



The University of Southern Queensland

## Course specification

This version produced 17 Jul 2008.

The current and official versions of the course specifications are available on the web at  
<<http://www.usq.edu.au/coursespecification/current>>.

Please consult the web for updates that may occur during the year.

### Description: Remote Sensing and Image Processing

Subject	Cat-nbr	Class	Term	Mode	Units	Campus
GIS	3406	67013	2, 2007	EXT	1.00	Toowoomba

<b>Academic group:</b>	FOENS
<b>Academic org:</b>	FOES05
<b>Student contribution band:</b>	2
<b>ASCED code:</b>	031103

### STAFFING

Examiner: Armando Apan

### OTHER REQUISITES

Recommended prior or concurrent study: SVY3202

### RATIONALE

Remote sensing is an important technology for land resource mapping, monitoring and modelling. Remotely sensed images provide an invaluable source of current and archival information about the geographical distribution of natural and man-made features. The use of digital images in various applications is aiding planners and decision-makers at various project stages and operational scales. It is essential and advantageous for GIS, surveying, and other professionals to be familiar with the concepts, techniques, and applications, involved in the digital processing of remotely sensed images.

### SYNOPSIS

This course is designed to provide students with the basic and intermediate knowledge and skills in the digital processing of remotely sensed images. Topics include: basic principles of remote sensing; image processing systems; pre-processing of remotely-sensed data; image enhancement techniques; image transformation and filtering techniques; unsupervised classification; supervised classification; post classification and accuracy assessment; integration with GIS; and applications and case studies. Various imagery products will be studied, such as panchromatic, multispectral and hyperspectral data. Image processing software will be used to demonstrate and reinforce the concepts and principles involved.

### OBJECTIVES

The course objectives define the student learning outcomes for a course. The assessment item(s) that may be used to assess student achievement of an objective are shown in parenthesis. On completion of this course, students should be able to:

1. evaluate the importance and role of remote sensing and digital image processing in land resource mapping, monitoring and modelling (Assignment 1, Assignment 2 and Exam);
2. demonstrate knowledge of the concepts and techniques involved in digital image processing of remotely sensed data (Assignment 1, Assignment 2 and Exam);
3. choose and apply appropriate image processing technique(s) for a specific requirement (Assignment 1, Assignment 2 and Exam);
4. evaluate the accuracy of image classification output (Assignment 2 and Exam);
5. compare with the traditional and recent applications of image processing techniques (Assignment 2 and Exam);
6. use image processing software to analyse temporal, spectral and spatial differences (Assignment 1, Assignment 2 and Exam).

## TOPICS

Description	Weighting (%)
1. Basic principles of remote sensing	10.00
2. Remote sensing platforms and sensors	10.00
3. Image processing systems	8.00
4. Pre-processing of remotely sensed data	12.00
5. Image enhancement, transformation and filtering techniques	20.00
6. Image classification	20.00
7. Advanced topics	10.00
8. Integration with GIS	10.00

## TEXT and MATERIALS required to be PURCHASED or ACCESSED

ALL textbooks and materials are available for purchase from USQ BOOKSHOP (unless otherwise stated). Orders may be placed via secure internet, free fax 1800642453, phone 07 46312742 (within Australia), or mail. Overseas students should fax +61 7 46311743, or phone +61 7 46312742. For costs, further details, and internet ordering, use the 'Textbook Search' facility at <http://bookshop.usq.edu.au> click 'Semester', then enter your 'Course Code' (no spaces).

Mather, PM 2004, *Computer Processing of Remotely-Sensed Images: An Introduction*, 3rd edn, John Wiley and Sons Ltd, West Sussex, England, ISBN: 0-470-84919-3.

(GIS3406 Remote Sensing and Image Processing study book, USQ Publication)

## REFERENCE MATERIALS

Reference materials are materials that, if accessed by students, may improve their knowledge and understanding of the material in the course and enrich their learning experience.

Campbell, J 2006, *Introduction to Remote Sensing*, 4th edn, Taylor & Francis, London.

Gibson, P 2000, *Introductory Remote Sensing: Digital Image Processing and Applications*, Routledge, London.

