



# ENVS3383

## Environmental Analysis Using Remote Sensing and GIS

Session 2, Online-scheduled-weekday 2022

*School of Natural Sciences*

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#### **Disclaimer**

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## General Information

### Unit convenor and teaching staff

Convenor / Lecturer

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Contact via by appointment

Lecturer

Maina Mbui

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Contact via by appointment

Credit points

10

Prerequisites

(130cp at 1000 level or above) including (ENV264 or ENV5264 or ENV52364 or GEOS264)

Corequisites

Co-badged status

Unit description

This unit provides students with an understanding of advanced spatial information science (SIS) procedures, and experience in the implementation of geographic information systems (GIS) and remote sensing (RS) in environmental fields. The unit covers modelling landforms and other environmental variables in GIS, an introduction to geostatistics, and a range of case studies from areas including catchment hydrology, climate variables, natural hazards and vegetation mapping. It also demonstrates advanced RS techniques to derive spatial information on land cover and land cover change, and the latest satellite programs. The GIS software used is ArcGIS. Students enrolling in this unit must have access to a computer with the Windows operating system. Mac or Linux system will not be supported.

## 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:

**ULO1:** Demonstrate knowledge of the principles underlying GIS raster analyses

**ULO2:** Apply GIS modelling techniques to make an evidence-based multi-attribute decision making

**ULO3:** Effectively communicate information derived using spatial analyses

**ULO4:** Describe and critique current applications of GIS and RS in Australia and worldwide

**ULO5:** Evaluate remotely sensed data acquired from a range of sensors

**ULO6:** Competently apply a wide range of techniques for RS data to provide information about the environment

## General Assessment Information

This unit does not have a Hurdle Requirement.

### Late Assessment Submission Penalty

From 1 July 2022, Students enrolled in Session based units with written assessments will have the following university standard late penalty applied. Please see <https://students.mq.edu.au/study/assessment-exams/assessments> for more information.

Unless a Special Consideration request has been submitted and approved, a 5% penalty (of the total possible mark) will be applied each day a written assessment is not submitted, up until the 7<sup>th</sup> day (including weekends). After the 7<sup>th</sup> day, a grade of '0' will be awarded even if the assessment is submitted. Submission time for all written assessments is set at **11:55 pm**. A 1-hour grace period is provided to students who experience a technical concern.

For any late submission of time-sensitive tasks, such as scheduled tests/exams, performance assessments/presentations, and/or scheduled practical assessments/labs, students need to submit an application for [Special Consideration](#).

### Assessments where Late Submissions will be accepted

In this unit, late submissions will accepted as follows:

- Assessments 1, 2 and 3 - YES, Standard Late Penalty applies
- Final exam - NO, unless Special Consideration is Granted

## Assessment Tasks

Name	Weighting	Hurdle	Due
<a href="#">Literature Review</a>	10%	No	14 Aug 2022
<a href="#">Project for Remote Sensing and Image Interpretation</a>	30%	No	2 Oct 2022
<a href="#">GIS Modelling using Raster Data</a>	20%	No	30 Oct 2022

Name	Weighting	Hurdle	Due
<u>Final Exam</u>	40%	No	Exam weeks

## Literature Review

Assessment Type <sup>1</sup>: Literature review

Indicative Time on Task <sup>2</sup>: 12 hours

Due: **14 Aug 2022**

Weighting: **10%**

In this assignment, students are asked to conduct a literature review on a specific application of remote sensing.

On successful completion you will be able to:

- Describe and critique current applications of GIS and RS in Australia and worldwide
- Competently apply a wide range of techniques for RS data to provide information about the environment

## Project for Remote Sensing and Image Interpretation

Assessment Type <sup>1</sup>: Project

Indicative Time on Task <sup>2</sup>: 25 hours

Due: **2 Oct 2022**

Weighting: **30%**

This project brings together what students learned through lectures and practicals and applies remote sensing and its methods to an application nominated by students. Students will present their findings using both oral presentation and report.

On successful completion you will be able to:

- Demonstrate knowledge of the principles underlying GIS raster analyses
- Effectively communicate information derived using spatial analyses
- Describe and critique current applications of GIS and RS in Australia and worldwide
- Evaluate remotely sensed data acquired from a range of sensors
- Competently apply a wide range of techniques for RS data to provide information about the environment

## GIS Modelling using Raster Data

Assessment Type <sup>1</sup>: Quantitative analysis task

Indicative Time on Task <sup>2</sup>: 15 hours

Due: **30 Oct 2022**

Weighting: **20%**

Students will undertake a multi-criteria analysis using GIS and gain experience with a range of GIS techniques on raster analyses and modelling for site selections.

