MATH703

Topology

S1 Day 2015

Dept of Mathematics

Contents

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General Information

Unit convenor and teaching staff Co Adam Sikora adam.sikora@mq.edu.au Contact via email
Credit points 4
Prerequisites Admission to MRes
Corequisites
Co-badged status
Unit description This unit provides an advanced introduction to the key areas of research interest in modern topology. Topology is the study of continuity. The definition of a topological space was conceived in order to say what it means for a function between such spaces to be continuous. There are several ways of defining topological structure and the proofs that these are equivalent abstract many concrete results about specific kinds of spaces. Different ways of expressing continuity are obtained. Sequences are not adequate for general topological spaces, they need to be replaced by nets or filters, and we discuss convergence of those. Particular properties of topological spaces are analysed in detail: these include separation properties, compactness, connectedness, countability conditions, local properties, metrizability, and so on. Applications to basic calculus are emphasised. We then introduce algebraic topology by discussing the Poincaré or fundamental group of a space.

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:

Understanding logical arguments and recognising any gaps or faults in such arguments.

Solving problems, including: formulating a precise mathematical question from a "real world" problem; identifying and applying appropriate mathematical techniques.

Expressing yourself clearly and logically in writing.

More broadly, you are expected to improve your generic skills in the following areas: literacy and numeracy, self-awareness and interpersonal skills, communications, critical analysis, problem solving and creative thinking.

Assessment Tasks

Name	Weighting	Due
Assignments	50%	TBA
Final Exam	30%	Examination period
Presentation	20%	TBA

Assignments

Due: **TBA**
Weighting: **50%**

Written solutions, generally involving both proof and calculation.

On successful completion you will be able to:

- Understanding logical arguments and recognising any gaps or faults in such arguments.
- Solving problems, including: formulating a precise mathematical question from a "real world" problem; identifying and applying appropriate mathematical techniques.
- Expressing yourself clearly and logically in writing.
- More broadly, you are expected to improve your generic skills in the following areas: literacy and numeracy, self-awareness and interpersonal skills, communications, critical analysis, problem solving and creative thinking.

Final Exam

Due: **Examination period**
Weighting: **30%**

Take-home exam based on the semester's work, to be conducted in department.

On successful completion you will be able to:

- Understanding logical arguments and recognising any gaps or faults in such arguments.
- Solving problems, including: formulating a precise mathematical question from a "real world" problem; identifying and applying appropriate mathematical techniques.
- Expressing yourself clearly and logically in writing.

- More broadly, you are expected to improve your generic skills in the following areas: literacy and numeracy, self-awareness and interpersonal skills, communications, critical analysis, problem solving and creative thinking.

Presentation

Due: **TBA**

Weighting: **20%**

Presentation of some parts of course material in a seminar form

On successful completion you will be able to:
- Understanding logical arguments and recognising any gaps or faults in such arguments.
- Solving problems, including: formulating a precise mathematical question from a "real world" problem; identifying and applying appropriate mathematical techniques.
- More broadly, you are expected to improve your generic skills in the following areas: literacy and numeracy, self-awareness and interpersonal skills, communications, critical analysis, problem solving and creative thinking.

Delivery and Resources

Classes

You should attend the two-hour lecture each week.

Required and recommended texts and/or materials

A taste of topology / Volker Runde. New York ; London : Springer, c2005

A Course in Point Set Topology / by John B. Conway. Springer International Publishing Springer, 2014

(available on-line from Macquarie library)

Technology used and required

You are expected to have access to an internet enabled computer with a web browser and pdf viewer. Assignments and the take home exam are to be submitted by email in pdf. There will be a shared DropBox folder from which the course materials -- assignments, exam and supplementary notes -- will be accessible. Several areas of the university provide wireless access for portable computers. There are computers for student use in the Library and in the Nu meracy Centre (C5A 255). **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

Weekly lecture: Wednesday 10am-12pm.

