



# UNSW

## UNSW Course Outline

# MATH3531 Topology and Differential Geometry - 2024

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## General Course Information

**Course Code :** MATH3531

**Year :** 2024

**Term :** Term 3

**Teaching Period :** T3

**Is a multi-term course? :** No

**Faculty :** Faculty of Science

**Academic Unit :** School of Mathematics & Statistics

**Delivery Mode :** In Person

**Delivery Format :** Standard

**Delivery Location :** Kensington

**Campus :** Sydney

**Study Level :** Undergraduate

**Units of Credit :** 6

### Useful Links

[Handbook Class Timetable](#)

## Course Details & Outcomes

### Course Description

This major theme of this course is the study of properties of curves and surfaces that are preserved under changes: differentiable changes in differential geometry and continuous changes in topology. The differential geometry is treated as a continuation of vector calculus

studied in earlier courses.

We begin with the study of curves in the plane and analyse what it means to be curved rather than straight, and then cover curves in space and how they curve and twist. We progress to surfaces and how they bend both internally and externally and look at minimal surfaces and geodesics. We show why a map of the earth must be distorted in our study of Gauss' "Remarkable Theorem" and then cover the Gauss-Bonnet Theorem. In the last section, we cover the Euler characteristic and the platonic solids, Möbius bands and other surfaces and study the elementary combinatorial topology of surfaces. The course culminates in the complete classification of topological surfaces..

**Note:** Offered in even numbered years only.

## Course Aims

The principal aim is to develop a working knowledge of the geometry and topology of curves and surfaces.

## Course Learning Outcomes

Course Learning Outcomes
CLO1 : demonstrate an understanding of the differential geometry and topology of curves
CLO2 : demonstrate an understanding of the classical differential geometry of surfaces
CLO3 : provide a complete topological classification of a surface.

Course Learning Outcomes	Assessment Item
CLO1 : demonstrate an understanding of the differential geometry and topology of curves	<ul style="list-style-type: none"><li>• Mid session test</li><li>• Final Exam</li><li>• Assignment 1</li></ul>
CLO2 : demonstrate an understanding of the classical differential geometry of surfaces	<ul style="list-style-type: none"><li>• Assignment 2</li><li>• Final Exam</li></ul>
CLO3 : provide a complete topological classification of a surface.	<ul style="list-style-type: none"><li>• Final Exam</li></ul>

## Learning and Teaching Technologies

Moodle - Learning Management System

# Assessments

## Assessment Structure

Assessment Item	Weight	Relevant Dates
Mid session test	20%	Start Date: Not Applicable Due Date: Not Applicable
Final Exam	50%	Start Date: Not Applicable Due Date: Not Applicable
Assignment 2	15%	Start Date: 21/10/2024 09:00 AM Due Date: 08/11/2024 11:59 PM
Assignment 1	15%	Start Date: 23/09/2024 09:00 AM Due Date: 11/10/2024 11:59 PM

## Assessment Details

### Mid session test

#### Assessment Overview

Held in tutorial in week 4, covers the first third of the course. Test is returned with feedback and solution to students within one week.

Students with a mark below 60% will be offered an opportunity to resit, with the resit mark capped at 60%.

#### Course Learning Outcomes

- CLO1 : demonstrate an understanding of the differential geometry and topology of curves

#### Assessment Length

45 minutes

#### Assignment submission Turnitin type

Not Applicable

#### Generative AI Permission Level

No Assistance

This assessment is designed for you to complete without the use of any generative AI. You are not permitted to use any generative AI tools, software or service to search for or generate information or answers.

For more information on Generative AI and permitted use please see [here](#).

## Final Exam

### Assessment Overview

To cover the whole course but with an emphasis on the final two thirds of the course (differential geometry and topology of surfaces).

Students have the opportunity to view their scripts in line with School and University policy.

### Course Learning Outcomes

- CLO1 : demonstrate an understanding of the differential geometry and topology of curves
- CLO2 : demonstrate an understanding of the classical differential geometry of surfaces
- CLO3 : provide a complete topological classification of a surface.