On successful completion you will be able to:

- Demonstrate knowledge of the principles underlying GIS raster analyses
- Apply GIS modelling techniques to make an evidence-based multi-attribute decision making
- Effectively communicate information derived using spatial analyses
- Competently apply a wide range of techniques for RS data to provide information about the environment

## Final Exam

Assessment Type <sup>1</sup>: Examination

Indicative Time on Task <sup>2</sup>: 29 hours

Due: **Exam weeks**

Weighting: **40%**

Final exam

On successful completion you will be able to:

- Demonstrate knowledge of the principles underlying GIS raster analyses
- Apply GIS modelling techniques to make an evidence-based multi-attribute decision making
- Describe and critique current applications of GIS and RS in Australia and worldwide
- Evaluate remotely sensed data acquired from a range of sensors
- Competently apply a wide range of techniques for RS data to provide information about the environment

<sup>1</sup> If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
- the [Writing Centre](#) for academic skills support.

<sup>2</sup> Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation

## Delivery and Resources

### Lecture program

There is one lecture per week. Please check lecture timetable and room location at <https://timetables.mq.edu.au> Zoom link of lectures will be provided in iLearn page of the unit. The recordings of lectures will be made available via Echo360 after each class.

### Practical program

There is one three-hour practical class from weeks 1 to 12 for ALL students. Please check prac timetable and location (including online session) at the Macquarie University Timetables website: <https://timetables.mq.edu.au>; Zoom links will be provided to the students enrolled in online classes. ESRI ArcGIS software, and the remote sensing software, ENVI, are used in this unit. Both software will be accessible via AppStream at <https://mq.okta.com/> There is NO on-campus session.

## Unit Schedule

Week	Topic
1	Introduction to the unit and recap
2	Fundamental of Remote Sensing
3	Spectral Indices
4	Classifications
5	Light Detection and Arranging (LiDAR) and applications
6	Radar (Microwave) Remote Sensing and applications Part 1
7	Radar (Microwave) Remote Sensing and applications Part 2
Break	
8	GIS Modelling – Site Selection
9	GIS Modelling – Bushfire Risk Modelling Part 1
10	GIS Modelling – Bushfire Risk Modelling Part 2

11	GIS Modelling – Bushfire Risk Modelling Part 3
12	Outlook of Earth Observation Programs
13	Unit Summary

The order of topics may be changed.

## Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://policies.mq.edu.au\)](https://policies.mq.edu.au). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- [Academic Appeals Policy](#)
- [Academic Integrity Policy](#)
- [Academic Progression Policy](#)
- [Assessment Policy](#)
- [Fitness to Practice Procedure](#)
- [Assessment Procedure](#)
- [Complaints Resolution Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#)

Students seeking more policy resources can visit [Student Policies \(https://students.mq.edu.au/support/study/policies\)](https://students.mq.edu.au/support/study/policies). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

To find other policies relating to Teaching and Learning, visit [Policy Central \(https://policies.mq.edu.au\)](https://policies.mq.edu.au) and use the [search tool](#).

## Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: <https://students.mq.edu.au/admin/other-resources/student-conduct>

## Results

Results published on platform other than [eStudent](#), (eg. iLearn, Coursera etc.) 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](https://ask.mq.edu.au) or if you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto:globalmba.support@mq.edu.au)

## Academic Integrity

At Macquarie, we believe [academic integrity](#) – honesty, respect, trust, responsibility, fairness and courage – is at the core of learning, teaching and research. We recognise that meeting the

expectations required to complete your assessments can be challenging. So, we offer you a range of resources and services to help you reach your potential, including free [online writing and maths support](#), [academic skills development](#) and [wellbeing consultations](#).

## Student Support

Macquarie University provides a range of support services for students. For details, visit <http://students.mq.edu.au/support/>

### The Writing Centre

[The Writing Centre](#) provides resources to develop your English language proficiency, academic writing, and communication skills.

- [Workshops](#)
- [Chat with a WriteWISE peer writing leader](#)
- [Access StudyWISE](#)
- [Upload an assignment to Studiosity](#)
- [Complete the Academic Integrity Module](#)

The Library provides online and face to face support to help you find and use relevant information resources.

- [Subject and Research Guides](#)
- [Ask a Librarian](#)

## Student Services and Support

Macquarie University offers a range of [Student Support Services](#) including:

- [IT Support](#)
- [Accessibility and disability support](#) with study
- Mental health [support](#)
- [Safety support](#) to respond to bullying, harassment, sexual harassment and sexual assault
- [Social support including information about finances, tenancy and legal issues](#)

## Student Enquiries

Got a question? Ask us via [AskMQ](#), or contact [Service Connect](#).

## IT Help

For help with University computer systems and technology, visit [http://www.mq.edu.au/about\\_us/offices\\_and\\_units/information\\_technology/help/](http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/).

When using the University's IT, you must adhere to the [Acceptable Use of IT Resources Policy](#). The policy applies to all who connect to the MQ network including students.