Gibson, P 2000, *Introductory Remote Sensing: Principles and Concepts*, Routledge, London.

Lillesand, TT 2004, *Remote Sensing and Image Interpretation*, 5th edn, Wiley, New York.

Richards, JA 2005, *Remote Sensing Digital Image Analysis: an introduction*, 4th edn, Springer, Berlin.

## STUDENT WORKLOAD REQUIREMENTS

ACTIVITY	HOURS
Assessment	50.00
Directed Study	52.00
Examinations	2.00
Private Study	51.00

## ASSESSMENT DETAILS

Description	Marks out of	Wtg(%)	Due date
ASSIGNMENT 1	200.00	20.00	05 Sep 2007
ASSIGNMENT 2	200.00	20.00	17 Oct 2007
2 HOUR CLOSED EXAMINATION	600.00	60.00	END S2 (see note 1)

### NOTES

1. Student Administration will advise students of the dates of their examinations during the semester.

## IMPORTANT ASSESSMENT INFORMATION

- 1 Attendance requirements:  
There are no attendance requirements for this course. However, it is the students' responsibility to study all material provided to them or required to be accessed by them to maximise their chance of meeting the objectives of the course and to be informed of course-related activities and administration.
- 2 Requirements for students to complete each assessment item satisfactorily:  
To satisfactorily complete an individual assessment item a student must achieve at least 50% of the marks or a grade of at least C-
- 3 Penalties for late submission of required work:  
If students submit assessments after the due date without prior approval then a penalty of 20% of the total marks available for the assignment will apply for each working day late.
- 4 Requirements for student to be awarded a passing grade in the course:  
To be assured of receiving a passing grade a student must achieve at least 40% in each of the weighted assessment items, achieve at least 50% in the examination and at least 50% of the total weighted marks available for the course.
- 5 Method used to combine assessment results to attain final grade:  
The final grades for students will be assigned on the basis of the aggregate of the weighted marks /grades obtained for each of the summative assessment items in the course.
- 6 Examination information:  
Candidates are allowed to bring only writing and drawing instruments into the Closed examination.

- 7 Examination period when Deferred/Supplementary examinations will be held:  
Any Deferred or Supplementary examinations for this course will be held during the examination period at the end of the semester of the next offering of this course.
- 8 University Regulations:  
Students should read USQ Regulations 5.1 Definitions, 5.6 Assessment, and 5.10 Academic Misconduct for further information and to avoid actions which might contravene University Regulations. These regulations can be found at the URL:  
<http://www.usq.edu.au/SECARIAT/calendar/Part5/> or the online USQ Handbook.

## **ASSESSMENT NOTES**

- 1 The due date for an assignment is the date by which a student must despatch the assignment to USQ. The onus is on the student to provide proof of the dispatch date, if requested by the Examiner.
- 2 Students may be required to provide a copy of assignments submitted for assessment purposes. Such copies should be dispatched to the USQ within 24 hours of receipt of a request to do so.
- 3 In accordance with University Policy, the Examiner may grant an extension of the due date of an assignment in extenuating circumstances.
- 4 The Faculty will normally only accept assessments that have been written, typed or printed on paper-based media.
- 5 The Faculty will NOT accept submission of assignments by facsimile.
- 6 Students who do not have regular access to postal services or who are otherwise disadvantaged by these regulations may be given special consideration. They should contact the Examiner of the course to negotiate such special arrangements.
- 7 In the event that a due date for an assignment falls on a local public holiday in their area, such as a Show holiday, the due date for the assignment will be the next day. Students are to note on the assignment cover, the date of the public holiday for the Examiner's convenience.
- 8 Students who, for medical, family/personal, or employment-related reasons, are unable to complete an assignment or to sit for an examination at the scheduled time may apply to defer an assessment in a course. Such a request must be accompanied by appropriate supporting documentation. One of the following temporary grades may be awarded IDS (Incomplete - Deferred Examination; IDM (Incomplete Deferred Make-up); IDB (Incomplete - Both Deferred Examination and Deferred Make-up).