



MATH288

Advanced Topics in Mathematics II

S1 Day 2015

Dept of Mathematics

Contents

<u>General Information</u>	2
<u>Learning Outcomes</u>	2
<u>Assessment Tasks</u>	3
<u>Delivery and Resources</u>	4
<u>Unit Schedule</u>	5
<u>Policies and Procedures</u>	5
<u>Graduate Capabilities</u>	7
<u>Extra Requirements</u>	11

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General Information

Unit convenor and teaching staff

Lecturer

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Unit convenor

Xuan Duong

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Credit points

3

Prerequisites

(MATH133 or MATH136(HD)) and permission of Executive Dean of Faculty

Corequisites

Co-badged status

Unit description

This unit is designed for students enrolled in the Bachelor of Advanced Science in Mathematics, and for strong Mathematics majors seeking to widen their mathematical background. Topics are chosen from accessible areas of current research to excite and challenge talented students.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at <https://www.mq.edu.au/study/calendar-of-dates>

Learning Outcomes

On successful completion of this unit, you will be able to:

demonstrate a well-developed knowledge of the principles, concepts and techniques of the topics covered.

construct sustained logical, clearly presented and justified mathematical arguments incorporating deductive reasoning, in the areas of the topics covered.

apply mathematical principles, concepts, techniques and technology efficiently to solve practical and abstract problems across a range of areas in the topics covered.

Assessment Tasks

Name	Weighting	Due
<u>Four assignments</u>	10%	As advised in lectures
<u>Four assignments</u>	10%	as per unit website
<u>Class test</u>	20%	Week 11
<u>Final examination</u>	60%	Exam period

Four assignments

Due: **As advised in lectures**

Weighting: **10%**

Four assignments on Lebesgue integration.

On successful completion you will be able to:

- demonstrate a well-developed knowledge of the principles, concepts and techniques of the topics covered.
- construct sustained logical, clearly presented and justified mathematical arguments incorporating deductive reasoning, in the areas of the topics covered.
- apply mathematical principles, concepts, techniques and technology efficiently to solve practical and abstract problems across a range of areas in the topics covered.

Four assignments

Due: **as per unit website**

Weighting: **10%**

Four assignments on Computational Mathematics.

On successful completion you will be able to:

- demonstrate a well-developed knowledge of the principles, concepts and techniques of the topics covered.
- construct sustained logical, clearly presented and justified mathematical arguments incorporating deductive reasoning, in the areas of the topics covered.
- apply mathematical principles, concepts, techniques and technology efficiently to solve practical and abstract problems across a range of areas in the topics covered.

Class test

Due: **Week 11**

Weighting: **20%**

Class test conducted in lecture.

On successful completion you will be able to:

- demonstrate a well-developed knowledge of the principles, concepts and techniques of the topics covered.
- construct sustained logical, clearly presented and justified mathematical arguments incorporating deductive reasoning, in the areas of the topics covered.
- apply mathematical principles, concepts, techniques and technology efficiently to solve practical and abstract problems across a range of areas in the topics covered.

Final examination

Due: **Exam period**

Weighting: **60%**

Final examination.

On successful completion you will be able to:

- demonstrate a well-developed knowledge of the principles, concepts and techniques of the topics covered.
- construct sustained logical, clearly presented and justified mathematical arguments incorporating deductive reasoning, in the areas of the topics covered.
- apply mathematical principles, concepts, techniques and technology efficiently to solve practical and abstract problems across a range of areas in the topics covered.

Delivery and Resources

Classes

Lectures: you should attend each two-hour block in each lecture stream each week, making a total of four hours.

Technology Used and Required

Students are expected to have access to an internet enabled computer with a web browser and Adobe Reader software. Accounts are available for all students in the Mathematics/Physics computing laboratory (E7B 209) — this will be the location of laboratory sessions and some lectures. Students are expected to work here on assignments and other assessment tasks.

Difficulties with your home computer or internet connection do not constitute a reasonable excuse for lateness of, or failure to submit, assessment tasks.

