



## UNSW Course Outline

# GMAT9600 Principles of Remote Sensing - 2024

Published on the 03 Sep 2024

## General Course Information

**Course Code :** GMAT9600

**Year :** 2024

**Term :** Term 3

**Teaching Period :** T3

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

**Faculty :** Faculty of Engineering

**Academic Unit :** School of Civil and Environmental Engineering

**Delivery Mode :** In Person

**Delivery Format :** Standard

**Delivery Location :** Kensington

**Campus :** Sydney

**Study Level :** Postgraduate, Undergraduate

**Units of Credit :** 6

### Useful Links

[Handbook Class Timetable](#)

## Course Details & Outcomes

### Course Description

Remote sensing techniques are powerful tools for spatial data acquisition and this course will describe the history, challenges and developments in remote sensing. Topics covered include definition and physics of basic electromagnetic radiation properties, energy-matter

relationships, spectral signatures of surfaces and the atmosphere, the reduction of atmospheric effects, sensor concepts (including film and electro-optical sensors), an introduction to data processing and enhancement (including image interpretation procedures). Satellite missions such as Landsat, SPOT, and ERS will be briefly introduced, as well as future remote sensing satellite constellations. The variety of satellite and airborne platforms, and the greater access to imagery, now make it possible to use remote sensing to address a wide range of applications. The diverse and ever-growing applications will be reviewed.

## Course Aims

This course will enable students to explore and gain further understanding of remote sensing for earth observation through the investigation of satellite remote sensing data with a direct emphasis of their application to real world situations in the field of mapping and environmental monitoring.

## Course Learning Outcomes

| Course Learning Outcomes   |
|--|
| CL01 : Investigate remote sensing options for identified applications        |
| CL02 : Apply remote sensing techniques                                       |
| CL03 : Explain the complementary nature between remote sensing and surveying |
| CL04 : Undertake basic data analysis   |
| CL05 : Create digital maps   |

| Course Learning Outcomes   | Assessment Item   |
|--|---|
| CL01 : Investigate remote sensing options for identified applications        | <ul style="list-style-type: none"> <li>• Quizzes</li> <li>• Final Exam</li> </ul>   |
| CL02 : Apply remote sensing techniques                                       | <ul style="list-style-type: none"> <li>• General Knowledge</li> <li>• Quizzes</li> <li>• Final Exam</li> </ul>                        |
| CL03 : Explain the complementary nature between remote sensing and surveying | <ul style="list-style-type: none"> <li>• Assignments</li> <li>• General Knowledge</li> <li>• Quizzes</li> <li>• Final Exam</li> </ul> |
| CL04 : Undertake basic data analysis   | <ul style="list-style-type: none"> <li>• Assignments</li> <li>• General Knowledge</li> </ul>  |
| CL05 : Create digital maps   | <ul style="list-style-type: none"> <li>• Assignments</li> </ul>   |

# Learning and Teaching Technologies

Moodle - Learning Management System | Blackboard Collaborate | Microsoft Teams

## Assessments

### Assessment Structure

| Assessment Item                                    | Weight | Relevant Dates   |
|--|--------|--|
| Quizzes<br>Assessment Format: Individual           | 20%    | Start Date: Not Applicable<br>Due Date: Please refer to Moodle for more information. |
| General Knowledge<br>Assessment Format: Individual | 10%    | Start Date: Not Applicable<br>Due Date: Week 1: 09 September - 15 September          |
| Assignments<br>Assessment Format: Individual       | 40%    | Start Date: Not Applicable<br>Due Date: Please refer to Moodle for more information. |
| Final Exam<br>Assessment Format: Individual        | 30%    | Start Date: Not Applicable<br>Due Date: During formal exam period                    |

## Assessment Details

### Quizzes

#### Assessment Overview

Weekly online quizzes to reinforce understanding of topics covered in the lectures. Marks will be returned at the end of the quiz.

#### Course Learning Outcomes

- CL01 : Investigate remote sensing options for identified applications
- CL02 : Apply remote sensing techniques
- CL03 : Explain the complementary nature between remote sensing and surveying

#### Detailed Assessment Description

Please refer to Moodle for more information.

#### 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](#).

## General Knowledge

### Assessment Overview

This exam will help student (and the course convener) to find out if there is a good match between the student's academic interest and strength and the course. The test will be held in Week 1 so that students can change their enrolments well before the census date.

Marks will be returned within 2 weeks.

### Course Learning Outcomes

- CL02 : Apply remote sensing techniques
- CL03 : Explain the complementary nature between remote sensing and surveying
- CL04 : Undertake basic data analysis

### Detailed Assessment Description

Please refer to Moodle for more information.

