



# ENVE853

## Environmental Applications of GIS and Remote Sensing

S2 External 2014

*Dept of Environment & Geography*

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#### **Disclaimer**

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## General Information

Unit convenor and teaching staff

Unit Convenor

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Credit points

4

Prerequisites

GEOS801 or GEOS810 or ENVE810 or ENV808

Corequisites

Co-badged status

Unit description

This unit builds on the basic GIS skills introduced in ENV808 and includes advanced GIS concepts and practical analysis. Topics include: analysis of landscape and environmental variables, GIS modelling, geostatistics, 3D analysis, network analysis, advanced editing and a range of case studies. Practical sessions include techniques for spatial data collection, data management, modelling and terrain products generation. This unit is designed to provide students with skills that enhance their educational experience and work-readiness in the field of spatial information science.

## 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:

Understand a wide range of principles underlying GIS analyses.

Be competent in applying a wide range of GIS techniques and procedures to analyse the spatial characteristics of data.

Be able to effectively communicate information derived using spatial analyses.

Have insights into current applications of GIS in Australia and worldwide.

Understand some concepts and issues relevant to the implementation of GIS in a workplace.

Have a thorough knowledge of spatial information science on which to build more specialist study or lifelong learning.

## General Assessment Information

### SUBMISSION OF ASSIGNMENTS

All students are required to keep a backup of the submitted version of their assessments.

Assignment reports will be submitted electronically, either in MS Word or PDF format, via the submission links provided on iLearn page.

Assignments are to be submitted by 9:00 AM on the dates specified.

### Late Submission Penalty

No extensions will be granted without a medical certificate or similar documentation. A penalty of 5% per day will be deducted from the total mark of the assessment task that is handed in late without an extension.

### Special Consideration

The University recognises that students may experience disruptions that adversely affect their academic performance in assessment activities. The Disruption to Studies Notification must be completed and submitted online through [www.ask.mq.edu.au](http://www.ask.mq.edu.au) within five (5) working days of the commencement of the disruption. **Disruption to Studies Policy** can be found under 'Policies and procedures" section of this unit guide.

## Assessment Tasks

| Name   | Weighting | Due                         |
|--|-----------|-----------------------------|
| <a href="#">1. GIS data sources</a>          | 5%        | Week 3, Mon 18 Aug, 9:00 am |
| <a href="#">2. GIS modelling</a>             | 20%       | Week 6, Mon 8 Sept, 9:00 am |
| <a href="#">3. Conceptual project design</a> | 15%       | Week 9, Mon 13 Oct 9:00 am  |
| <a href="#">4. Major Project</a>             | 20%       | Week 13, Mon 10 Nov 9:00 am |

| Name                                | Weighting | Due                   |
|-------------------------------------|-----------|-----------------------|
| <u>Progress with practical work</u> | 5%        | Check dates on iLearn |
| <u>Final Exam</u>                   | 35%       | Check Exam Timetable  |

## 1. GIS data sources

Due: **Week 3, Mon 18 Aug, 9:00 am**

Weighting: **5%**

This assessment task asks students to search and list web-based GIS data sources in Australia.

On successful completion you will be able to:

- Be competent in applying a wide range of GIS techniques and procedures to analyse the spatial characteristics of data.
- Have insights into current applications of GIS in Australia and worldwide.
- Understand some concepts and issues relevant to the implementation of SIS in a workplace.
- Have a thorough knowledge of spatial information science on which to build more specialist study or lifelong learning.

## 2. GIS modelling

Due: **Week 6, Mon 8 Sept, 9:00 am**

Weighting: **20%**

This assessment is based on the practical work in weeks 2-4. They increase your ability to develop accurate spatial information, by introducing new analytical techniques for spatial data in raster format.

On successful completion you will be able to:

- Understand a wide range of principles underlying GIS analyses.
- Be competent in applying a wide range of GIS techniques and procedures to analyse the spatial characteristics of data.
- Be able to effectively communicate information derived using spatial analyses.
- Have insights into current applications of GIS in Australia and worldwide.
- Understand some concepts and issues relevant to the implementation of SIS in a workplace.
- Have a thorough knowledge of spatial information science on which to build more specialist study or lifelong learning.

