ENVS264

Introduction to Geographic Information Science

S1 Day 2016

Dept of Environmental Sciences

Contents

General Information

Unit convenor and teaching staff
Lecturer
Joseph Maina Mbui
joseph.mbui@mq.edu.au
Contact via Email
Level 2 AHH building
Email to schedule an appointment

Lecturer
Michael Chang
michael.chang@mq.edu.au
Contact via Email
Level 2 AHH building
Email to schedule an appointment

Credit points
3

Prerequisites
COMP115 or COMP125 or ISYS100 or ISYS104 or STAT170 or STAT171

Corequisites

Co-badged status

Unit description
This unit provides students with a comprehensive introduction to geospatial technologies, including geographic information systems (GIS), global positioning systems (GPS) and remote sensing. Students will learn core concepts and develop technical skills in data acquisition and management, mapping and spatial sampling and analysis. Students are provided training using the latest commercially available geospatial software. This unit covers the application of geographic information science across a range of disciplines, including environmental science and management, physical and human geography and urban planning.

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:

Identify and define key concepts and principles of geographic information science, including scale, projections, interactions and interdependence
Perform basic operations using geographic information systems (GIS) and remote sensing software
Organise, analyse and interpret geographic information using a range of techniques
Communicate the outputs of geographic analysis in both map and written formats
Apply standard geographic information science concepts and techniques to a range of contexts

Assessment Tasks

Name	Weighting	Due
Assignment 1	5%	March 18 2016
Assignment 2	20%	May 6 2016
Assignment 3	15%	June 3 2016
Quiz	10%	April 8 and June 10 2016
Final Exam	50%	Check exam timetable

Assignment 1

Due: **March 18 2016**
Weighting: **5%**

Report on the week 2 – 3 practical exercises using the ESRI 'Virtual Campus'.

On successful completion you will be able to:

- Identify and define key concepts and principles of geographic information science, including scale, projections, interactions and interdependence
- Perform basic operations using geographic information systems (GIS) and remote sensing software
- Apply standard geographic information science concepts and techniques to a range of contexts

Assignment 2

Due: **May 6 2016**
Weighting: **20%**

Report on the week 4 - 8 practical exercises on attribute tables, queries and geoprocessing.

On successful completion you will be able to:

- Identify and define key concepts and principles of geographic information science, including scale, projections, interactions and interdependence
- Perform basic operations using geographic information systems (GIS) and remote sensing software
- Organise, analyse and interpret geographic information using a range of techniques
- Communicate the outputs of geographic analysis in both map and written formats
- Apply standard geographic information science concepts and techniques to a range of contexts

Assignment 3

Due: **June 3 2016**
Weighting: **15%**

Report on the week 9 - 12 practical exercises on data capture, raster analysis and advanced mapping.

On successful completion you will be able to:

- Identify and define key concepts and principles of geographic information science, including scale, projections, interactions and interdependence
- Perform basic operations using geographic information systems (GIS) and remote sensing software
- Organise, analyse and interpret geographic information using a range of techniques
- Communicate the outputs of geographic analysis in both map and written formats
- Apply standard geographic information science concepts and techniques to a range of contexts

Quiz

Due: **April 8 and June 10 2016**
Weighting: **10%**

Two short quizzes on lecture topics.

On successful completion you will be able to:

- Identify and define key concepts and principles of geographic information science, including scale, projections, interactions and interdependence

Final Exam

Due: **Check exam timetable**
Weighting: **50%**

Final exam covering all aspects of the unit.

On successful completion you will be able to:

- Identify and define key concepts and principles of geographic information science, including scale, projections, interactions and interdependence
- Communicate the outputs of geographic analysis in both map and written formats
- Apply standard geographic information science concepts and techniques to a range of contexts

Delivery and Resources

ENVS264 provides students with a comprehensive introduction to geospatial technologies, including geographic information systems (GIS), global positioning systems (GPS) and remote sensing. Students will learn core concepts and develop technical skills in data acquisition and management, mapping and spatial sampling and analysis. Students are provided training using the latest commercially available geospatial software.

ENVS264's lectures cover a range of topics to introduce you to geographic information science, including: coordinate systems and map projections, how to create your own digital data, spatial analysis with vector and raster data, cartography (map making), remote sensing and 3D analysis. The practical classes apply standard geographic information science concepts and techniques to a range of disciplines, including environmental science and management, physical and human geography and urban planning.

Delivery

This unit is offered both internally and externally.

