UNSW Course Outline

GMAT3220 Geospatial Information Systems - 2024

Published on the 30 Jan 2024

General Course Information

Course Code : GMAT3220
Year : 2024
Term : Term 1
Teaching Period : T1
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

An overview of the components of Geographic Information Systems (GIS). Database management in the context of spatial data. Data acquisition techniques including overviews of digitising, scanning, field survey and remote sensing. Data conversion process, visualisation of

geospatial data, cartography, colour and 3D views. Concepts and definitions of spatial information systems, coordinate systems, mapping and spatial issues, data structures including vector, raster and surface modelling. Inputting both spatial and attribute data to the GIS. Transformation of data between coordinate systems, re-projection of map coordinates. GPS-based image registration. Editing data and creating topologically clean data. Tagging spatial data with attributes, linking spatial data to attribute databases. Use of basic analysis functions: spatial selection, attribute selection, making reports of spatial and attribute data, interfacing to the system using a high level language. Use of the World Wide Web to disseminate information.

Course Aims

This course aims to provide the practical training in order for the student to work effectively and critically with GIS. Concepts and definitions of spatial information systems, coordinate systems, mapping and spatial issues, data structures including vector, raster and surface modeling. Inputting both spatial and attribute data to the GIS. Transformation of data between coordinate systems, re-projection of map coordinates. GPS-based image registration. Geo-databases. Editing data and creating topologically clean data. Tagging spatial data with attributes, linking spatial data to attribute databases. Use of basic analysis functions: spatial selection, attribute selection, making reports of spatial and attribute data, interfacing to the system using a high level language. Use of the World Wide Web to disseminate information.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Develop simple data models for use in many GIS applications.
CLO2 : Explain the concepts and definitions of spatial systems, coordinate systems, mapping and spatial issues with maps, data structures including vector, raster and surface modelling.
CLO3 : Build geo-databases and analyse spatial data
CLO4 : Design a Web-based GIS

Course Learning Outcomes	Assessment Item
CLO1 : Develop simple data models for use in many GIS applications.	• Homework • On-site lab work • Major Assignment • Final Exam
CLO2 : Explain the concepts and definitions of spatial systems, coordinate systems, mapping and spatial issues with maps, data structures including vector, raster and surface modelling.	• Homework • On-site lab work • Major Assignment • Final Exam
CLO3 : Build geo-databases and analyse spatial data	• Homework • On-site lab work • Major Assignment • Final Exam
CLO4 : Design a Web-based GIS	• Homework • On-site lab work • Major Assignment • Final Exam

Learning and Teaching Technologies

Moodle - Learning Management System | Microsoft Teams | Review - Assessment/Feedback Tool | Echo 360

Additional Course Information

Approaches to learning in the course are given in the following:

- **Private Study**: Review lecture material and textbook; Do set problems and assignments Join Moodle discussions of problems; Reflect on class problems and assignments; Download materials from Moodle; Keep up with notices and find out marks via Moodle
- **Lectures**: Find out what you must learn; See methods that are not in the textbook; Follow worked examples; Hear announcements on course changes
- **Workshops:** Be guided by Demonstrators in lab; Practice solving set problems; Ask questions

- **Assessments:** Demonstrate your knowledge and skills in your assignments; Demonstrate higher understanding and problem-solving skills
- **Laboratory Work**: Hands-on work to set studies in context

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Homework Assessment Format: Individual	16%	Start Date: 4 pm every Thursday Due Date: 4 pm Wednesday, a week after
On-site lab work Assessment Format: Individual	20%	Start Date: 10 am Friday, each week Due Date: 1 pm Friday, the same day
Major Assignment Assessment Format: Individual	20%	Start Date: 05/03/2024 11:00 AM Due Date: 10/04/2024 11:59 PM
Final Exam Assessment Format: Individual	44%	

Assessment Details

Homework

Assessment Overview

This is homework assignment consisting of a few questions about the lecture.

Course Learning Outcomes

- CLO1 : Develop simple data models for use in many GIS applications.
- CLO2 : Explain the concepts and definitions of spatial systems, coordinate systems, mapping and spatial issues with maps, data structures including vector, raster and surface modelling.
- CLO3 : Build geo-databases and analyse spatial data
- CLO4 : Design a Web-based GIS

Detailed Assessment Description

Start date: 11 am

Submission notes

A word document with your answers to the homework questions should be submitted via Moodle.

Assessment information

Assessment of homework (4 points per week for 8 weeks) will be based on the following criteria:

- No answers 0 point
- Partial or incorrect answers 1-3 points

- Complete and correct answers 4 points

Assignment submission Turnitin type

This assignment is submitted through Turnitin and students can see Turnitin similarity reports.

On-site lab work

Assessment Overview

This is on-site lab work on a weekly basis. Detailed step-by-step instructions will be provided.

Workshop on each lab exercise will be provided.