### Assignment submission Turnitin type

Not Applicable

### Generative AI Permission Level

#### **No Assistance**

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## Assignments

### Assessment Overview

Students will complete 2 assignments. The first will be on radar remote sensing and require processing data collected during a major flood event and comparing radar with other techniques. The second will be based on satellite optical remote sensing data collected during a major bushfire. Students will complete the assignments in the lab and marks for the first assignment will be returned before the submission of the second assignment. The second assignment

marks will be returned at the end of term.

#### **Course Learning Outcomes**

- CL03 : Explain the complementary nature between remote sensing and surveying
- CL04 : Undertake basic data analysis
- CL05 : Create digital maps

#### **Detailed Assessment Description**

Please refer to Moodle for more information.

#### **Assignment submission Turnitin type**

Not Applicable

#### **Generative AI Permission Level**

**No Assistance**

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### **Final Exam**

#### **Assessment Overview**

The 2-hour final exam will be held during the final exam period and all content in the course may be assessed.

#### **Course Learning Outcomes**

- CL01 : Investigate remote sensing options for identified applications
- CL02 : Apply remote sensing techniques
- CL03 : Explain the complementary nature between remote sensing and surveying

#### **Detailed Assessment Description**

Please refer to Moodle for more information.

#### **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.

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## General Assessment Information

### Grading Basis

Standard

## Course Schedule

| Teaching Week/Module                 | Activity Type | Content   |
|--------------------------------------|---------------|---|
| Week 0 : 2 September - 8 September   | Reading       |   |
| Week 1 : 9 September - 15 September  | Blended       | Introduction to Course;<br>Introduction to Earth Observation/Remote Sensing<br>TEST – general knowledge (Wed) |
| Week 2 : 16 September - 22 September | Lecture       | Electromagnetic Radiation – Definition & Physics  |
| Week 3 : 23 September - 29 September | Lecture       | Spectral Reflectance and Atmospheric Attenuation  |
| Week 4 : 30 September - 6 October    | Lecture       | Radar Background and Surface Interaction<br>Interferometric Synthetic Aperture Radar                          |
| Week 5 : 7 October - 13 October      | Laboratory    | Lab - Assignment / lab 1 – radar application (Civil Engineering Building Room: 201 & 611)                     |
| Week 6 : 14 October - 20 October     | Other         | flexibility week - no teaching  |
| Week 7 : 21 October - 27 October     | Lecture       | Electro-optical Sensors   |
| Week 8 : 28 October - 3 November     | Laboratory    | Lab - Assignment / lab 2 – optical application (Civil Engineering Building Room: 201 & 611)                   |
| Week 9 : 4 November - 10 November    | Lecture       | Ground segment, Remote Sensing & GIS  |
| Week 10 : 11 November - 17 November  | Lecture       | Revision, course summary, overall feedback  |

## Attendance Requirements

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

## General Schedule Information

External Exam Policy for PG courses in the GENERAL ASSESSMENT INFORMATION section of ECOS: The Distance class is exclusively available to PG students who are onshore and reside more than 100km away from the UNSW Kensington campus.

Please refer to the External Exam Policy (<https://intranet.civeng.unsw.edu.au/external-exam-policy>) for your eligibility. Applications must be submitted by Week 6 as late submissions will NOT be accepted. If you do not meet the External Exam policy, please do not enrol in the distance class; you will need to attend in person.

# Course Resources

## Prescribed Resources

The course will be mainly based on PDF files of Powerpoint lecture slides available at the course Moodle site.

The material will be uploaded week by week.

## Recommended Resources

The following are recommended reading materials:

1. CCRS website: <http://www.nrcan.gc.ca/node/9363>
2. "Principles of Remote Sensing", Paul J. Curran. London; New York : Longman, 1985.
3. "Physical Principles of Remote Sensing", William.G. Rees. Cambridge, U.K.; New York, NY : Cambridge University Press, 2001.
4. The UNSW Library website: <http://info.library.unsw.edu.au/web/services/services.html>

## Staff Details

| Position | Name      | Email | Location                            | Phone        | Availability   | Equitable Learning Services Contact | Primary Contact |
|----------|-----------|-------|-------------------------------------|--------------|----------------|-------------------------------------|-----------------|
| Convenor | Linlin Ge |       | Civil Engineering Building Room 414 | +61423287219 | by appointment | No                                  | Yes             |

## Other Useful Information

### Academic Information

#### I. Special consideration and supplementary assessment

If you have experienced an illness or misadventure beyond your control that will interfere with your assessment performance, you are eligible to apply for Special Consideration prior to, or within 3 working days of, submitting an assessment or sitting an exam.

