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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	1015SCG
COURSE TITLE	Quantitative Reasoning
ACADEMIC ORGANISATION	ESC School of Environment and Science
TRIMESTER	Trimester 3 2024
MODE	Mixed Mode
LEVEL	Undergraduate
LOCATION	Gold Coast, On Campus
CREDIT POINT VALUE	10

Course Description:

Mathematics underpins and informs all scientific fields and is the language of science. Quantitative Reasoning is a mathematics course with a difference. Students will learn how to translate scientific problems into mathematical form, and how to understand and interpret mathematical and numerical results. With modern software, they will use case studies to learn how to apply mathematical concepts, from basics up to simple calculus, to real-world scientific problems. Incompatible: 1013SCG Applied Mathematics

Assumed Background:

1015SCG Quantitative Reasoning is a core first year course in the Bachelor of Environmental Science, Bachelor of Data Science and some majors in the Bachelor of Science, and therefore must be completed regardless of the level of high school maths you have obtained. 1015SCG is NOT an equivalent course to Year 11/12 Mathematical Methods (QLD Maths B) and cannot be used as a pathway into a program requiring a Year 11/12 Mathematical Methods (QLD Maths B) equivalent course.

There are no prerequisites for 1015SCG Quantitative Reasoning, but we assume competency in mathematical calculations (such as algebra) to a senior school mathematics level, i.e. General Mathematics (QLD Maths A) or greater. Students who do not feel they have this background should take Foundations Mathematics 1017SCG before taking this course.

1.2 Course Introduction

Quantitative Reasoning is a mathematics course with a difference. This course will move away from the usual content-driven mathematics course to a course that explores how mathematics is used within the sciences. Students will gain skills on how to pose mathematical questions (including by developing simple mathematical models) about a variety of real-world phenomena. This course will also position mathematics as a human endeavour, and examine how quantitative arguments can be constructed and critiqued.

Computers are essential tools in mathematics, which have facilitated many recent discoveries in science and mathematics. In this course we focus less on the mechanics of solving quantitative problems, deferring to computational tools, and focus more on how to set up problems that can be solved by these computational tools, how to interpret those solutions, and how to communicate and critique them effectively. These skills will be the focus of the workshops and assessment in this course.

This course is designed for a diverse range of learners and does not require prerequisite knowledge in mathematics beyond the typical middle school curriculum (i.e. maths up to around year 10).

Previous Student Feedback

The course ran in its current form for the first time in T1 2020, with a number of significant change to content, assessment tasks and learning outcomes. A number of further changes have been made on the basis of feedback since then. A more thorough set of notes has been developed. The structure of the assessment has been simplified, which also allows for students to obtain more useful feedback on their assessment tasks through the course. It has also made it possible to re-order the content to improve the natural progression of ideas through the course.

Students appreciated the workshops and enjoyed the use of Microsoft Teams so that questions could be easily answered and you could see the answers from other students too. Many students, including those who find mathematics more challenging, found

the regular quizzes helped them understand what they needed to know. Students also enjoyed the report tasks, as we could interact with other students and see their point of view on particular matters of real-world interest.

1.3 Course Staff

Convenor **Dr Agnieszka Gorecka**

EMAIL	a.gorecka@griffith.edu.au
CAMPUS	Gold Coast Campus

Convenor **Miss Michelle Ward**

EMAIL	michelle.ward@griffith.edu.au
CAMPUS	Nathan Campus

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

Details contained in this section of the course profile and in section 4.1 Learning Activities are to be read in conjunction with the official class timetable.

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.

1.6 Technical Specifications

Students will be using Excel during the workshops. A device with working Excel and a basic Excel skills are required.

2. Aims, Outcomes & Graduate Attributes

2.1 Course Aims

Quantitative Reasoning introduces students to the role of mathematical and statistical (quantitative) arguments in the scientific method. We examine how quantitative arguments arise in science, how to construct and critique scientific arguments, how to pose quantitative scientific problems, and computational tools to help solve such problems. Our focus is less on the mechanics of solving mathematical problems (which in practice can often be done by computer) and more on the bigger picture of when and how quantitative methods should be used to shed light on important scientific questions.

Note that this course is NOT equivalent to Mathematical Methods (QLD Maths B) in Year 11/12 and is designed for students who wish to learn the essentials in mathematics required in the sciences.

2.2 Learning Outcomes

After successfully completing this course you should be able to:

- 1 Relate the use of mathematics to your own scientific studies and interests
- 2 Use computational tools to perform mathematical calculations.
- 3 Communicate scientific arguments effectively in writing
- 4 Construct and critique quantitative scientific arguments
- 5 Construct suitable mathematical models of real-world phenomena
- 6 Solve problems related to mathematical models of real-world phenomena, in order to better understand those phenomena

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	•	•	•

3. Learning Resources

3.1 Required Resources

Details of your Required Learning Resources are available from the [Reading List](#).