### 3. Conceptual project design

Due: **Week 9, Mon 13 Oct 9:00 am**

Weighting: **15%**

This assessment enables students to gain experience designing GIS analysis procedures in the area of interest. Case study of applying spatial information analysis in various industries can be found at: <http://www.esri.com/industries>

Students need to select a case study of their interest, identify the GIS data using the sources identified in assessment task 1, then create a conceptual design of a similar GIS application in the Australian context.

On successful completion you will be able to:

- Understand a wide range of principles underlying GIS analyses.
- Be competent in applying a wide range of GIS techniques and procedures to analyse the spatial characteristics of data.
- Be able to effectively communicate information derived using spatial analyses.
- Have insights into current applications of GIS in Australia and worldwide.
- Understand some concepts and issues relevant to the implementation of SIS in a workplace.
- Have a thorough knowledge of spatial information science on which to build more specialist study or lifelong learning.

### 4. Major Project

Due: **Week 13, Mon 10 Nov 9:00 am**

Weighting: **20%**

This project uses GIS modelling to measure public transport (i.e. buses and trains) accessibility levels for a study area (e.g. Macquarie University). More details will be introduced in the lecture in week 10.

On successful completion you will be able to:

- Understand a wide range of principles underlying GIS analyses.
- Be competent in applying a wide range of GIS techniques and procedures to analyse the spatial characteristics of data.
- Be able to effectively communicate information derived using spatial analyses.
- Have insights into current applications of GIS in Australia and worldwide.
- Understand some concepts and issues relevant to the implementation of SIS in a workplace.
- Have a thorough knowledge of spatial information science on which to build more

specialist study or lifelong learning.

## Progress with practical work

Due: **Check dates on iLearn**

Weighting: **5%**

Progress tasks with practical work: to encourage students to build their GIS skills throughout the semester, marks are awarded for meeting progress targets in practical classes.

On successful completion you will be able to:

- Understand a wide range of principles underlying GIS analyses.
- Be competent in applying a wide range of GIS techniques and procedures to analyse the spatial characteristics of data.
- Have a thorough knowledge of spatial information science on which to build more specialist study or lifelong learning.

## Final Exam

Due: **Check Exam Timetable**

Weighting: **35%**

Final exam covering all aspects of the unit.

The examination period in Second Half Year is from 11 to 29 November 2013. The timetable will be available in draft form approximately 8 weeks before the commencement of the examinations and in final form approximately 4 weeks before the commencement of the examinations.

On successful completion you will be able to:

- Understand a wide range of principles underlying GIS analyses.
- Be competent in applying a wide range of GIS techniques and procedures to analyse the spatial characteristics of data.
- Be able to effectively communicate information derived using spatial analyses.
- Understand some concepts and issues relevant to the implementation of SIS in a workplace.
- Have a thorough knowledge of spatial information science on which to build more specialist study or lifelong learning.

## Delivery and Resources

### CLASS

#### Delivery

Day and external

### Lecture program and location

1. There is a one-hour lecture per week. For internal students, please check lecture time and location at the Macquarie University Timetables website: <https://timetables.mq.edu.au>)
2. External students can listen to recorded lectures via Echo360.

### Practical program

1. There is one three-hour practical class per week. Pracs are running from weeks 2 to 12. Please check prac time and location at Macquarie University Timetables website.
2. Internal students who have a home computer with Windows XP, Vista, Windows 7 or 8 operating system may obtain a copy of the ArcGIS software, to enable extra work at home. This is not essential to complete the unit, as the computers in the computer lab are available for casual use outside formal practical classes.

### Practical work for external students

1. There is **NO** on-campus session for this unit.
2. To complete the practical work, external students **must** have a computer with Windows XP, Vista, Windows 7 or 8 operating system. External students are provided with a copy of the ArcGIS software to use while studying this unit (details will be announced on iLearn).
3. **External students without a home computer running Windows system should discontinue their enrolment in the unit.** ArcGIS can only be installed on Windows operating systems.

## REQUIREMENTS TO COMPLETE THIS UNIT SATISFACTORY

- Attend **ALL** lecture and practical sessions (internal students);
- Check announcement and discussion threads on iLearn page at least once a week.
- Acquire a pass grade or above of the total grade of all assessments.

### REQUIRED AND RECOMMENDED TEXTS AND MATERIALS

#### Textbooks

There are no prescribed texts for this unit.