Course Learning Outcomes

- CLO1 : Develop simple data models for use in many GIS applications.
- CLO2 : Explain the concepts and definitions of spatial systems, coordinate systems, mapping and spatial issues with maps, data structures including vector, raster and surface modelling.
- CLO3 : Build geo-databases and analyse spatial data
- CLO4 : Design a Web-based GIS

Assessment Length

3 hours

Submission notes

A lab report including your answers to the lab questions should be submitted to lab demonstrator/lecturer.

Assessment information

Assessment of on-site lab work (5 points per week for 8 weeks) will be based on the following criteria:

- No output 0 point
- Partial output 1-2 points
- Full output but with incorrect results 3-4 points
- Complete and correct results 5 points

Assignment submission Turnitin type

Not Applicable

Major Assignment

Assessment Overview

This Assignment aims to analyze a GIS data input problem and produce a display of the results using ArcGIS.

Course Learning Outcomes

- CLO1 : Develop simple data models for use in many GIS applications.
- CLO2 : Explain the concepts and definitions of spatial systems, coordinate systems, mapping and spatial issues with maps, data structures including vector, raster and surface modelling.
- CLO3 : Build geo-databases and analyse spatial data
- CLO4 : Design a Web-based GIS

Detailed Assessment Description

Lecturer will provide details of the assignment in Moodle.

Submission notes

An electronic copy of individual report in Microsoft Word format, and a zip file of data, maps and reference documents, etc. that you produced or obtained during the course of the assignment, but do not include the data given to you from the lecturer, should be submitted via Moodle.

Assessment information

Assessment of major assignment report (40 points) will be based on the following criteria:

- Written presentation max. 10 points
- Review of other work max. 10 points
- Quality of project work max. 10 points
- Results, Interpretation & conclusions max. 10 points

Assignment submission Turnitin type

This assignment is submitted through Turnitin and students can see Turnitin similarity reports.

Final Exam

Assessment Overview

Centrally managed final exam during the exam period.

Course Learning Outcomes

- CLO1 : Develop simple data models for use in many GIS applications.
- CLO2 : Explain the concepts and definitions of spatial systems, coordinate systems, mapping and spatial issues with maps, data structures including vector, raster and surface modelling.
- CLO3 : Build geo-databases and analyse spatial data
- CLO4 : Design a Web-based GIS

Detailed Assessment Description

TBA

Assessment Length

2 hours

Assessment information

A mark of at least 36 points out of the total 88 points in the final exam is required before the class work is included in the final mark.

Assignment submission Turnitin type

Not Applicable

Hurdle rules

A mark of at least 40% in the final examination is required before the class work is included in the final mark.

General Assessment Information

Late submission will get 5% deduction of the assignment mark for each day late.

Students who perform poorly in the on-site lab assessments and homework assignments are recommended to discuss progress with the lecturer during the semester. Homework assignments will be briefed to you in the middle of lectures without prior notice, hence attendance in lectures is essential.

Grading Basis

Standard

Course Schedule

Teaching Week/Module	Activity Type	Content
Week 1 : 12 February - 18 February	Lecture	• Introduction to GIS • Map projections
	Laboratory	• Introduction to ArcGIS Pro • Map projections
Week 2 : 19 February - 25 February	Lecture	Vector and raster
	Laboratory	Vector and raster
Week 3 : 26 February - 3 March	Lecture	Data acquisition and accuracy
	Laboratory	• Image registration
Week 4 : 4 March - 10 March	Lecture	Spatial interpolation
	Laboratory	Digitise, edit and clean
Week 5 : 11 March - 17 March	Other	Survey Camp - no lecture
Week 6 : 18 March - 24 March	Other	No Teaching Week
Week 7 : 25 March - 31 March	Lecture	Database and SQL
	Laboratory	Tables, relationships, and queries (This is affected by public holidays so this lab is shifted to Week 8)
Week 8 : 1 April - 7 April	Lecture	Surface modelling
	Laboratory	Tables, relationships, and queries
Week 9 : 8 April - 14 April	Lecture	Spatial Analysis
	Laboratory	Surface modelling and topographic representation
Week 10 : 15 April - 21 April	Lecture	Topology
	Laboratory	Spatial Analysis

Attendance Requirements

For courses with Workshops and/or Labs, attendance for those classes is a necessary part of the course. You must attend at least 80% of the workshop/lab in which you are enrolled for the duration of the session.

Course Resources

Prescribed Resources

Kang-tsung Chang, Introduction to Geographic Information Systems, 9th Ed., the McGraw-Hill Companies

Recommended Resources

Getting to Know ArcGIS Pro 2.8 By Michael Law, Amy Collins

Maribeth Price, Mastering ArcGIS, 6th Ed., the McGraw-Hill Companies

Course Evaluation and Development

There are two forums, namely GIS Forum and ArcGIS Forum, available on Moodle so that students can post their questions. The lecturer will respond to the questions on an ad-hoc basis.

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Badal Pokharel		CE409		Thursday and Friday	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-specific Information

Final Examinations

Final Exams in T1 2024 will be held on campus between the 26th April and 9th May, and Supplementary Exams between the 20th - 24th May 2024. You are required to be available on these dates. Please do not to make any personal or travel arrangements during this period.

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.