3.2 Recommended Resources

Details of your Recommended Learning Resources are available from the [Reading List](#).

3.3 University Learning Resources

The University provides many facilities and support services to assist students in their studies. Links to information about University support resources that are available to students include:

Readings: From the reading list, students can access Required and Recommended Learning Resources through direct links to articles, ebooks, databases, websites, the Library catalogue and digitised readings in one convenient place. Students can also prioritise their readings, add personal study notes, and export citations.

Learning@Griffith: There is a dedicated page for this course at myGriffith.

Student Support: Provides a range of services to support students throughout their studies including personal support such as Counselling and Health Services; Academic support; and Financial and Welfare support.

Careers and Employment: The team provides Career Wellbeing, Career Planning and Decision Making, Finding Jobs, Skills Identification and Development, Graduate Employment Information, LinkedIn Profile Review, Interview Preparation, Online Psychometric and Aptitude Test Preparation, International Student Support, Disability Disclosure Strategies and Higher Degree Research (HDR) Career Consultations.

Library: The Library provides a wide range of quality client-focused services and programs to students, researchers and staff of the University. The Library works in collaboration with the academic community to achieve academic and research outcomes.

Student Computing: The University provides access to common use computing facilities for educational purposes.

Griffith Information Technology Code of Practice - Provides guidance to all users of Griffith University Information Technology.

Academic Integrity Module: This module will help you to understand the principles around integrity and will set you up for success at University and in the workplace. It will take approximately 15 minutes to complete. It is strongly encouraged that you complete it by the end of the first trimester of study.

Academic integrity student tutorial: This tutorial helps you understand more about academic integrity and why it is important. You will learn about the types of academic misconduct and the University's policies.

Academic Integrity Declaration

Breaches of academic integrity seriously compromise student learning, as well as the academic quality of the University's programs. All breaches of academic integrity are taken seriously.

By enrolling in this course and submitting assessment, I agree that:

- I have read the [Student Academic Integrity Policy](#) and the [Student Breaches of Academic Integrity Procedure](#).
- Except where indicated through references/citations, all assessment submitted will be my own work, based on my personal study and/or research.
- I will not collude with another student or person in the production of assessment in this course unless group work and collaboration is an expectation of the assessment item.
- No assessment item has been submitted for assessment in any other course at Griffith, or at any other University or at any other time in the same course without the permission of the relevant Course Convenor.
- I will not copy in part or in whole or otherwise plagiarise the work of other students and/or other persons.
- I will not make any of my assessment in this course available to another student, without the permission of the Course Convenor.
- In the case of online quizzes and examinations, I will only access the materials permitted in the exam instructions and limit my internet usage to what is needed to take the exam.

I accept that should I be found to be in breach of the non-disclosure provision identified above, action will be taken under the [Student Academic Integrity Policy](#). Penalties may include failing the course or exclusion from the University.

I also **acknowledge** and agree that the course convenor may:

- Give access to assessment to another Griffith staff member for the purpose of marking.
- Submit assessment items to a text-matching service. This web-based service will retain a copy of any assessment item for

checking the work of other students but will not reproduce it in any form.

- Use assessment items for the purposes of moderation, or as exemplars, according to University policies.

3.5 Other Learning Resources & Information

There is currently no reading list for this course.

A set of lecture notes covering the course will be provided for download from the Learning@Griffith course site.

R and RStudio (free computer packages) and Wolfram Alpha (free web based application) may be used throughout the course. Details will be provided as needed during the course.

4. Teaching & Learning Activities

4.1 Learning Activities

Week Commencing	Activity	Learning Outcomes
4 Nov 24	Why quantitative reasoning? (Wk 1) (Lecture Series): We'll spend this week introducing the course, and exploring the role of maths and stats in science, the scientific method and your own chosen field	1
11 Nov 24	Workshops (Weeks 2,4,6,8,10,12) (Workshop): During fortnightly workshops, students will be able to consolidate their understanding of the course content through planned activities, as well as having the opportunity to work toward completing assessment tasks.	1, 2, 3, 4, 5, 6
11 Nov 24	Data and Functions (Wk 2-3) (Lecture Series): Where does numerical data come from, and how do we describe it? We'll take a look at numbers, measurement, scientific notation, orders of magnitude, and units. We'll also consider the idea of a functions, and look at examples of important functions you should know, and their key uses.	1, 2, 5
25 Nov 24	Statistical Inference (Wk 4-5) (Lecture Series): How do we connect real-world data with our theoretical hypotheses? We'll look at errors in data, drawing connections between sets of data, and how we infer whether our data support our theory (or not).	1, 2, 4, 5, 6
9 Dec 24	Case studies + Critical Thinking (Wk 6-7) (Lecture Series): We'll look at a number of examples of Quantitative Reasoning in practice, and reflect on the Critical Thinking skills needed.	1, 2, 5, 6
6 Jan 25	Case studies + Science Communication (Wk 8-10) (Lecture Series): We'll look at a number of examples of Quantitative Reasoning in practice, and consider how to present results as effectively as possible, in a scientific context. This includes how to structure a scientific argument, the language we use in scientific reports, and how best to present scientific data in graphs and tables.	3, 4, 5, 6
20 Jan 25	Case Studies + Data Science (Wk 11-12) (Lecture Series): We'll explore some final examples of Quantitative Reasoning in practice, and look at data science as a modern method of extracting meaning from (often very large) sets of data.	1, 2, 4, 6