## UNIT WEBPAGE AND TECHNOLOGY USED AND

## REQUIRED

### Unit web page

The iLearn web page for this unit is at <http://ilearn.mq.edu.au/>

### Technology used

- iLearn and Echo360 for assisting learning;
- ArcGIS software for practical work.

For practical work, external students must have at home a computer with the Windows XP, Vista, Windows 7 or 8 operating system. **(If you do not have a computer with this system, you should discontinue your enrolment in the unit.)** The ArcGIS software does **NOT** support Mac, or Linux system.

ArcGIS education license is available for students to install this software on their home computers. The license is, however, strictly limited to one copy per student.

## Unit Schedule

| Week | Lecture   | Practical        | Assessment Task Due |
|------|---|------------------|---------------------|
| 1    | ENVE853 Overview Recap on basic GIS analysis<br>Lecturer: Michael Chang | No prac          |                     |
| 2    | GIS modelling<br>Lecturer: Michael Chang                                | Raster modelling |                     |
| 3    | GIS modelling<br>Lecturer: Michael Chang                                | Raster modelling | Assignment 1        |
| 4    | Classification & regression<br>Lecturer: Michael Chang                  | Raster modelling |                     |
| 5    | Vector spatial analysis and patterns<br>Lecturer: Alana Grech           | Assignment 2     |                     |
| 6    | Interpolation<br>Lecturer: Michael Chang                                | Interpolation    | Assignment 2        |



|    |  |                    |               |
|----|--|--------------------|---------------|
| 7  | ArcGIS Geodatabase<br>Lecturer: Michael Chang          | ArcGIS Geodatabase |               |
| 8  | Public Holiday   | Public Holiday     |               |
| 9  | Other GIS software<br>Lecturer: Alana Grech            | MapInfo            | Assignment 3  |
| 10 | Network analysis<br>Lecturer: Alana Grech              | Network analysis   |               |
| 11 | GIS and transport<br>Lecturer: Alana Grech             | Major project      |               |
| 12 | 3D analysis and visualisation<br>Lecturer: Alana Grech | Major project      |               |
| 13 | Unit summary   | No prac            | Major project |

## Policies and Procedures

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

Academic Honesty Policy [http://mq.edu.au/policy/docs/academic\\_honesty/policy.html](http://mq.edu.au/policy/docs/academic_honesty/policy.html)

Assessment Policy <http://mq.edu.au/policy/docs/assessment/policy.html>

Grading Policy <http://mq.edu.au/policy/docs/grading/policy.html>

Grade Appeal Policy <http://mq.edu.au/policy/docs/gradeappeal/policy.html>

Grievance Management Policy [http://mq.edu.au/policy/docs/grievance\\_management/policy.html](http://mq.edu.au/policy/docs/grievance_management/policy.html)

Disruption to Studies Policy [http://www.mq.edu.au/policy/docs/disruption\\_studies/policy.html](http://www.mq.edu.au/policy/docs/disruption_studies/policy.html) *The Disruption to Studies Policy is effective from March 3 2014 and replaces the Special Consideration Policy.*

In addition, a number of other policies can be found in the [Learning and Teaching Category](#) of Policy Central.

## Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: [https://students.mq.edu.au/support/student\\_conduct/](https://students.mq.edu.au/support/student_conduct/)

## Student Support

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

### Learning Skills

Learning Skills ([mq.edu.au/learningskills](http://mq.edu.au/learningskills)) provides academic writing resources and study strategies to improve your marks and take control of your study.

- [Workshops](#)
- [StudyWise](#)
- [Academic Integrity Module for Students](#)
- [Ask a Learning Adviser](#)

## Student Services and Support

Students with a disability are encouraged to contact the [Disability Service](#) who can provide appropriate help with any issues that arise during their studies.

## Student Enquiries

For all student enquiries, visit Student Connect at [ask.mq.edu.au](http://ask.mq.edu.au)

## IT Help

For help with University computer systems and technology, visit <http://informatics.mq.edu.au/help/>.

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

## Graduate Capabilities

### PG - Discipline Knowledge and Skills

Our postgraduates will be able to demonstrate a significantly enhanced depth and breadth of knowledge, scholarly understanding, and specific subject content knowledge in their chosen fields.

This graduate capability is supported by:

#### Learning outcomes

- Understand a wide range of principles underlying GIS analyses.
- Be competent in applying a wide range of GIS techniques and procedures to analyse the spatial characteristics of data.
- Be able to effectively communicate information derived using spatial analyses.
- Have insights into current applications of GIS in Australia and worldwide.