### Assessment Length

2 hours

### Assignment submission Turnitin type

Not Applicable

### Generative AI Permission Level

No Assistance

This assessment is designed for you to complete without the use of any generative AI. You are not permitted to use any generative AI tools, software or service to search for or generate information or answers.

For more information on Generative AI and permitted use please see [here](#).

## Assignment 2

### Assessment Overview

due in week 9. Concentrates on the middle third of the course (differential geometry of surfaces).

Submitted and assessed with feedback on moodle within 10 working days.

### Course Learning Outcomes

- CLO2 : demonstrate an understanding of the classical differential geometry of surfaces

### Generative AI Permission Level

Simple Editing Assistance

In completing this assessment, you are permitted to use standard editing and referencing

functions in the software you use to complete your assessment. These functions are described below. You must not use any functions that generate or paraphrase passages of text or other media, whether based on your own work or not.

If your Convenor has concerns that your submission contains passages of AI-generated text or media, you may be asked to account for your work. If you are unable to satisfactorily demonstrate your understanding of your submission you may be referred to UNSW Conduct & Integrity Office for investigation for academic misconduct and possible penalties.

For more information on Generative AI and permitted use please see [here](#).

## Assignment 1

### Assessment Overview

due in week 5. Covers the first third of the course (differential geometry of curves).

Submitted and assessed with feedback on moodle within 10 working days.

### Course Learning Outcomes

- CLO1 : demonstrate an understanding of the differential geometry and topology of curves

### Generative AI Permission Level

#### Simple Editing Assistance

In completing this assessment, you are permitted to use standard editing and referencing functions in the software you use to complete your assessment. These functions are described below. You must not use any functions that generate or paraphrase passages of text or other media, whether based on your own work or not.

If your Convenor has concerns that your submission contains passages of AI-generated text or media, you may be asked to account for your work. If you are unable to satisfactorily demonstrate your understanding of your submission you may be referred to UNSW Conduct & Integrity Office for investigation for academic misconduct and possible penalties.

For more information on Generative AI and permitted use please see [here](#).

## General Assessment Information

### Grading Basis

Standard

# Course Schedule

Teaching Week/Module	Activity Type	Content
Week 0 : 2 September - 8 September	Other	Moodle course page is made available.
Week 1 : 9 September - 15 September	Lecture	Lectures on Plane Curves
	Tutorial	Tutorial on Plane Curves
Week 2 : 16 September - 22 September	Lecture	Lectures on Plane Curves
	Tutorial	Tutorial on Plane Curves
Week 3 : 23 September - 29 September	Lecture	Lectures on Plane Curves and Space Curves
	Tutorial	Tutorial on Plane Curves and Space Curves
Week 4 : 30 September - 6 October	Assessment	45-minute exam held in the tutorial.
	Lecture	Lectures on Space Curves and Differential Geometry of Surfaces.
Week 5 : 7 October - 13 October	Assessment	Assignment 1 is due this week on Moodle.
	Lecture	Lectures on Differential Geometry of Surfaces
	Tutorial	Tutorial on Differential Geometry of Surfaces
Week 6 : 14 October - 20 October	Other	Flexibility Week
Week 7 : 21 October - 27 October	Lecture	Lectures on Differential Geometry of Surfaces
	Tutorial	Tutorial on Differential Geometry of Surfaces
Week 8 : 28 October - 3 November	Lecture	Lectures on Topology of Surfaces
	Tutorial	Tutorial on Topology of Surfaces
Week 9 : 4 November - 10 November	Lecture	Lectures on Topology of Surfaces
	Tutorial	Tutorial on Topology of Surfaces
	Assessment	Assignment 2 due on Moodle
Week 10 : 11 November - 17 November	Lecture	Lectures on Topology of Surfaces
	Tutorial	Tutorial on Topology of Surfaces

## Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

## Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
	Tim Buttsworth					No	Yes

## Other Useful Information

### Academic Information

Upon your enrolment at UNSW, you share responsibility with us for maintaining a safe, harmonious and tolerant University environment.