Learning and Teaching Activities

Lecture

2 hours per week

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

PG - Capable of Professional and Personal Judgment and Initiative

Our postgraduates will demonstrate a high standard of discernment and common sense in their professional and personal judgment. They will have the ability to make informed choices and decisions that reflect both the nature of their professional work and their personal perspectives.

This graduate capability is supported by:

Learning outcome

- Understanding logical arguments and recognising any gaps or faults in such arguments.

Assessment tasks

- Assignments
- Final Exam
- Presentation

PG - Discipline Knowledge and Skills

Our postgraduates will be able to demonstrate a significantly enhanced depth and breadth of knowledge, scholarly understanding, and specific subject content knowledge in their chosen fields.

This graduate capability is supported by:

Learning outcomes

- Understanding logical arguments and recognising any gaps or faults in such arguments.
- Solving problems, including: formulating a precise mathematical question from a "real

world" problem; identifying and applying appropriate mathematical techniques.

- Expressing yourself clearly and logically in writing.

- More broadly, you are expected to improve your generic skills in the following areas: literacy and numeracy, self-awareness and interpersonal skills, communications, critical analysis, problem solving and creative thinking.

Assessment tasks

- Assignments

- Final Exam

- Presentation

PG - Critical, Analytical and Integrative Thinking

Our postgraduates will be capable of utilising and reflecting on prior knowledge and experience, of applying higher level critical thinking skills, and of integrating and synthesising learning and knowledge from a range of sources and environments. A characteristic of this form of thinking is the generation of new, professionally oriented knowledge through personal or group-based critique of practice and theory.

This graduate capability is supported by:

Learning outcomes

- Understanding logical arguments and recognising any gaps or faults in such arguments.

- Solving problems, including: formulating a precise mathematical question from a "real world" problem; identifying and applying appropriate mathematical techniques.

- More broadly, you are expected to improve your generic skills in the following areas: literacy and numeracy, self-awareness and interpersonal skills, communications, critical analysis, problem solving and creative thinking.

Assessment tasks

- Assignments

- Final Exam

- Presentation

PG - Research and Problem Solving Capability

Our postgraduates will be capable of systematic enquiry; able to use research skills to create new knowledge that can be applied to real world issues, or contribute to a field of study or practice to enhance society. They will be capable of creative questioning, problem finding and problem solving.

This graduate capability is supported by:

Learning outcomes

- Understanding logical arguments and recognising any gaps or faults in such arguments.
- Solving problems, including: formulating a precise mathematical question from a "real world" problem; identifying and applying appropriate mathematical techniques.
- Expressing yourself clearly and logically in writing.
- More broadly, you are expected to improve your generic skills in the following areas: literacy and numeracy, self-awareness and interpersonal skills, communications, critical analysis, problem solving and creative thinking.

Assessment tasks

- Assignments
- Final Exam
- Presentation

PG - Effective Communication

Our postgraduates will be able to communicate effectively and convey their views to different social, cultural, and professional audiences. They will be able to use a variety of technologically supported media to communicate with empathy using a range of written, spoken or visual formats.

This graduate capability is supported by:

Learning outcomes

- Solving problems, including: formulating a precise mathematical question from a "real world" problem; identifying and applying appropriate mathematical techniques.
- Expressing yourself clearly and logically in writing.

Assessment tasks

- Assignments
- Final Exam
- Presentation

PG - Engaged and Responsible, Active and Ethical Citizens

Our postgraduates will be ethically aware and capable of confident transformative action in relation to their professional responsibilities and the wider community. They will have a sense of connectedness with others and country and have a sense of mutual obligation. They will be able to appreciate the impact of their professional roles for social justice and inclusion related to national and global issues

This graduate capability is supported by:

Learning outcomes

- Understanding logical arguments and recognising any gaps or faults in such arguments.
- Solving problems, including: formulating a precise mathematical question from a "real world" problem; identifying and applying appropriate mathematical techniques.
- Expressing yourself clearly and logically in writing.
- More broadly, you are expected to improve your generic skills in the following areas: literacy and numeracy, self-awareness and interpersonal skills, communications, critical analysis, problem solving and creative thinking.

Assessment tasks

- Assignments
- Final Exam