Lecture program and location

There is one 1 hour lecture per week. Please check lecture times and rooms at the Macquarie University timetables website (www.timetables.mq.edu.au). Lectures are recorded and posted to iLearn via Echo360. Internal students are expected to attend lectures *in person*; external students can access lectures through iLearn.

Practical program and location

Internal students: There is one 3 hour practical class per week. Please check practical times and rooms at the Macquarie University timetables website (www.timetables.mq.edu.au). Practical

class sizes are limited by the number of available computers. You must use the online enrolment system to change the time/day of your practical class. Practicals begin in Week 2.

External students: You must have a home computer with a Windows 7 or above, Vista or XP operating system (the ArcGIS software is NOT supported by Mac or Linux operating systems.). A copy of the ArcGIS software will be provided to all external students. You must install this software on your computer.

Workload

ENVS264 earns 3 credit points towards your degree. You are expected to invest at least 9 hours of study per week on average over the semester. This includes your lectures and practical exercises (4 hours per week), assignments and the final exam.

Submission of assignments

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

Assignments should be in a MS Word or PDF file format. All maps and tables associated with the assignment must be incorporated in the MS Word document or PDF.

Students are not permitted to email their assignments or submit them in a softcopy format. Assignments are to be submitted via the Turnitin link provided in iLearn by 5PM on the date specified.

How do I request an extension?

Extensions must be requested by email from the unit convenor prior to the assignment's due date (except in exceptional circumstances), and supported by appropriate documentation (e.g. a medical certificate).

Extensions will only be granted in writing (by email) at the discretion of the unit convenor. Otherwise, automatic penalties will apply. Assignments that are handed in late without an extension or exceptional circumstances will not be marked if they are submitted more than 7 days after the due date. If submitted within 7 days, marks will be deducted for lateness at the rate of 5% of the possible mark per day.

Return of marked assignments

Your assignments will be returned via iLearn within two teaching weeks of the submission, and will include written feedback.

Requirements to complete this unit satisfactory

1. Attend lecture and practical classes (internal students);

2. Complete all assignments and the final exam; and

3. Acquire a pass grade or above.

Grades for the unit as a whole will be awarded according to the following general criteria (course rubric).

	Developing	Functional	Proficient	Advanced
General description of the level of attainment	Has not yet reached the desired standard. Limited understanding of required concepts and knowledge. A **fail** grade (or under some circumstances a conceded pass) would be given	Has reached basic academic standards. Work has limited translation of concepts and procedures to new contexts unless aided. A **pass** grade would be awarded	Has completely reached the standards expected. Can work independently in new contexts, adapting procedures to meet the context. Demonstrates awareness of own limitations. A **credit** grade would be awarded.	Has gone beyond the expected standards. Exhibits high levels of independence and can use concepts to generate new ways of completing procedures. Can engage in critical reflection. A grade of **distinction** or **high distinction** would be awarded.

Resources

Technology used

This unit will use Echo360 and iLearn, and ArcGIS, Google Earth and MS Excel software, and GPS for the practical exercises.

You will require access to a computer and broadband internet to complete this unit. The library computers and computer labs are available for casual use outside scheduled practical classes.

Internal students who have a home computer with a Windows operating system may obtain a copy of the ArcGIS software from the unit convenor. The ArcGIS software is NOT supported by Mac or Linux operating systems. It is not essential for internal students to have ArcGIS installed on their home computer as the computers in the computer labs are available for casual use outside scheduled practical classes. However, external students must have ArcGIS installed on their home computer.

Unit web page

This unit's webpage will be available on iLearn. Information about how students can access iLearn can be found at: http://www.mq.edu.au/iLearn/student_info/index.htm

The iLearn page uses Macquarie University's standard interface and has links, access to lectures (as audio files through Echo360, and as downloadable PDF presentations) and practical instructions. Important announcements will be made through iLearn, so check the ENVS264 page regularly.

Information about how to access lecture recordings through the Echo360 EchoCenter page in iLearn can be found at: http://mq.edu.au/iLearn/student_info/lecture_recordings.htm

Required and recommended texts/materials

Chang, K. 2008. *Introduction to geographic information systems.* McGraw Hill, New York. [Available at Macquarie University Library].