Unit Schedule

WEEK	BEGINNING	TOPOLOGY, COVERINGS	Diophantine Analysis
1	03/03/2014	Metric spaces	Diophantine analysis
2	10/03/2014	Topological spaces	
3	17/03/2014	Compact spaces	
4	24/03/2014	Groups and actions	
5	31/03/2014	Topological groups	
6	07/04/2014	Coverings	
		Mid-semester break	
7	28/04/2014	Homotopy type	
8	05/05/2014	Fundamental group	
9	12/05/2014	Fundamental group	
10	19/05/2014	Classification of coverings	
11	26/05/2014	Galois correspondence	
12	02/06/2014	Applications	
13	09/06/2014	Revision	

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central](#). Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy http://mq.edu.au/policy/docs/academic_honesty/policy.html

Assessment Policy <http://mq.edu.au/policy/docs/assessment/policy.html>

Grading Policy <http://mq.edu.au/policy/docs/grading/policy.html>

Grade Appeal Policy <http://mq.edu.au/policy/docs/gradeappeal/policy.html>

Grievance Management Policy http://mq.edu.au/policy/docs/grievance_management/policy.html

Disruption to Studies Policy http://www.mq.edu.au/policy/docs/disruption_studies/policy.html *The Disruption to Studies Policy is effective from March 3 2014 and replaces the Special Consideration Policy.*

In addition, a number of other policies can be found in the [Learning and Teaching Category](#) of Policy Central.

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/support/student_conduct/

Results

Results shown in *iLearn*, or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in [eStudent](#). For more information visit <ask.mq.edu.au>.

Student Support

Macquarie University provides a range of support services for students. For details, visit <http://students.mq.edu.au/support/>

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to improve your marks and take control of your study.

- [Workshops](#)
- [StudyWise](#)
- [Academic Integrity Module for Students](#)
- [Ask a Learning Adviser](#)

Student Services and Support

Students with a disability are encouraged to contact the [Disability Service](#) who can provide appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at <ask.mq.edu.au>

IT Help

For help with University computer systems and technology, visit <http://informatics.mq.edu.au/help/>.

When using the University's IT, you must adhere to the [Acceptable Use Policy](#). The policy

applies to all who connect to the MQ network including students.

Graduate Capabilities

Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

Learning outcomes

- demonstrate a well-developed knowledge of the principles, concepts and techniques of the topics covered.
- construct sustained logical, clearly presented and justified mathematical arguments incorporating deductive reasoning, in the areas of the topics covered.
- apply mathematical principles, concepts, techniques and technology efficiently to solve practical and abstract problems across a range of areas in the topics covered.

Assessment tasks

- Class test
- Final examination

Capable of Professional and Personal Judgement and Initiative

We want our graduates to have emotional intelligence and sound interpersonal skills and to demonstrate discernment and common sense in their professional and personal judgement. They will exercise initiative as needed. They will be capable of risk assessment, and be able to handle ambiguity and complexity, enabling them to be adaptable in diverse and changing environments.

This graduate capability is supported by:

Learning outcomes

- demonstrate a well-developed knowledge of the principles, concepts and techniques of the topics covered.
- construct sustained logical, clearly presented and justified mathematical arguments incorporating deductive reasoning, in the areas of the topics covered.
- apply mathematical principles, concepts, techniques and technology efficiently to solve practical and abstract problems across a range of areas in the topics covered.

Assessment tasks

- Four assignments

- Four assignments
- Class test
- Final examination

Commitment to Continuous Learning

Our graduates will have enquiring minds and a literate curiosity which will lead them to pursue knowledge for its own sake. They will continue to pursue learning in their careers and as they participate in the world. They will be capable of reflecting on their experiences and relationships with others and the environment, learning from them, and growing - personally, professionally and socially.

This graduate capability is supported by:

Learning outcomes

- demonstrate a well-developed knowledge of the principles, concepts and techniques of the topics covered.
- construct sustained logical, clearly presented and justified mathematical arguments incorporating deductive reasoning, in the areas of the topics covered.
- apply mathematical principles, concepts, techniques and technology efficiently to solve practical and abstract problems across a range of areas in the topics covered.