4.2 Other Teaching and Learning Activities Information

Public holidays T3 2024:

Student Vacation break - 23 Dec 2024 to 3 Jan 2025.

25 December 2024 - Christmas Day

26 December 2024 - Boxing Day

1 January 2025 - New Year's Day

27 January 2025 - Australia Day

Deeming days: There are no Deeming Days

If a class is usually scheduled on a day that falls on a public holiday or is cancelled for any reason, the content will be delivered online or integrated across other classes, as appropriate. (Alternatively, you can include advice specific to re-scheduling of your labs, etc.)

Students Repeating a Course: Normally, students repeating a course should not 'carry forward' marks from a previous attempt. Assessment items are usually offered to provide formative experience as well as a summative assessment. Therefore, NO MARK for any assessment item from a previous attempt will be carried forward.

Disability or Health Condition: If a student has a disability or health condition that may require reasonable adjustments to undertake any of the learning activities in this course, or may require individualised Workplace Health and Safety arrangements to support their safe participation in learning activities (such as laboratory activities), the convenor requires notification by email, by no later than Week 1 of the trimester, to ensure appropriate accommodations can be arranged to support students' safe participation in these activities. It is recommended that students with a disability also register with [Student Disability and Accessibility](#). At Griffith University, we seek to remove barriers that students with disabilities may face in higher education,

including access to learning environments.

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> Workshop tasks	11 Nov 24 - 7 Feb 25	25%	25 marks	2, 3, 4, 6	
<i>Log of Learning Activities</i> Employability Task Part A	22 Nov 24 17:00	5%	50 marks	1	
<i>Assignment - Problem Solving</i> Assignment Maths and inference assignment	20 Dec 24 17:00	30%	100 marks	2, 3, 5, 6	
<i>Log of Learning Activities</i> Employability Task Part B	17 Jan 25 17:00	5%	50 marks	1	
<i>Assignment - Written</i> Assignment Scientific Critique	31 Jan 25 17:00	35%	100 marks	2, 3, 4, 5, 6	

5.2 Assessment Detail

Title: Workshop tasks

Type: Log of Learning Activities

Learning Outcomes Assessed: 2, 3, 4, 6

Due Date:

11 Nov 24 - 7 Feb 25

Weight: 25%

Marked out of: 25

Task Description:

Workshop assessment will be held during the workshops. Students will be given tasks to finish during the workshops, the marks will be given based on the student's engagement, participation and the completion of the workshop problems.

Criteria & Marking:

The feedback will be provided within 2 weeks of submission (before the next workshop).

The marks will be given based on the student's engagement, participation and the completion of the workshop problems.

Re-attempt:

The 5 best workshop marks out of 6 will be taken. Students who miss the workshop can still get marks if they submit a deferred assessment application AND show the work to the demonstrator at the next workshop.

Submission: In Person at the School Department.

This assessment item:

- is a school based activity
- is an individual activity
- does not include a self assessment activity
- may be available for re-assessment (see conditions outlined under Re-attempt above)

Title: Employability Task Part A

Type: Log of Learning Activities

Learning Outcomes Assessed: 1

Due Date:

22 Nov 24 17:00

Weight: 5%

Marked out of: 50

Task Description:

Students will produce a reflection on their career ambitions, and the relevance of mathematics to those ambitions. Further details will be provided at the start of the course

Criteria & Marking:

Assessment criteria will be provided in the PebblePad workbook where students will submit their work. Feedback will be provided within two weeks of submission, within PebblePad.

Submission: via PebblePad

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: Maths and inference assignment

Type: Assignment - Problem Solving Assignment

Learning Outcomes Assessed: 2, 3, 5, 6

Due Date:

20 Dec 24 17:00

Weight: 30%

Marked out of: 100

Task Description:

This assignment will assess students' understanding of performing mathematical calculations and using statistical inference to interpret data. The range of problems that could be given in the assignment will correspond to those covered in the first five weeks of the course.

Criteria & Marking:

Students will be provided with a distribution of marks for each part of each question (as per standard practice in mathematics assignments based on performing mathematical exercises). Students will receive detailed feedback on their submission within two weeks of submission via L@G.