Unit Schedule

Week	Lecture Topic	Lecturer	Practical
1	Introduction to ENVS264	J Maina	No practical
2	GIS basics + GIS data models + Software demonstration	J Maina	ESRI Virtual Campus
3	Coordinate systems and map projections	J Maina	ESRI Virtual Campus
4	Spatial analysis with vector data + data flow diagrams	J Maina	Attribute tables and queries 1
5	Public Holiday	J Maina	Attribute tables and queries 2
6	How to make a map	J Maina	Geoprocessing 1
	SESSION 1 BREAK		
7	Public Holiday	J Maina	Geoprocessing 2
8	Online GIS, GIS applications and careers in GIS	J Maina	Geoprocessing 3
9	Creating digital data	J Maina	Data capture 1
10	Spatial analysis with raster data	J Maina	Raster analysis
11	Remote sensing 1	Chang	Data capture 2
12	Remote sensing 2	Chang	Preparation and Presentation of Maps
13	Summary	J Maina	No practical

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

New Assessment Policy in effect from Session 2 2016 http://mq.edu.au/policy/docs/assessment/policy_2016.html. For more information visit http://students.mq.edu.au/events/2016/07/19/new_assessment_policy_in_place_from_session_2/

Assessment Policy prior to Session 2 2016 http://mq.edu.au/policy/docs/assessment/policy.html

Grading Policy prior to Session 2 2016 http://mq.edu.au/policy/docs/grading/policy.html

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

Complaint Management Procedure for Students and Members of the Public http://www.mq.edu.a

u/policy/docs/complaint_management/procedure.html

Disruption to Studies Policy 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/

Results

Results shown in *iLearn*, 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.

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) 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

IT Help

For help with University computer systems and technology, visit 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.

Graduate Capabilities

Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

Learning outcome

- Organise, analyse and interpret geographic information using a range of techniques

Assessment tasks

- Assignment 2
- Assignment 3
- Final Exam

Capable of Professional and Personal Judgement and Initiative

We want our graduates to have emotional intelligence and sound interpersonal skills and to demonstrate discernment and common sense in their professional and personal judgement. They will exercise initiative as needed. They will be capable of risk assessment, and be able to handle ambiguity and complexity, enabling them to be adaptable in diverse and changing environments.

This graduate capability is supported by:

Learning outcomes

- Perform basic operations using geographic information systems (GIS) and remote sensing software
- Organise, analyse and interpret geographic information using a range of techniques
- Communicate the outputs of geographic analysis in both map and written formats

Discipline Specific Knowledge and Skills

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

Learning outcomes

- Identify and define key concepts and principles of geographic information science, including scale, projections, interactions and interdependence
- Perform basic operations using geographic information systems (GIS) and remote sensing software
- Organise, analyse and interpret geographic information using a range of techniques
- Communicate the outputs of geographic analysis in both map and written formats

Assessment tasks

- Assignment 1
- Assignment 2
- Assignment 3
- Quiz
- Final Exam

Critical, Analytical and Integrative Thinking

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

Learning outcomes

- Identify and define key concepts and principles of geographic information science, including scale, projections, interactions and interdependence
- Perform basic operations using geographic information systems (GIS) and remote sensing software
- Organise, analyse and interpret geographic information using a range of techniques
- Communicate the outputs of geographic analysis in both map and written formats
- Apply standard geographic information science concepts and techniques to a range of contexts

Assessment tasks

- Assignment 2
- Assignment 3
- Quiz
- Final Exam

Problem Solving and Research Capability

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

This graduate capability is supported by:

Learning outcomes

- Identify and define key concepts and principles of geographic information science, including scale, projections, interactions and interdependence
- Perform basic operations using geographic information systems (GIS) and remote sensing software
- Organise, analyse and interpret geographic information using a range of techniques
- Apply standard geographic information science concepts and techniques to a range of contexts

Assessment tasks

- Assignment 2
- Assignment 3
- Final Exam

Effective Communication

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:

Learning outcome

- Communicate the outputs of geographic analysis in both map and written formats

Engaged and Ethical Local and Global citizens

As local citizens our graduates will be aware of indigenous perspectives and of the nation's historical context. They will be engaged with the challenges of contemporary society and with knowledge and ideas. We want our graduates to have respect for diversity, to be open-minded, sensitive to others and inclusive, and to be open to other cultures and perspectives: they should have a level of cultural literacy. Our graduates should be aware of disadvantage and social justice, and be willing to participate to help create a wiser and better society.

This graduate capability is supported by:

Assessment tasks

- Assignment 2
- Assignment 3

Socially and Environmentally Active and Responsible

We want our graduates to be aware of and have respect for self and others; to be able to work with others as a leader and a team player; to have a sense of connectedness with others and country; and to have a sense of mutual obligation. Our graduates should be informed and active participants in moving society towards sustainability.

This graduate capability is supported by:

Learning outcome

- Organise, analyse and interpret geographic information using a range of techniques

Changes from Previous Offering

The unit has a new convenor, Dr. Joseph Maina Mbui. Some content has been removed in 2016 due to two Public Holidays.