UTS Subject Information

35007 Real Analysis

Delivery:	Spring Session 2026
Total Workload Hours:	150 hours
Credit Points:	6
Result Type:	Grade and marks

Subject Description

Real Analysis rigorously establishes calculus foundations, starting with real numbers and the least upper bound principle, progressing through limits, continuity, derivatives, and their applications, including Taylor series. After becoming well-versed in these fundamental topics, you will learn more advanced topics such as Riemann sums, Riemann integration, uniform convergence and convergence of Riemann integrals. You will also be taught rigorous real analysis definitions of important mathematical functions. A key aim is to teach you how to construct and present precise and rigorous mathematical proofs.

Subject Learning Outcomes (SLOs)

1. Develop skills in constructing rigorous mathematical arguments and presenting them using clear language and mathematical notation.
2. Be able to understand the proofs of the major results in the topic of real analysis.
3. Develop the ability to prove mathematical results that the student has not previously seen.
4. Apply the skills learnt to solve problems in areas where mathematical analysis is used.
5. Develop skills concerning the use of computer coding and computing to understand, check and validate mathematical results.

Teaching and Learning Strategies

Interactive workshops and tutorials on campus. The material will be developed with the students in interactive workshops. Students will have several exercise sheets on which they will work through outside of class. In the tutorials students will be expected to work with their peers on particular questions from the subject's exercise sheets and may be asked to present them to the class on a whiteboard. All exercise sheet solutions will be made available at later dates. A key skill in mathematics is the ability to communicate with one's peers in clear mathematical language. Constructing a proof is one of the most challenging aspets of mathematics. There are however various proof strategies and the students will be shown several of these. Students will see how mathematicians formulate theorems and write proofs, with each step laid out clearly and precisely. Each part of a proof must follow logically from the previous parts. Students will

have a chance to write their own proofs in the various assessment tasks. They will be required to set them out in a clear logical order with every part of the proof fully justified. This is the essence of communication in mathematics. They will receive feedback on their work in assessment tasks 1 and 2, which are returned to the students after marking with helpful comments, as well as in the tutorials. This will help them to see how their work can be improved. They will also, eventually, be given worked solutions to the exercise sheets so that they can compare their own work and privately reflect on how they can improve.

Content (Topics)

The fundamental principles of real analysis. The least upper bound axiom. Sequences and series. Limits including epsilon-delta proofs. Continuous functions and their properties. Differentiation. Maxima and minima. Riemann integration. Sequences and series for functions. Taylor series. Rigorous real analysis definitions of key functions such as natural logarithm and sine. Integration methods.

Required and Recommended Texts

All required and recommended texts for this subject are contained in the Reading List which you can access from the Canvas site menu.

Other Required Resources

If you have concerns about affording the course-related costs for this subject, UTS Financial Assistance can help you plan ahead or apply for grants or interest-free loans.

Minimum Requirements

Students must obtain a mark of 50 or higher to pass the subject.

Attendance Requirements

2 hours per week of lectures; 2 hours per week of tutorials.

Assessment task 1: Progress check-in

Description:

PART 1 OF ASSESSMENT NUMBER 1
During Week 3 class there will be a one hour in-class quiz on the material covered during Week 1 and Week 2. The quiz will be graded and returned to the students during the Week 4 class. This early progress check-in will allow the students to gauge their progress prior to the census date. Part 1 of Assessment number 1 is worth 20% of the total assessment for 35007 Real Analysis.
PART 2 OF ASSESSMENT NUMBER 1
During the Week 8 class there will be a one hour in-class quiz on the material covered during Weeks 3 to Week 7 inclusive. The quiz will be graded and returned to the students during the Week 9 class. This progress check-in will allow the students to gauge their progress at around the two-thirds mark of the subject them and help them decide if and how much their level of dedication should change prior to the

final examination. Part 2 of Assessment number 1 is worth 20% of the total assessment for 35007 Real Analysis.
PART 3 OF ASSESSMENT NUMBER 1
During the Week 10 coass there will a one hour in-class computer laboratory. This computer laboratory will teach the students about how coding and computing can aid learning real analysis concepts and solve relevant problems. Computer graphics examples will be used to reinforce earlier topics. Both during the laboratory and, possibly, the following week the students will be required to carry out some of their own coding and computational tasks according to specific problems and submit their solutions for grading with one week of the computing laboratory. The results will be made available to the students during the Week 12 class. Part 3 of Assessment number 1 is worth 10% of the total assessment for 35007 Real Analysis.

