 3, 4, 5, 6, 7, 8

Due Date:

Examination Period

Weight: 45%

Marked out of: 100

Perusal: 10 minutes

Duration: 120 minutes

Format: Closed Book with Notes

Task Description:

The exam is designed to assess the students' overall grasp of the course's concepts, methods and techniques. It will not assess the MATLAB component of the course. STUDENTS MUST OBTAIN AT LEAST 45% ON THE FINAL EXAM TO PASS THE COURSE.

Criteria & Marking:

45% weighting.

STUDENTS MUST OBTAIN AT LEAST 45% ON THE FINAL EXAM TO PASS THE COURSE.

This assessment item:

- is a centrally organised activity
- is an individual activity
- does not include a self assessment activity

5.3 Late Submission

An assessment item submitted after the due date, without an approved extension, will be penalised. The standard penalty is the reduction of the mark allocated to the assessment item by 5% of the total weighted mark for the assessment item, for each working day that the item is late. A working day will be defined as Monday to Friday. Assessment items submitted more than five working days after the due date will be awarded zero marks. To understand how the mark is reduced please refer to [Assessment Submission and Return Procedures](#)

5.4 Other Assessment Information

Griffith University Disclosure Statement

The University shall provide reasonable adjustments to assessment for students with disabilities consistent with the Disabilities Standards for Education 2005, while maintaining the academic integrity of its programs. Adjustments shall be made on an individual basis. Please refer to this policy as it sets out the principles and processes that guide the University [Reasonable Adjustments for Assessment - Students with Disabilities](#)

Supplementary Assessment is available in this course in accordance with Section 8 of the University Assessment Policy. To achieve a Pass grade for the course a pass mark for the supplementary assessment item must be achieved.

Final Grades

A student's final grade for this course will be based on the aggregation and weighting of marks across assessment, any mandatory pass components and grade cut-offs. Grade cut-offs can vary, so you will need to wait for the official release of grades to be sure of your grade for this course.

- This course is a graded course (i.e 7, 6, 5, 4, 3, 2, 1).

The assignments are designed for students to apply their knowledge to a range of exercises. Assignments will be marked by the lecturer and common mistakes and misconceptions will be highlighted.

All assessment item results will be published on MyMarks on Learning@Griffith.

Return of Assessment Items

Assignments will be returned in class within two weeks of submission.

Notification of Availability of Feedback on Assessment

Individual feedback will be provided by written comments on the assignment and group feedback will be provided during class.

Supplementary assessment is available in this course in accordance with Section 8 of the University Assessment Policy. A pass mark (50% or greater) must be achieved in the Supplementary assessment item or exam to achieve the grade of 4.

Disability. If any student has a disability and/or health condition that may impact on their ability to successfully undertake required learning activities in this course, they are encouraged to complete the Griffith University Disclosure Statement and advise their Course Convenor.

6. Policies & Guidelines

This section contains the details of and links to the most relevant policies and course guidelines. For further details on University Policies please visit the [Policy Library](#)

6.1 Assessment Related Policies and Guidelines

University Policies & Guidelines

The University's assessment-related policies can be found in the [Griffith Policy Library](#).

The Assessment policy covers topics including: assessment requirements; award of grades; supplementary assessment; special consideration; extensions and deferred assessment; conduct of students in examinations; cheating; plagiarism; notification of results; appeals against the award of grades.

Academic Integrity

Student academic misconduct encompasses all behaviour:

- involving the misrepresentation of academic achievement; or
- undermining the core values (honesty, trust, fairness, respect and responsibility) of academic integrity; or
- breaching academic integrity;

whether intentional or unintentional. Student academic misconduct includes doing as well as attempting to do any of the acts, omissions or things that constitute academic misconduct.

Student academic misconduct is defined in the [Institutional Framework for Promoting Academic Integrity among Students](#).

Please also refer to the [Student Academic Misconduct Policy](#).

Reasonable Adjustments for Assessment - Students with Disabilities Policy

The [Reasonable Adjustments for Assessment - Students with Disabilities](#) Policy sets out the principles and processes that guide the University in making reasonable adjustments to assessment for students with disabilities while maintaining the academic integrity of its programs.

Griffith University Disclosure Statement

The [Griffith University Disclosure Statement](#) has been developed to identify and negotiate whether necessary and reasonable accommodations and adjustments can be made, wherever possible, to enable students with disabilities and/or health conditions to undertake required learning activities. Course Convenors are encouraged to reference the Griffith University Disclosure Statement in the Learning Activities and Assessment Plan sections of their course profiles.

Assessment, how to submit an assignment and exams, viewing your grades

All you need to know about [assessment, exams and grades](#)

Text Matching Software

The University uses text matching software. Students should be aware that your Course Convenor may use software to check submitted assessment tasks. If this is the case, your Course Convenor will provide more detailed information about how the software will be used for individual assessment items.

