UNSW Course Outline

GMAT3500 Remote Sensing and Photogrammetry - 2024

Published on the 03 Sep 2024

General Course Information

Course Code : GMAT3500
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 : Undergraduate
Units of Credit : 6

Useful Links

Handbook Class Timetable

Course Details & Outcomes

Course Description

Introduction to the geometric and spectral properties of remotely sensed (satellite, aerial or terrestrial) images of the Earth's surface or objects. Description of analogue and digital images - photography, electro-optical and microwave systems. The physics of visible, infrared and

microwave remotely sensed imagery, including atmospheric effects. Image geometry - central projection, scan and microwave systems. The principles of stereovision. Inner orientation of central projection, collinearity equations and deviations from collinearity. Exterior orientation of sensor systems. Object geometry from overlapping images, for block photography for aerial and close range applications. Digital photogrammetric workstations and their functions. Photogrammetric project planning. Image interpretation.

Course Aims

To explore and gain further understanding of remote sensing for Earth Observation through the investigation of satellite remote sensing data, as well as digital photographic imaging and scanning technologies, with a direct emphasis on their application to mapping and environmental monitoring.

To present the principles of processing aerial and satellite frame and push-broom based digital images, as well as close range frame images for determining accurate metric details of extracted objects or Earth features for input into digital mapping, GIS databases and analyses, and for close range applications.

To present the basic principles of acquisition and processing of Lidar data for the determination of DEMs and other information extraction.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Investigate remote sensing and photogrammetric options for identified applications
CLO2 : Apply remote sensing and photogrammetric techniques
CLO3 : Explain the complementary nature between remote sensing, photogrammetry and surveying
CLO4 : Undertake basic data analysis
CLO5 : Create digital maps

Course Learning Outcomes	Assessment Item
CLO1 : Investigate remote sensing and photogrammetric options for identified applications	• Quizzes • Lab Assignments • Final exam
CLO2 : Apply remote sensing and photogrammetric techniques	• Quizzes • Lab Assignments • Final exam
CLO3 : Explain the complementary nature between remote sensing, photogrammetry and surveying	• Quizzes • Lab Assignments • Final exam
CLO4 : Undertake basic data analysis	• Lab Assignments • Final exam
CLO5 : Create digital maps	• Lab Assignments • Final exam

Learning and Teaching Technologies

Moodle - Learning Management System | Microsoft Teams | Blackboard Collaborate

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Quizzes Assessment Format: Individual	25%	Start Date: Not Applicable Due Date: Please refer to Moodle for more information.
Lab Assignments Assessment Format: Individual	30%	Start Date: Not Applicable Due Date: Please refer to Moodle for more information.
Final exam Assessment Format: Individual	45%	Start Date: Not Applicable Due Date: During formal exam period

Assessment Details

Quizzes

Assessment Overview

Weekly 30-minute quizzes on Moodle. Marks will be returned after the close of the quiz.

Course Learning Outcomes

- CLO1 : Investigate remote sensing and photogrammetric options for identified applications
- CLO2 : Apply remote sensing and photogrammetric techniques
- CLO3 : Explain the complementary nature between remote sensing, photogrammetry and surveying

Detailed Assessment Description

The 1st Quiz and feedback will be completed before 6 October 2024.

Please refer to Moodle for more information.

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.

Lab Assignments

Assessment Overview

3 assignments which cover optical satellite imagery, radar remote sensing and photogrammetry. Students will be provided with a dataset for each assignment to analyse. Marking criterias will be provided, and marks will be returned before the due date of the next assignment or by the end of the term for the third assignment.

Course Learning Outcomes

- CLO1 : Investigate remote sensing and photogrammetric options for identified applications
- CLO2 : Apply remote sensing and photogrammetric techniques
- CLO3 : Explain the complementary nature between remote sensing, photogrammetry and surveying
- CLO4 : Undertake basic data analysis
- CLO5 : Create digital maps

Detailed Assessment Description

Please refer to Moodle for more information.

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 topics covered in the course may be assessed.

Course Learning Outcomes

- CLO1 : Investigate remote sensing and photogrammetric options for identified applications
- CLO2 : Apply remote sensing and photogrammetric techniques
- CLO3 : Explain the complementary nature between remote sensing, photogrammetry and surveying
- CLO4 : Undertake basic data analysis
- CLO5 : Create digital maps

Detailed Assessment Description

Please refer to Moodle for more information.

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	Lecture	Introduction to Course; Introduction to Remote Sensing; Electromagnetic Radiation – Definition & Physics
Week 2 : 16 September - 22 September	Lecture	Spectral Reflectance and Atmospheric Attenuation Electro-optical Sensors
Week 3 : 23 September - 29 September	Lecture	Radar remote sensing Interferometric Synthetic Aperture Radar
Week 4 : 30 September - 6 October	Lecture	Introduction to photogrammetry; Foundations of photogrammetry
Week 5 : 7 October - 13 October	Laboratory	Lab 1 - optical remote sensing (Room: CE 611) Lab 2 - radar remote sensing (Room: CE 611)
Week 6 : 14 October - 20 October	Other	flexibility week - no teaching
Week 7 : 21 October - 27 October	Lecture	Close range photogrammetry; Aerial photogrammetry
Week 8 : 28 October - 3 November	Laboratory	Lab 3 - photogrammetry (Room: CE 611) Lab assistance - extra (Room: CE 611)
Week 9 : 4 November - 10 November	Lecture	UAV photogrammetry; Space-borne photogrammetry
Week 10 : 11 November - 17 November	Lecture	Laser Scanning, Remote Sensing, Photogrammetry & GIS; Revision, course summary

Attendance Requirements

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

General Schedule Information

Undergraduate students must attend at least 80% of the classes in which they are enrolled for the duration of the session.

10 weeks

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.

The following are recommended reading materials:

CCRS website: http://www.nrcan.gc.ca/node/9363

The UNSW Library website: http://info.library.unsw.edu.au/web/services/services.html

Recommended Resources

“Principles of Remote Sensing”, Paul J. Curran. London; New York : Longman, 1985.

“Physical Principles of Remote Sensing”, William.G. Rees. Cambridge, U.K.; New York, NY : Cambridge University Press, 2001.

“Introduction to modern photogrammetry”, Mikhail E., J. Bethel, and J.C. McGlone, Wiley, 2001.

“Elements of photogrammetry”, Paul R. Wolf, McGraw-Hill, 1983.

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 polices. 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 Plagarism

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. 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

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.