Submission: Via the 'Assignments' tool in Learning@Griffith.

This assessment item:

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

Title: Employability Task Part B

Type: Log of Learning Activities

Learning Outcomes Assessed: 1

Due Date:

17 Jan 25 17:00

Weight: 5%

Marked out of: 50

Task Description:

Students will produce artefacts based on the work they have completed through the course, and reflect on the relevance of knowledge and skills they have developed in the course to their career ambitions

Criteria & Marking:

Assessment criteria will be provided in the PebblePad workbook where students will submit their work. Feedback will be provided within two weeks of submission, within PebblePad.

Submission: Other. via PebblePad

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: Scientific Critique

Type: Assignment - Written Assignment

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

Due Date:

31 Jan 25 17:00

Weight: 35%

Marked out of: 100

Task Description:

This assignment will assess students' ability to apply Quantitative Reasoning to a problem of their own choosing, and to report their deliberations in an effective manner.

Criteria & Marking:

Students will be provided with a detailed rubric, and further information, in order to understand what is expected of them in this assessment task. This rubric will be used to mark their work. Students will receive detailed feedback on their submission within two weeks of submission via L@G.

Submission: Via the 'Assignments' tool in Learning@Griffith.

This assessment item:

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

5.3 Late Submission

For all courses (other than Honours Dissertation Courses): Refer to the [Assessment Procedure for Students](#).

For all Honours Dissertation courses: Enrolment in an Honours degree shall be cancelled and the candidature terminated if the candidate fails to lodge their Honours dissertation by the prescribed date including any approved extensions.

5.4 Other Assessment Information

Supplementary Assessment is available in this course.

Supplementary assessment may be awarded if you have submitted all the assessment requirements of the course, and you have received a grade of 3 or have achieved an overall percentage equivalent to the grade of 3 or higher, but you have not achieved a pass or the required minimum mark in one or more mandatory pass components of the course.

You are allowed one attempt at a supplementary assessment item per course per trimester. If you gain a pass mark for your supplementary assessment item, you will be awarded a grade of 4.

Where you do not achieve a pass mark for the supplementary assessment item, the original grade of 3 for the course will remain, except for courses using the Medical School grading basis where a non-graded fail (NGF) is awarded.

Please see the [Assessment Procedure for Students](#) for more information.

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).

Other Information

At Griffith University, our core values include honesty, trust, fairness, respect and responsibility. These core values are particularly applied to Academic Integrity in this course. The expectation is that all assessment work that you submit is your own work. Students can use generative AI to explore ideas, get suggestions for argument structures to build on and develop literacy skills. Students cannot use generative AI for generating assessment items and presenting them as your own work. You must quote, reference, or cite your use of AI in assessment items in this course.

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 policies can be found in the [Griffith Policy Library](#).

Specific assessment policies include:

- [Assessment Policy](#)
- [Assessment Procedure for Students](#)

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](#). Links to key policy documents, in addition to those listed in 6.1 above, are included below for easy reference:

- [Student Lifecycle Communications Policy](#)
- [Student Conduct Safety and Wellbeing](#)
- [Enrolment Policy](#)
- [Student Charter Framework](#)
- [Student Review and Appeals Policy](#)
- [Student Review and Appeals Procedure](#)
- [Student Complaints Policy](#)
- [Students with Disabilities Policy](#)

Other Course Guidelines

The course does not have practical work, i.e. labs, and so Health & Safety Assessment is NOT required.

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 Relate the use of mathematics to your own scientific studies and interests
- 2 Use computational tools to perform mathematical calculations.
- 3 Communicate scientific arguments effectively in writing
- 4 Construct and critique quantitative scientific arguments
- 5 Construct suitable mathematical models of real-world phenomena
- 6 Solve problems related to mathematical models of real-world phenomena, in order to better understand those phenomena

Assessment & Learning Activities

LEARNING ACTIVITIES	LEARNING OUTCOMES					
	1	2	3	4	5	6
Why quantitative reasoning? (Wk 1) (Lecture Series)	●					
Data and Functions (Wk 2-3) (Lecture Series)	●	●			●	
Workshops (Weeks 2,4,6,8,10,12) (Workshop)	●	●	●	●	●	●
Statistical Inference (Wk 4-5) (Lecture Series)	●	●		●	●	●
Case studies + Critical Thinking (Wk 6-7) (Lecture Series)	●	●			●	●
Case studies + Science Communication (Wk 8-10) (Lecture Series)			●	●	●	●
Case Studies + Data Science (Wk 11-12) (Lecture Series)	●	●		●		●
ASSESSMENT TASKS						
Workshop tasks		●	●	●		●
Employability Task Part A	●					
Maths and inference assignment		●	●		●	●
Employability Task Part B	●					
Scientific Critique		●	●	●	●	●

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			