Related links:

- [Academic Integrity website](#)
- [Academic Standing, Progression and Exclusion Policy](#)
- [Assessment Policy](#)
- [Assessment Submission and Return Procedures](#)
- [End of Trimester Centrally Administered Examinations Policy and Procedures](#)
- [Governance of Assessment and Academic Achievement Standards](#)
- [Standards for First Year Assessment](#)
- [Institutional Framework for Promoting Academic Integrity among Students](#)
- [Student Academic Misconduct Policy](#)

6.2 Other Policies and Guidelines

University Policies and Guidelines

Students are responsible for ensuring that they have read all sections of the Course Profile for the course/s in which they are enrolled in any enrolment period. The published online version of the Course Profile is the authoritative version and by the publication of the Course Profile online, the University deems the student has been notified of and read the course requirements. Variations to the Course Profile during the trimester of offer are not permitted except in exceptional circumstances and will be advised in writing to all enrolled students and via the Learning@Griffith website. Additional information regarding the content of this course may be published on the Learning@Griffith website.

Copyright matters

Copyright applies to all teaching materials and materials generated by students which substantially relate to Griffith University courses. *Students are warned against selling Griffith University teaching materials and their student notes online through commercial websites during and after their studies.* You will almost certainly be in breach of copyright law and Griffith's IT Code of Practice if you post these materials on the internet and commercial websites. Please refer to the [Copyright Guide for Students](#) for further information.

Health and Safety

Griffith University is committed to providing a safe work and study environment. However, all students, staff and visitors have an obligation to ensure the safety of themselves and those whose safety may be affected by their actions. Staff in control of learning activities will ensure as far as reasonably practical, that those activities are safe and that all safety obligations are being met. Students are required to comply with all safety instructions and are requested to report safety concerns to the University.

General health and safety information is available on the [Health, Safety and Wellbeing](#) website.

Other Key Student-Related Policies

All University policy documents are accessible to students via the [Griffith Policy Library](#) and links to key policy documents, in addition to those listed in 6.1 above, are included below for easy reference:

- [Student Communications Policy](#)
- [Health and Safety Policy](#)
- [Student Administration Policy](#)
- [Student Charter](#)
- [Student Review and Appeals Policy](#)
- [Student Review and Appeals Procedures](#)
- [Student Complaints Policy](#)

Other Course Guidelines

COURSE COMMUNICATIONS

Face to face in workshops and computer labs, by email or by consultation as discussed in class.

Learning Summary

Below is a table showing the relationship between the learning outcomes for this course, the learning activities used to develop each outcome and the assessment task used to assess each outcome.

Learning Outcomes

After successfully completing this course you should be able to:

- 1 Use MATLAB to implement the methods studied in this course, as well as to solve a variety of numerical problems and represent the solutions in graphical form.
- 2 Demonstrate the effect that the representation of numbers on a computer has on the solutions obtained to simple problems.
- 3 Solve a single nonlinear equation by a number of methods and calculate the error involved in the approximations.
- 4 Solve systems of linear equations using various numerical methods and analyse the resulting errors in the solutions.
- 5 Derive, apply and compare methods for numerical integration and analyse the resulting errors.
- 6 Derive, apply and compare methods for numerical differentiation and analyse the resulting errors.
- 7 Derive and apply methods for fitting a function to data and analyse the resulting errors.
- 8 Analyse and implement methods for solving systems of first order and single second order ordinary differential equations numerically.
- 9 Critically recognise and reflect on non-academic skills that you are developing through your course of study.

Assessment & Learning Activities

LEARNING ACTIVITIES	LEARNING OUTCOMES								
	1	2	3	4	5	6	7	8	9
Numbers and Computers (Lecture Series)	●	●							
Solving nonlinear equations (Lecture Series)	●		●						
Solving a system of linear equations (Lecture Series)	●			●					
Numerical integration (Lecture Series)	●				●				
Numerical differentiation (Lecture Series)	●					●			
Curve fitting and interpolation (Lecture Series)	●						●		
Ordinary differential equations (Lecture Series)	●							●	
Revision (Review)	●	●	●	●	●	●	●	●	●
ASSESSMENT TASKS									
Participation and Completion of MATLAB tutorials	●	●	●	●	●	●	●	●	●
Weekly in-class quiz	●	●	●	●	●	●	●	●	●
PebblePad Reflection	●								●
Assignment 1	●	●	●						
Assignment 2	●			●	●	●			
Assignment 3	●						●	●	
MATLAB Quiz	●								
End of Semester		●	●	●	●	●	●	●	●

Graduate Attributes

For further details on the Griffith Graduate please [click here](#)

Griffith University prepares influential graduates to be:

- [Knowledgeable and skilled, with critical judgement](#)
- [Effective communicators and collaborators](#)
- [Innovative, creative and entrepreneurial](#)
- [Socially responsible and engaged in their communities](#)
- [Culturally capable when working with First Australians](#)
- [Effective in culturally diverse and international environments](#)

This table demonstrates where each of the Griffith Graduate Attributes is taught, practised and assessed in this course.

University wide attributes

GRADUATE ATTRIBUTE	TAUGHT	PRACTISED	ASSESSED
Knowledgeable and skilled, with critical judgement	•	•	•
Effective communicators and collaborators	•	•	•
Innovative, creative and entrepreneurial	•	•	•
Socially responsible and engaged in their communities			
Culturally capable when working with First Australians			
Effective in culturally diverse and international environments			