- Understand some concepts and issues relevant to the implementation of SIS in a workplace.
- Have a thorough knowledge of spatial information science on which to build more specialist study or lifelong learning.

## **Assessment tasks**

- 1. GIS data sources
- 2. GIS modelling
- 3. Conceptual project design
- 4. Major Project
- Progress with practical work
- Final Exam

## **PG - Critical, Analytical and Integrative Thinking**

Our postgraduates will be capable of utilising and reflecting on prior knowledge and experience, of applying higher level critical thinking skills, and of integrating and synthesising learning and knowledge from a range of sources and environments. A characteristic of this form of thinking is the generation of new, professionally oriented knowledge through personal or group-based critique of practice and theory.

This graduate capability is supported by:

## **Learning outcomes**

- Understand a wide range of principles underlying GIS analyses.
- Be competent in applying a wide range of GIS techniques and procedures to analyse the spatial characteristics of data.
- Have insights into current applications of GIS in Australia and worldwide.
- Understand some concepts and issues relevant to the implementation of SIS in a workplace.
- Have a thorough knowledge of spatial information science on which to build more specialist study or lifelong learning.

## **Assessment tasks**

- 2. GIS modelling
- 3. Conceptual project design
- 4. Major Project
- Final Exam

## PG - Research and Problem Solving Capability

Our postgraduates will be capable of systematic enquiry; able to use research skills to create new knowledge that can be applied to real world issues, or contribute to a field of study or practice to enhance society. They will be capable of creative questioning, problem finding and problem solving.

This graduate capability is supported by:

### Learning outcomes

- Understand a wide range of principles underlying GIS analyses.
- Be competent in applying a wide range of GIS techniques and procedures to analyse the spatial characteristics of data.
- Be able to effectively communicate information derived using spatial analyses.
- Have insights into current applications of GIS in Australia and worldwide.
- Understand some concepts and issues relevant to the implementation of SIS in a workplace.
- Have a thorough knowledge of spatial information science on which to build more specialist study or lifelong learning.

### Assessment tasks

- 1. GIS data sources
- 2. GIS modelling
- 3. Conceptual project design
- 4. Major Project

## PG - Effective Communication

Our postgraduates will be able to communicate effectively and convey their views to different social, cultural, and professional audiences. They will be able to use a variety of technologically supported media to communicate with empathy using a range of written, spoken or visual formats.

This graduate capability is supported by:

### Learning outcomes

- Be able to effectively communicate information derived using spatial analyses.
- Understand some concepts and issues relevant to the implementation of SIS in a workplace.

### Assessment tasks

- 2. GIS modelling

- 3. Conceptual project design
- 4. Major Project
- Final Exam

## PG - Engaged and Responsible, Active and Ethical Citizens

Our postgraduates will be ethically aware and capable of confident transformative action in relation to their professional responsibilities and the wider community. They will have a sense of connectedness with others and country and have a sense of mutual obligation. They will be able to appreciate the impact of their professional roles for social justice and inclusion related to national and global issues

This graduate capability is supported by:

### Learning outcomes

- Be competent in applying a wide range of GIS techniques and procedures to analyse the spatial characteristics of data.
- Have insights into current applications of GIS in Australia and worldwide.

### Assessment tasks

- 2. GIS modelling
- 3. Conceptual project design

## PG - Capable of Professional and Personal Judgment and Initiative

Our postgraduates will demonstrate a high standard of discernment and common sense in their professional and personal judgment. They will have the ability to make informed choices and decisions that reflect both the nature of their professional work and their personal perspectives.

This graduate capability is supported by:

### Learning outcomes

- Understand a wide range of principles underlying GIS analyses.
- Be competent in applying a wide range of GIS techniques and procedures to analyse the spatial characteristics of data.
- Be able to effectively communicate information derived using spatial analyses.
- Have insights into current applications of GIS in Australia and worldwide.
- Understand some concepts and issues relevant to the implementation of GIS in a workplace.
- Have a thorough knowledge of spatial information science on which to build more specialist study or lifelong learning.

## **Assessment tasks**

- 1. GIS data sources
- 2. GIS modelling
- 3. Conceptual project design
- 4. Major Project
- Final Exam