You are required to:

- Comply with the University's conditions of enrolment.
- Act responsibly, ethically, safely and with integrity.
- Observe standards of equity and respect in dealing with every member of the UNSW community.
- Engage in lawful behaviour.
- Use and care for University resources in a responsible and appropriate manner.
- Maintain the University's reputation and good standing.

For more information, visit the [UNSW Student Code of Conduct Website](#).

## Academic Honesty and Plagiarism

**Referencing** is a way of acknowledging the sources of information that you use to research your assignments. You need to provide a reference whenever you draw on someone else's words, ideas or research. Not referencing other people's work can constitute plagiarism.

Further information about referencing styles can be located at <https://student.unsw.edu.au/referencing>

**Academic integrity** is fundamental to success at university. Academic integrity can be defined as a commitment to six fundamental values in academic pursuits: honesty, trust, fairness, respect, responsibility and courage. At UNSW, this means that your work must be your own, and others' ideas should be appropriately acknowledged. If you don't follow these rules, plagiarism may be detected in your work.

Further information about academic integrity, plagiarism and the use of AI in assessments can be located at:

- The [Current Students site](#),
- The [ELISE training site](#), and
- The [Use of AI for assessments](#) site.

The Student Conduct and Integrity Unit provides further resources to assist you to understand your conduct obligations as a student: <https://student.unsw.edu.au/conduct>

## Submission of Assessment Tasks

### Penalty for Late Submissions

UNSW has a standard late submission penalty of:

- 5% per day,

- for all assessments where a penalty applies,
- capped at five days (120 hours) from the assessment deadline, after which a student cannot submit an assessment, and
- no permitted variation.

***Any variations to the above will be explicitly stated in the Course Outline for a given course or assessment task.***

Students are expected to manage their time to meet deadlines and to request extensions as early as possible before the deadline.

### **Special Consideration**

If circumstances prevent you from attending/completing an assessment task, you must officially apply for special consideration, usually within 3 days of the sitting date/due date. You can apply by logging onto myUNSW and following the link in the My Student Profile Tab. Medical documentation or other documentation explaining your absence must be submitted with your application. Once your application has been assessed, you will be contacted via your student email address to be advised of the official outcome and any actions that need to be taken from there. For more information about special consideration, please visit: <https://student.unsw.edu.au/special-consideration>

**Important note:** UNSW has a “fit to sit/submit” rule, which means that if you sit an exam or submit a piece of assessment, you are declaring yourself fit to do so and cannot later apply for Special Consideration. This is to ensure that if you feel unwell or are faced with significant circumstances beyond your control that affect your ability to study, you do not sit an examination or submit an assessment that does not reflect your best performance. Instead, you should apply for Special Consideration as soon as you realise you are not well enough or are otherwise unable to sit or submit an assessment.

### **Faculty-specific Information**

#### **Additional support for students**

- [The Current Students Gateway](#)
- [Student Support](#)
- [Academic Skills and Support](#)
- [Student Wellbeing, Health and Safety](#)
- [Equitable Learning Services](#)
- [UNSW IT Service Centre](#)
- [Science EDI Student Initiatives, Offerings and Guidelines](#)

## School Contact Information

Please visit the [School of Mathematics and Statistics website](#) for a range of information.

For information on Courses, please go to "Student life & resources" and either Undergraduate and/or Postgraduate and respective "Undergraduate courses" and "Postgraduate courses" for information on all course offerings.

All school policies, forms and help for students can be located by going to the "Student Services" within "Student life & resources" page. We also post notices in "Student noticeboard" for your information. Please familiarise yourself with the information found in these locations. If you cannot find the answer to your queries on the web you are welcome to contact the Student Services Office directly.

### **Undergraduate**

E: [ug.mathsstats@unsw.edu.au](mailto:ug.mathsstats@unsw.edu.au)

P: 9385 7011 or 9385 7053

### **Postgraduate**

E: [pg.mathsstats@unsw.edu.au](mailto:pg.mathsstats@unsw.edu.au)

P: 9385 7053

Should we need to contact you, we will use your official UNSW email address of in the first instance. **It is your responsibility to regularly check your university email account. Please use your UNSW student email and state your student number in all emails to us.**