Learning Outcomes:

- SLO1 Develop skills in constructing rigorous mathematical arguments and presenting them using clear language and mathematical notation.
- SLO4 Apply the skills learnt to solve problems in areas where mathematical analysis is used.
- SLO5 Develop skills concerning the use of computer coding and computing to understand, check and validate mathematical results.

Type: Quiz

Groupwork: Individual

Weight: 50%

Length: There are three parts to Assessment 1 and considerable effort will be required to complete the tasks satisfactorily.

Feedback: Each quiz and computer laboratory will be graded with feedback given.

Assessment Criteria:

Criteria	Weighting	Linked SLOs
Capacity to construct an argument.	15%	
Correctness of a proof.	15%	
Clarity of written answers.	15%	• SLO1 Develop skills in constructing rigorous mathematical arguments and presenting them using clear language and mathematical notation.
Demonstration of understanding.	15%	• SLO2 Be able to understand the proofs of the major results in the topic of real analysis. • SLO3 Develop the ability to prove mathematical results that the student has not previously seen.

Validity of solutions.	25%	• SLO2 Be able to understand the proofs of the major results in the topic of real analysis. • SLO4 Apply the skills learnt to solve problems in areas where mathematical analysis is used.
Ability to write correct computer code.	15%	• SLO5 Develop skills concerning the use of computer coding and computing to understand, check and validate mathematical results.

Assessment task 2: Assignment

Description: To provide formative assessment of your progress in understanding real analysis.
The student will answer four questions. The student will be expected to give a correct proof of a mathematical result that they have not seen before. Answers should take no more than half a page of calculations. Students will also be asked to decide if a statement is true or false and give accurate reasons for their answer. The final question will require students to prove some basic facts, which must then be put together to prove a more substantial result. This reflects the way that research in mathematics is conducted, where simpler pieces are often put together to produce major results.

Learning Outcomes:

- SLO1 Develop skills in constructing rigorous mathematical arguments and presenting them using clear language and mathematical notation.
- SLO2 Be able to understand the proofs of the major results in the topic of real analysis.
- SLO3 Develop the ability to prove mathematical results that the student has not previously seen.
- SLO4 Apply the skills learnt to solve problems in areas where mathematical analysis is used.

Type: Written submission

Groupwork: Individual

Weight: 20%

Length: The assignment will have a two-weeks time horizon.

Feedback: Each student's assignment will be graded and feedback provided.

Assessment Criteria:

Criteria	Weighting	Linked SLOs
Correctness of an argument.	20%	
Clarity of answer.	20%	
Depth of understanding.	20%	
Correctness of proof of previously unseen statement.	20%	
Accuracy of solution.	20%	• SLO1 Develop skills in constructing rigorous mathematical arguments and presenting them using clear language and mathematical notation.

Assessment task 3: Final Examination

Description: This assessment task will test overall competency with the subject's content and concepts.
This is the final examination. It will assess all aspects of the subject except that involving computer code. It will consist of five questions. The subject notes, possibly with annotations from the students, will be allowed.
The student will have to demonstrate their ability to construct elementary proofs and perform standard types of results derivations that arise in real analysis.

Learning Outcomes:

- SLO1 Develop skills in constructing rigorous mathematical arguments and presenting them using clear language and mathematical notation.
- SLO2 Be able to understand the proofs of the major results in the topic of real analysis.
- SLO3 Develop the ability to prove mathematical results that the student has not previously seen.
- SLO4 Apply the skills learnt to solve problems in areas where mathematical analysis is used.

Type: Final exam

Groupwork: Individual

Weight: 30%

Length: The final examinaton will be one and half hours. A substantial amount of effort will be required to adequately prepare for the final examination.

Assessment Criteria:

Criteria	Weighting	Linked SLOs
Correctness of an argument.	20%	

Clarity of answer.	20%
Depth of understanding.	20%
Correctness of proof of previously unseen statement.	20%
Accuracy of solution.	20%

Academic Integrity

Academic integrity is about demonstrating honesty, trust, fairness, respect, responsibility and courage in your studies and assessments. Studying at UTS and being part of our community means maintaining these values and acting with academic integrity at all times. Find out everything you need to know about academic integrity at UTS.

Assessment Procedures

All staff and students involved in the assessment of coursework subjects at UTS are subject to the Coursework Assessments Policy. The policy applies to the assessment of all coursework subjects. This policy does not apply to thesis subjects that are taken by students enrolled in research degrees but does apply to any coursework subjects undertaken by research degree students. It does not describe policy that relates to academic progression through a course of study. The policy should be read with the Coursework Assessments Procedure and the Student Rules.

Information last updated 23 July 2026.