Assessment tasks

- Four assignments
- Four assignments
- Class test
- Final examination

Discipline Specific Knowledge and Skills

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

Learning outcomes

- demonstrate a well-developed knowledge of the principles, concepts and techniques of the topics covered.
- construct sustained logical, clearly presented and justified mathematical arguments

incorporating deductive reasoning, in the areas of the topics covered.

- apply mathematical principles, concepts, techniques and technology efficiently to solve practical and abstract problems across a range of areas in the topics covered.

Assessment tasks

- Four assignments
- Four assignments
- Class test
- Final examination

Critical, Analytical and Integrative Thinking

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

Learning outcomes

- demonstrate a well-developed knowledge of the principles, concepts and techniques of the topics covered.
- construct sustained logical, clearly presented and justified mathematical arguments incorporating deductive reasoning, in the areas of the topics covered.
- apply mathematical principles, concepts, techniques and technology efficiently to solve practical and abstract problems across a range of areas in the topics covered.

Assessment tasks

- Four assignments
- Four assignments
- Class test
- Final examination

Problem Solving and Research Capability

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

This graduate capability is supported by:

Learning outcomes

- demonstrate a well-developed knowledge of the principles, concepts and techniques of the topics covered.
- construct sustained logical, clearly presented and justified mathematical arguments incorporating deductive reasoning, in the areas of the topics covered.
- apply mathematical principles, concepts, techniques and technology efficiently to solve practical and abstract problems across a range of areas in the topics covered.

Assessment tasks

- Four assignments
- Four assignments
- Class test
- Final examination

Effective Communication

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:

Learning outcomes

- demonstrate a well-developed knowledge of the principles, concepts and techniques of the topics covered.
- construct sustained logical, clearly presented and justified mathematical arguments incorporating deductive reasoning, in the areas of the topics covered.
- apply mathematical principles, concepts, techniques and technology efficiently to solve practical and abstract problems across a range of areas in the topics covered.

Assessment tasks

- Four assignments
- Four assignments
- Class test
- Final examination

Engaged and Ethical Local and Global citizens

As local citizens our graduates will be aware of indigenous perspectives and of the nation's

historical context. They will be engaged with the challenges of contemporary society and with knowledge and ideas. We want our graduates to have respect for diversity, to be open-minded, sensitive to others and inclusive, and to be open to other cultures and perspectives: they should have a level of cultural literacy. Our graduates should be aware of disadvantage and social justice, and be willing to participate to help create a wiser and better society.

This graduate capability is supported by:

Learning outcomes

- demonstrate a well-developed knowledge of the principles, concepts and techniques of the topics covered.
- construct sustained logical, clearly presented and justified mathematical arguments incorporating deductive reasoning, in the areas of the topics covered.
- apply mathematical principles, concepts, techniques and technology efficiently to solve practical and abstract problems across a range of areas in the topics covered.

Assessment task

- Four assignments

Socially and Environmentally Active and Responsible

We want our graduates to be aware of and have respect for self and others; to be able to work with others as a leader and a team player; to have a sense of connectedness with others and country; and to have a sense of mutual obligation. Our graduates should be informed and active participants in moving society towards sustainability.

This graduate capability is supported by:

Learning outcome

- apply mathematical principles, concepts, techniques and technology efficiently to solve practical and abstract problems across a range of areas in the topics covered.

Assessment task

- Four assignments

Extra Requirements

Satisfactory performance on supervised assessment tasks, such as tests and the final exam, is necessary to pass this unit. If there is a significant difference between a student's marks on supervised assessment tasks and on unsupervised assessment tasks, the scaling of these tasks may be adjusted when determining the final grade, to reflect more appropriately that student's performance on supervised tasks.

There may be assignment questions directed specifically toward students enrolled in Math 388.

Also, students in 388 can expect to have their work judged against a higher standard than students in 288.