Please note that UNSW has a Fit to Sit rule, which means that if you sit an exam, you are declaring yourself fit enough to do so and cannot later apply for Special Consideration.

For details of applying for Special Consideration and conditions for the award of supplementary

assessment, please see the information on UNSW's [Special Consideration page](#).

## II. Administrative matters and links

All students are expected to read and be familiar with UNSW guidelines and policies. In particular, students should be familiar with the following:

- [Attendance](#)
- [UNSW Email Address](#)
- [Special Consideration](#)
- [Exams](#)
- [Approved Calculators](#)
- [Academic Honesty and Plagiarism](#)
- [Equitable Learning Services](#)

## III. Equity and diversity

Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course convener prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equitable Learning Services. Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.

## IV. Professional Outcomes and Program Design

Students are able to review the relevant professional outcomes and program designs for their streams by going to the following link: <https://www.unsw.edu.au/engineering/student-life/student-resources/program-design>.

*Note: This course outline sets out the description of classes at the date the Course Outline is published. The nature of classes may change during the Term after the Course Outline is published. Moodle or your primary learning management system (LMS) should be consulted for the up-to-date class descriptions. If there is any inconsistency in the description of activities between the University timetable and the Course Outline/Moodle/LMS, the description in the Course Outline/Moodle/LMS applies.*

## Academic Honesty and Plagiarism

UNSW has an ongoing commitment to fostering a culture of learning informed by academic



integrity. All UNSW students have a responsibility to adhere to this principle of academic integrity. Plagiarism undermines academic integrity and is not tolerated at UNSW. *Plagiarism at UNSW is defined as using the words or ideas of others and passing them off as your own.*

Plagiarism is a type of intellectual theft. It can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement. UNSW has produced a website with a wealth of resources to support students to understand and avoid plagiarism, visit: [student.unsw.edu.au/plagiarism](http://student.unsw.edu.au/plagiarism). The Learning Centre assists students with understanding academic integrity and how not to plagiarise. They also hold workshops and can help students one-on-one.

You are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting and the proper referencing of sources in preparing all assessment tasks.

Repeated plagiarism (even in first year), plagiarism after first year, or serious instances, may also be investigated under the Student Misconduct Procedures. The penalties under the procedures can include a reduction in marks, failing a course or for the most serious matters (like plagiarism in an honours thesis or contract cheating) even suspension from the university. The Student Misconduct Procedures are available here:

[www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf](http://www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf)

## Submission of Assessment Tasks

Work submitted late without an approved extension by the course coordinator or delegated authority is subject to a late penalty of five percent (5%) of the maximum mark possible for that assessment item, per calendar day.

The late penalty is applied per calendar day (including weekends and public holidays) that the assessment is overdue. There is no pro-rata of the late penalty for submissions made part way through a day. This is for all assessments where a penalty applies.

Work submitted after five days (120 hours) will not be accepted and a mark of zero will be awarded for that assessment item.

For some assessment items, a late penalty may not be appropriate. These will be clearly

indicated in the course outline, and such assessments will receive a mark of zero if not completed by the specified date. Examples include:

- Weekly online tests or laboratory work worth a small proportion of the subject mark;
- Exams, peer feedback and team evaluation surveys;
- Online quizzes where answers are released to students on completion;
- Professional assessment tasks, where the intention is to create an authentic assessment that has an absolute submission date; and,
- Pass/Fail assessment tasks.

## Faculty-specific Information

[Engineering Student Support Services](#) – The Nucleus - enrolment, progression checks, clash requests, course issues or program-related queries

[Engineering Industrial Training](#) – Industrial training questions

[UNSW Study Abroad](#) – study abroad student enquiries (for inbound students)

[UNSW Exchange](#) – student exchange enquiries (for inbound students)

[UNSW Future Students](#) – potential student enquiries e.g. admissions, fees, programs, credit transfer

## Phone

(+61 2) 9385 8500 – Nucleus Student Hub

(+61 2) 9385 7661 – Engineering Industrial Training

(+61 2) 9385 3179 – UNSW Study Abroad and UNSW Exchange (for inbound students)

## School Contact Information

For assistance with enrolment, class registration, progression checks and other administrative matters, please see [the Nucleus: Student Hub](#). They are located inside the Library – first right as you enter the main library entrance. You can also contact them via <http://unsw.to/webforms> or reserve a place in the face-to-face queue using the UniVerse app.

For course administration matters, please contact the Course Coordinator.

Questions about the this course should normally be asked during the scheduled class so that everyone can benefit from the answer and discussion.